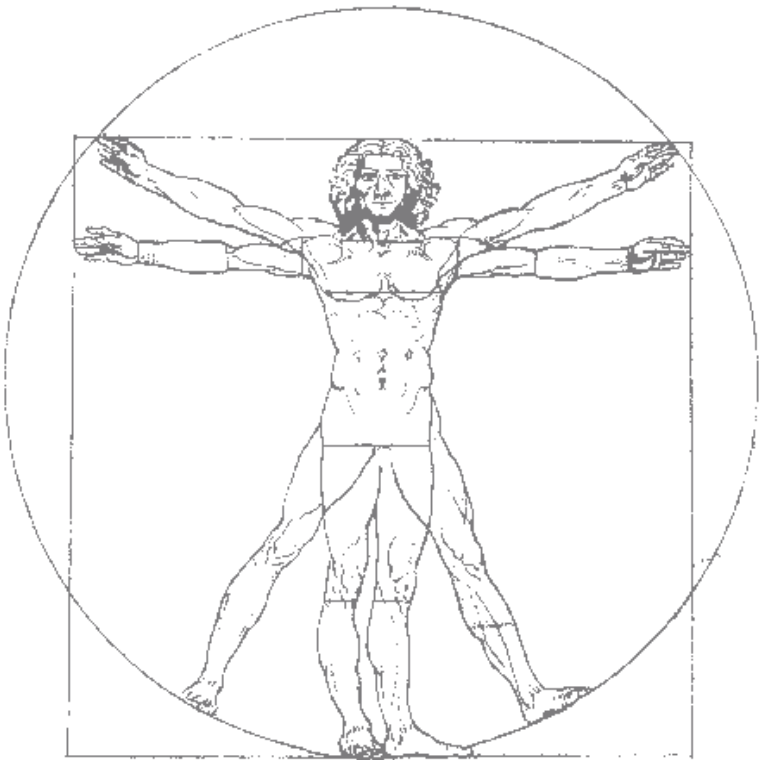
Surgical Sciences

Thirtieth Annual Residents' and Fellows' RESEARCH DAY

WAKE FOREST UNIVERSITY SCHOOL OF MEDICINE



NOVEMBER 15, 2022

Research Day Chairperson
James Jordan, PhD

Wake Forest University
School of Medicine

In keeping with the mission of the School of Medicine to maintain extensive research programs, Surgical Sciences is proud to announce its 30th Annual Research Day. From its humble beginning in the early 1990's to the very large symposium of today, the Residents' and Fellows' Research Day has grown with the Surgical Sciences. This day is an opportunity to display and recognize the depth and breadth of research within Surgical Sciences; not only to our peers in the surgical departments, but to the entire population of the Medical Center. Students from both medical and graduate programs; residents, and fellows present data on activities, projects and applications which cover a broad spectrum ranging from the very basic to clinically applied research and the testing of innovative procedures or medications in patients. While the posters are presented by the trainees of Surgical Sciences, this is a celebration of the research carried out by residents, fellows, graduate students, medical students, Ph.D. researchers, surgeons and other dedicated research staff.

In recognition of the need to balance the dual goals of promoting effective scientific collaborations through open sharing of early stage results, on the one hand, and promoting commercialization in the public interest through intellectual property of research developments, on the other, the Surgical Sciences Research Day is conducted as a "closed meeting." Accordingly, you acknowledge and agree that by participating in the event, you will receive and maintain any unpublished information or materials in confidence until such time as the information or materials are published or otherwise made publicly available by the originating investigator.

SCHEDULE OF ACTIVITIES

11:30 am – 1:00 pm……..	Set Up Posters *Commons Conference Rooms 1, 2, & 3* *G and E Floor, Nutrition Center*
1:00 pm – 2:00 pm…….	Research Lecture Prasad S. Adusumilli, MD, FACS “(CAR) T-Cell Therapy for Solid Tumors” *Babcock Auditorium* *E Floor, Gray Building*
2:00 pm – 4:00 pm…….	Judging of Posters and Reception *Commons Conference Rooms 1, 2, & 3* *G and E Floor, Nutrition Center*
7:00 pm……	Recognition Dinner Awards Presentation *Old Town Club*

KEYNOTE SPEAKER

Prasad S. Adusumilli, MD, FACS

Deputy Chief and Professor, Thoracic Surgery
Vice Chair, Dept. of Surgery
Head, Solid Tumors Cell Therapy,
Cellular Therapeutics Center
Director, Mesothelioma Program
Memorial Sloan Kettering Cancer Center, New York, NY

Prasad S. Adusumilli, MD, FACS is the Deputy Chief and Attending thoracic surgeon at the Memorial Sloan Kettering Cancer Center with expertise in the surgical management of cancers in the chest, and direct the research activities of 12 faculty members. He is a thoracic surgeon with expertise in thoracic cancers management. In addition to complex oncological resections, he performs minimally-invasive resections as well as robotic bronchoscopic procedures. As Vice Chair in the Dept. of Surgery, he develops translational research programs, and coordinates the research activities of >75 trainees and 150 faculty members. In his role as Head of Solid Tumor Cell Therapy in the Cellular Therapeutics Center, he leads the development and conduct of cell therapy for solid tumors. His responsibilities as the Director of Mesothelioma Program comprises coordinating multi-disciplinary clinical and research interactions among the mesothelioma working group.

His clinical research is focused on early-stage lung cancer biology and thoracic cancers (lung, esophageal cancers and malignant pleural mesothelioma) tumor immunology. His laboratory research, supported by NIH R01 and DoD awards, focuses on tumor immunology and chimeric antigen receptor (CAR) T-cell immunotherapy for cancers.

SURGICAL SCIENCES

DEPARTMENT CHAIRMEN:

Edward H. (Ted) Kincaid M.D. .....Department of Cardiothoracic Surgery

J. Wayne Meredith, M.D. .....Department of General Surgery

Charles L. Branch, Jr., M.D. .....Department of Neurosurgery

Craig M. Greven, M.D. .....Department of Ophthalmology

L. Andrew Koman, M.D. .....Department of Orthopaedic Surgery and Rehabilitation

J. Dale Browne, M.D. .....Department of Otolaryngology

Lisa David, M.D. .....Department of Plastic and Reconstructive Surgery

Anthony Atala, M.D. .....Department of Urology

Matthew Edwards, M.D. .....Department of Vascular and Endovascular Surgery

RESEARCH DAY 2022
PLANNING COMMITTEE

HOST DEPARTMENT- CARDIOTHORACIC SURGERY

Edward H. (Ted) Kincaid, M.D. .....Chair, Department of Cardiothoracic Surgery
James Jordan, Ph.D. .....Chairperson, Department of Cardiothoracic Surgery
Hossam Shaltout, Ph.D.....Co-Chairperson, Department of Surgery-Hypertension

Committee Members

Lydia Durr.....Hypertension & Vascular Research

Shanna J. Ellison.....Hypertension & Vascular Research

Michelle Gammons.....Department of Cardiothoracic Surgery

Shea Gilliam-Davis, Ph.D.....Hypertension & Vascular Research

Kenya Little.....Hypertension & Vascular Research

Kaitlin Namet .....Department of Cardiothoracic Surgery

Pam Stafford.....Hypertension & Vascular Research

PAST KEYNOTE SPEAKERS

1993	Frank W. LoGerfo, M.D. Harvard Medical School
1994	James A. O'Neill, Jr., M.D. University of Pennsylvania School of Medicine
1995	James Patrick O'Leary, M.D. LSU School of Medicine
1996	Joseph A. Smith, Jr., M.D. Vanderbilt University School of Medicine
1997	Robert Martuza, M.D. Georgetown University Hospital
1998	John M. Fredrickson, M.D. Washington University School of Medicine
1999	Joseph E. Murray, M.D. Harvard Medical School
2000	C. Thomas, Caskey, M.D., F.A.C.P. Cogene Biotech Ventures
2001	Elizabeth G. Nabel, M.D. National Heart, Lung and Blood Institute
2002	W. Randolph Chitwood, Jr., M.D. East Carolina University School of Medicine
2003	L. D. Britt, M.D., M.P.H. Eastern Virginia Medical School
2004	Arthur Kellermann, M.D., M.P.H. Emory University
2005	James Urbaniak, M.D. Duke University Medical Center
2006	William D. Steers, M.D., F.A.C.S. University of Virginia
2007	Mitchell Berger, M.D. University of California San Francisco
2008	Raphael Lee, M.D. University of Chicago Medical Center
2009	Alexander W. Clowes, M.D, The University of Washington
2010	Jonas T. Johnson, M.D. University of Pittsburg School of Medicine
2011	Marco Zarbin, M.D., Ph.D., F.A.C.S. New Jersey Medical School
2012	Paul Sobotka, M.D., F.A.C.P., F.A.C.C. The Ohio State University
2013	Vindo H. Thourani, M.D. Emory University School of Medicine.
2014	Regis J. O'Keefe, M.D., Ph.D. Washington University School of Medicine
2015	Ralph V. Clayman, M.D. University of California, Irvine School of Medicine
2016	Andres Lozano, M.D., Ph.D., F.R.C.S.C., F.R.S.C., F.C.A.H.S. University of Toronto
2017	Micheal T. Longaker, M.D, M.B.A., F.A.C.S. Stanford University School of Medicine
2018	Todd E. Rasmussen, M.D., F.A.C.S. Uniformed Services University School of Medicine
2019	Andreas K. Lauer, M.D. Oregon Health & Science Universtiy
2020	Ana H. Kim, M.D. Columbia University Medical Center
2021	Rebecca Sippel M.D., F.A.C.S. University of Wisconsin-Madison

PREVIOUS AWARD RECIPIENTS

CLINICAL RESEARCH

	Gold Medal	Silver Medal
1993	Tim Dersch, M.D. Plastic and Reconstructive Surgery	R. Bradley Thomasson, M.D. General Surgery
1994	Raymond Poore, M.D. Urology	Anthony Seaton, M.D., Ph.D. Urology
1995	Preston R. Miller, M.D. General Surgery	L. Andrew Eskew, M.D. Urology John P. Little, M.D. Otolaryngology
1996	L. Andrew Eskew, M.D. Urology	A. J. C. Burke, M.D. Otolaryngology
1997	S. Iyer, Ph.D. Hypertension Center	Dom Coric, M.D. Neurosurgery Jonathon Deitch, M.D. General Surgery
1998	Alan Burke, M.D. Otolaryngology	Todd R. Reulbach, M.D. Otolaryngology
1999	Charles J. Rosser, M.D. Urology	Sanford G. Duke, M.D. Otolaryngology
2000	Gregory S. Cherr, M.D. General Surgery Dean DeRoberts, M.D. Plastic Surgery Resident	Marc. M. Malek, M.D. Plastic and Reconstructive Surgery Steven D. Wray, M.D. Neurosurgery Resident
2001	Matthew S. Edwards, M.D. General Surgery Fellow	Tina Singh, M.D. Ophthalmology Fellow
2002	Jonathan C. Hundley, M.D. General Surgery Resident	Jeffrey McNeil, M.D. CT Surgery Fellow

CLINICAL RESEARCH continued

	Gold Medal	Silver Medal
2002	Phillip S. Moore, M.D. General Surgery Resident	
	Claire Sanger, M.D. Plastic and Reconstructive Surgery Resident	
	James D. Maloney, M.D. CT Surgery Fellow	
2003	J. A. Veys, M.D. Urology Resident	Michael R. Goins, M.D. Otolaryngology Resident
	D. Wilson, M.D. General Surgery Fellow	Matthew M. Mondi, M.D. General Surgery Resident
		Jeffrey A. Travis, M.D. General Surgery Fellow
2004	Catherine J. Rees, M.D. Otolaryngology Resident	Jeffrey David Pearce, M.D. General Surgery Resident
	Jeffrey A. Travis, M.D. Cardiothoracic Surgery Fellow	David Cole, M.D. Orthopaedics Resident
	Annemarie Relyea-Chew, B.S. Emergency Medicine Student	Hiroshi Yokoyama, M.D. Hypertension and Vascular Disease Center Fellow
2005	Dean DeRoberts, M.D. Plastic and Reconstructive Surgery Resident	R. Shayn Martin, M.D. General Surgery Resident
	Eric S. Gwynn, M.D. Urology and Sticht Aging Center Resident	Christina M. Plikaitis, M.D. Plastic and Reconstructive Surgery Resident
	Barnaby Dedmond, M.D. Orthopaedics Fellow	Graham Bundy, M.D. Cardiothoracic Surgery Fellow

CLINICAL RESEARCH continued

	Gold Medal	Silver Medal
2006	Oliver Adrian Varban, M.D. General Surgery Resident	Daniel Barnes, M.D. Emergency Medicine Resident
	Adrian Lata, M.D. Cardiothoracic Surgery Fellow	George D. Chloros, M.D. Orthopaedic Surgery and Neurology Fellow
		Matthew T. Cline Orthopaedics Student
2007	Christina M. Plikaitis, M.D. Plastic and Reconstructive Surgery Resident	Ellen Chance Sanders, M.D. Ophthalmology Resident
	Rajinder Singh, M.D. General Surgery and Internal Medicine Fellow	William Todd Stoeckel, M.D. Plastic and Reconstructive Surgery Resident
	Cheryl Onwuchuruba Orthopaedics Student	Joe Gonzalez-Engle Emergency Medicine Student
2008	Jeff Carter, M.D. General Surgery Resident	Christina M. Plikaitis, M.D. Plastic and Reconstructive Surgery Resident
	Rajinder Pal Singh, M.D. General Surgery Fellow	Rajinder Pal Singh, M.D. General Surgery Fellow
	Joshua Matthew Cooper Orthopaedic Surgery Student	Stephanie Lareau Emergency Medicine Student
2009	Jeff Carter, M.D. General Surgery Resident	Jordan Wallin, M.D. Otolaryngology Resident
	Luke Neff, M.D. General Surgery Resident	
	Phillip Moore, M.D. Vascular and Endovascular Surgery Fellow	Roche de Guzman, Ph.D. Institute for Regenerative Medicine Fellow

	Gold Medal	Silver Medal
2009	Kerry Danelson Plastic Surgery Student	Babak Yekta Emergency Medicine Student
2010	Robert D. Becher, M.D. General Surgery Resident	Jeffrey Carter, M.D. General Surgery Resident
	Thomas Sarlikiotis, M.D. Orthopaedics Fellow	Jaehyun Kim, Ph.D. Institute for Regenerative Medicine Fellow
	Kevin Shamburg Orthopaedics Student	Amber Campbell Plastic Surgery Student
2011	Jade M. Nunez, M.D. General Surgery Resident	James T. O'Neil, M.D. Otolaryngology Resident
	Billy G. Chacko, M.D. Vascular and Endovascular Surgery Fellow	Hamza Rana, M.D. Vascular and Endovascular Surgery Fellow
	W. Parker Abblitt, B.S. Orthopaedic Surgery Student	Bronwyn Russell, B.S. Orthopaedic Surgery Student
2012	Mark Witcher, M.D. / Ph.D. Neurosurgery Resident	Tim Fife, M.D. Otolaryngology Resident
	Billy G. Chacko, M.D. Cardiology, Ophthalmology, Cardiovascular Epidemiology Fellow	JaNae Joyner, Ph.D. Hypertension and Vascular Research Center Fellow
	Richard Kao Otolaryngology Student	Wayne Chen Orthopaedics Student

	Gold Medal	Silver Medal
2013	Benjamin Schmidt, MD Cardiothoracic Resident	Andrea Doud, MD General Surgery Resident
	Kelly Kempe, MD Vascular and Endovascular Fellow	Imran Choudhry, MD Orthopaedics Fellow
	Ashley Wagoner, BS Hypertension & Vascular Research Center Student	Matthew Rohlfing, BS Orthopaedics Student
2014	Andrea Doud, M.D. General Surgery Resident	Reese Randle, M.D. General Surgery Resident
		Mark Witcher, M.D. Neurosurgery Resident
	Alejandro Marquez-Lara, M.D. Orthopaedics Fellow	Hany El Hennawy, M.D. General Surgery Fellow
	Ashley Wagoner, B.S. Hypertension and Vascular Research Center Student	Jia Hao Liang, B.S. General Surgery Student
2015	Brian Bones, M.D. Radiology Resident	Ryan Rebowe, M.D. Plastic and Reconstructive Surgery Resident
	Hany El-Hennawy, M.D. Surgery - Transplant Fellow	Bruce Chung, M.D. General Surgery - Trauma Fellow
	Amber Carrier, Ph.D Surgery - Transplant Student	Ashley Wagoner, B.S. Hypertension and Vascular Research Student

	Gold Medal	Silver Medal
2016	Konstantinos Chouliaras, MD General Surgery-Oncology Resident	Mija Khan, MD Plastic and Reconstructive Surgery Resident
	Nima Pourhabibi Zarandi, MD Institute for Regenerative Medicine Fellow	Baha Alradawna, MD General Surgery-Transplant Fellow
	Hayden Holbrook, BS Orthopaedic Surgery Student	Alexandra Goodwin, BS Orthopaedic Surgery Student
2017	Olivia Priest, MD Plastic and Reconstructive Surgery Resident	Konstantinos Chouliaras, MD General Surgery-Oncology Resident
	David Harriman, MD General Surgery-Transplant Fellow	Robert Ferguson, MD Cardiothoracic Surgery Fellow
	Tyler Callese, BS Radiology/Vascular and Interventional Radiology Student	Heather Barber, BS Institute for Regenerative Medicine Student
2018	Robert C. Siska, MD Plastic and Reconstructive Surgery Resident	Konstantinos Chouliaras, MD General Surgery-Oncology Resident
	David Harriman, MD General Surgery-Transplant Fellow	Ioannis Kontopidis, MD Cardiothoracic Surgery Fellow
	Mike C. Lin, BS Cardiothoracic Surgery Student	Tracey Pu, BS Cardiothoracic Surgery Student
2019	Christine Velazquez, MD Plastic and Reconstructive Surgery Resident	Suman Medda, MD Orthopaedic Surgery Resident
	Adam Campman Nelson, MD General Surgery Fellow	David Hobson, MD Cardiothoracic Surgery Fellow
	R. Andrew Hesse, BS Surgery-Ophthalmology Student	Harper Wilson, BS/BA Otolaryngology Student

	Gold Medal	Silver Medal
2020	Mija Khan, MD Plastic and Reconstructive Surgery Resident	Jungwon Park, MD, PhD Plastic and Reconstructive Surgery Resident
	Christine Velazquez, MD General Surgery Fellow	Shiny Rajan, PhD Institute for Regenerative Medicine Fellow
	Vanessa Lukas, BA General Surgery-Urology Student	Ishetta Madeka, BA General Surgery-Oncology Student
2021	Jacob Maus, MD Plastic and Reconstructive Surgery Resident	Sydney Thomas, MD Surgery-Otolaryngology (Dentistry) Resident
	Griffin Bins, MD Plastic and Reconstructive Surgery Fellow	Berjesh Sharda, MD General Surgery – Transplantation Fellow
	Rohin Gawdi, BS General Surgery- Oncology Student	Symonne Martin General Surgery- Trauma Student

BASIC RESEARCH

	Gold Medal	Silver Medal
1993	Dudley Hudspeth, M.D. Cardiothoracic Surgery	Ibrahim Benter, Ph.D. Hypertension and Vascular Research Center
1994	David Pollock, M.D. Orthopaedic Surgery	Virginia Newman, M.D. General Surgery
1995	James Jordan, B.S. Cardiothoracic Surgery	Xiao Wei Lu, M.D. Hypertension and Vascular Research Center
1996	Stephen Troum, M.D. Orthopaedic Surgery	Robert D. Riley, M.D. General Surgery
1997	David Major, M.S. Plastic and Reconstructive Surgery	Zhongyu Li, M.D. Orthopaedic Surgery
1998	Wade J. Sexton, M.D. Urology	Timothy Oskin, M.D. General Surgery
1999	Jung-Soo Kim, M.D. Otolaryngology Dickson Schaeffer, M.D. Orthopaedic Surgery	
2000	D. Nicole Deal, M.D. Orthopaedic Surgery	M. Todd Kirby, Ph.D. Neurosurgery
2001	Claire Sanger, D.O. Plastic Surgery and Reconstructive Surgery Resident	Cassandra Lee, M.D. Orthopaedic Surgery Resident
	LioMar A. Alvarez, Ph.D. Hypertension & Vascular Research Center Fellow	Tina Singh, M.D. Neurobiology & Anatomy Fellow
2002	Cassandra A. Lee, M.D. Orthopaedic Surgery Resident	Jason A. Castle, M.D. Orthopaedic Surgery Resident
	Atsushi Sakima, M.D. Hypertension & Vascular Disease Center Fellow	Ojas Shah, M.D. Urology Fellow

BASIC RESEARCH continued

	GOLD MEDAL	SILVER MEDAL
2002	Jason Hong Hypertension & Vascular Disease Center Student	Jing Li General Surgery Student
		Matt Camp Plastic Surgery Student
2003	Cassandra Lee, M.D. Orthopaedic Surgery Resident	G. A. Elsaidi. D.O. Orthopaedic Surgery Resident
	R. Richmond, Ph.D. Hypertension & Vascular Disease Center Fellow	A. Sakima, M.D. Hypertension & Vascular Disease Center Fellow
	P. Garabelli Hypertension & Vascular Disease Center Student	Stevco Stefanoski Otolaryngology Student
		L. Anton Hypertension & Vascular Disease Center Student
2004	Jian Shen, M.D., Ph.D. Orthopaedic Surgery Resident	Jill Wykosky, B.S. Neurosurgery Resident
	Anastasios Papadonikolakis, M.D. Orthopaedic Surgery Resident	
	Michiya Igase, M.D. Hypertension and Vascular Disease Center Fellow	Liliya M. Yamaleyeva, M.D. Hypertension and Vascular Disease Center Fellow
	David R. Soto-Pantoja, B.S. Hypertension and Vascular Disease Center Student	

	Gold Medal	Silver Medal
2005	Matthew Bolinger, M.D. Otolaryngology Resident	Cassandra Lee, M.D. Orthopaedic Surgery Resident
	Yagna Jarajapu, Ph.D. Regenerative Medicine Fellow	Normann B. Cabrera, M.D. Orthopaedic Surgery Fellow
	Jill Wykosky, B.S. Neurosurgery Student	
	Steven J. Newton Hypertension and Vascular Disease Center Student	
	Benjamin C. Wood Plastic and Reconstructive Surgery Student	
2006	Patrick William Whitlock, M.D., Ph.D. Orthopaedic Surgery and Wake Forest Institute for Regenerative Medicine Resident	William Frazier, M.D. Otolaryngology and Wake Forest Institute for Regenerative Medicine Resident
	Pedro Miguel Baptista, M.D. Wake Forest Institute of Regenerative Medicine Fellow	Tao Xu, M.D. Wake Forest Institute of Regenerative Medicine Fellow
	Jyotsana Menon Hypertension and Vascular Disease Center Student	Maxwell Kenneth Langfitt Orthopaedics Student
	Jill Wykosky Neurosurgery and Radiation Oncology Student	

	Gold Medal	Silver Medal
2007	Peter J. Apel, M.D. Orthopaedics Resident	Katheryne J. Stabile, M.D. Orthopaedics and WFIRM Resident
	Enzo S. Palma, M.D. Neurosurgery and Radiation Oncology Fellow	George Chloros, M.D. Orthopaedics Fellow
	Jill Wykosky Neurosurgery Student	Jyotsana Menon Hypertension Student
2008	Patrick W. Whitlock, M.D. Orthopaedic Surgery Resident	Andy Stevens, M.D. Neurosurgery, Infectious Disease & Pathology Resident
	Pedro M. Baptista, M.D. Regenerative Medicine Fellow	Bryan Tillman, M.D. Regenerative Medicine & Vascular & Endovascular Surgery Fellow
	Hetal Pandya Neurosurgery Student	David Ricardo Soto-Pantoja Hypertension & Vascular Research Center Student
2009	Hossam Shaltout, Ph.D. Hypertension & Vascular Research Center Resident	Luke Neff, M.D. Regenerative Medicine Resident
	Benjamin Corona, Ph.D. Regenerative Medicine Fellow	TanYa Gwathmey, Ph.D. Hypertension & Vascular Research Center Fellow
	Kyle Binder Regenerative Medicine Student	Katherine Cook Hypertension & Vascular Research Center Student

	Gold Medal	Silver Medal
2010	Sandeep Mannava, M.D. Orthopaedics Resident	Luke Neff, M.D. General Surgery Resident
	Roche de Guzman, Ph.D. Regenerative Medicine Fellow	Manisha Nautiyal, Ph.D. Hypertension & Vascular Research Center Fellow
	Carla Maria Lema Tome, Ph.D. Neurosurgery Fellow	Shantaram Bharadwaj, Ph.D. Institute for Regenerative Medicine Fellow
	Hetal Pandya Neurosurgery Student	Van Nguyen Neurosurgery Student
2011	Kyle David Wood, M.D. Urology Resident	Charles Peyton, M.D. Institute for Regenerative Medicine Resident
	Wenhong Chen, M.D., Ph.D. Neurosurgery Fellow	Christopher M. MacNeill, Ph.D. Plastic and Reconstructive Surgery Fellow
	Van T. Nguyen Neurosurgery Student	Amanda Beauchamp Neurosurgery Student
2012	Austin Stone, M.D. Orthopaedic Surgery Resident	Reese Randle, M.D. General Surgery Resident
	Christopher MacNeil, Ph.D. Plastic and Reconstructive Surgery Fellow	Norihito Moniwa, M.D. Hypertension and Vascular Research Center Fellow
	Elizabeth Miller Cardiothoracic Surgery Student	Tabitha Rosenbalm Plastic and Reconstructive Surgey Student

BASIC RESEARCH continued

	Gold Medal	Silver Medal
2013	Mark Witcher, M.D., Ph.D. Neurosurgery Resident	Daniel Bracey, M.D. Orthopaedics Resident
	Sara Ferluga, Ph.D. Neurosurgery Fellow	Christopher MacNeil, Ph.D. Plastic and Reconstructive Surgery Fellow
	Rui Wang Plastic and Reconstructive Surgery Student	Alison Arter Hypertension and Vascular Research Center Student
2014	Austin Stone, M.D., Ph.D. Orthopaedics Resident	Cara Lorentzen, M.D. Orthopaedics Resident
	Tabitha Rosenbalm, Ph.D. Plastic and Reconstructive Surgery Fellow	Ian Hutchinson, M.D. Orthopaedics Fellow
	Elizabeth Graham, B.S. Plastic and Reconstructive Surgery Student	Bryce Robinson, B.S. Cardiothoracic Surgey Student
2015	Alejandro Marquez-Lara, M.D. Orthopaedic Surgery Resident	W. Keith Ballentine III, M.D. Urology Resident
	Hooman Sadri-Ardekani, M.D., Ph.D. Wake Forest Institute for Regenerative Medicine Fellow	Joao Paulo Zambon, M.D., Ph.D. Wake Forest Institute for Regenerative Medicine Fellow
	Eleanor McCabe-Lankford, B.S. Plastic and Reconstructive Surgery Student	Guorui Deng, B.S. Hypertension and Vascular Research Student

	Gold Medal	Silver Medal
2016	Benyam Yoseph, MD Institute for Regenerative Medicine Resident	Ryan Rebowe, MD. Plastic and Reconstructive Surgery Resident
	Guillermo Galdon, MD Institute for Regenerative Medicine Fellow	Xue Ma, MD, PhD Orthopaedic Surgery Fellow
	Renata Magalhaes, MD Institute for Regenerative Medicine Student	Eleanor McCabe-Lankford, BS Plastic and Reconstructive Surgery Student
2017	Daniel Bracey, MD, PhD Orthopaedic Surgery Resident	Taylor Peak, MD Urology Resident
	Nima Pourhabibi Zarandi, MD Institute for Regenerative Medicine Fellow	Ronald Nelson, Jr., PhD Institute for Regenerative Medicine Fellow
	Catherine Moore, BS Plastic and Reconstructive Surgery Student	Marianne Collard, BS Hypertension and Vascular Research Student
2018	Lily Velet, MD Urology Resident	Edward J. Doyle, III, MD Otolaryngology Resident
	Nima Pourhabibi Zarandi, MD Institute for Regenerative Medicine Fellow	Manuel U. Ramirez, PhD Hypertension and Vascular Research Fellow
	Omeed Rahimi, MS Hypertension and Vascular Research Student	Elizabeth R. Stirling, MS Hypertension and Vascular Research Student
2019	Amy P. Trammell, MD Orthopaedic Surgery Resident	Robert Siska, MD Plastic and Reconstructive Surgery Resident
	Tomohisa Yamashita, MD, PhD General Surgery Fellow	Omar A. Abdelaal, MD Institute for Regenerative Medicine Fellow

BASIC RESEARCH continued

	Gold Medal	Silver Medal
2019	Jordan Forte, BS Plastic and Reconstructive Surgery Student	Adam Jorgensen Institute for Regenerative Medicine Student
2020	Aaron Bradshaw, MD General Surgery-Urology Resident	Tyler Overholt, MD General Surgery-Urology Resident
	Brittany Liebenow, BA Neurosurgery Student	Ishetta Madeka, BA General Surgery-Oncology Student
2021	Robert Siska, MD Plastic and Reconstructive Surgery Resident	Richard A. Erali, MD General Surgery-Oncology Resident
	Nadeem Wajih, PhD General Surgery-Oncology Fellow	Anastasiya Gorkun, PhD Institute for Regenerative Medicine Fellow
	Ethan Shelkey, BS Institute for Regenerative Medicine Student	Yismeilin Feliz-Mosquea, BS General Surgery- Hypertension Student

EDUCATIONAL RESEARCH

	Gold Medal	Silver Medal
2018	Lindsay Jones Allred, MD Plastic and Reconstructive Surgery Resident	
2019	Thomas N. Steele, MD Plastic and Reconstructive Surgery Resident	
2021	Michael Boyajian, MD Plastic and Reconstructive Surgery Resident	Thomas N. Steele, MD Plastic and Reconstructive Surgery Resident

ABSTRACTS

1. Incidence of Clinically Relevant Perioperative Hypotension among Surgical Hip Fracture Patients

Taylor Abouhaif, BS Doug Jaffe, DO

Tarek Haggy Byron Jaeger Doug Jaffe, DO Ashish Khanna
Anesthesiology
CLINICAL SCIENCE-Student

Incidence of Clinically Relevant Perioperative Hypotension among Surgical Hip Fracture Patients Student: Taylor Abouhaif, Class of 2025 Faculty Mentor and Department: Dr. Doug Jaffe, DO, Anesthesiology Funding Source: The Dubie H. Holleman Fund for Cancer and Heart Research ABSTRACT Background: With an increasing life expectancy, there is a rise in the number of individuals experiencing hip fractures, particularly in the elderly population. For these cases, surgical repair is the treatment of choice. The increasing number of these procedures opens the door for a variety of postoperative complications including major adverse cardiac events, acute kidney injury, and cerebrovascular injuries. Myocardial injury, the leading cause of mortality within the first month following surgery is strongly linked to postoperative hypotension. Postoperative hypotension commonly goes undetected with the traditional once every 4-6 hours check on vital signs as is the norm all over the world. At Atrium Health Wake Forest Baptist, ViSi monitors are currently deployed in patient care units, which allow for measuring of patient vital signs up to every 15 seconds, a frequency that has not consistently been reported in the available literature. Hypothesis: It is hypothesized that the rate of perioperative hypotension following hip fracture repair is higher than that reported in current literature. Methods: A retrospective study with data collected from the electronic medical record of Atrium Health Wake Forest Baptist was performed. We queried the electronic medical records of patients who had surgical repair of hip fractures from 1/1/2016 through 12/31/2021. Demographics, perioperative data and vital signs were extracted and de-identified to permit analysis. Hypotension was defined as systolic blood pressure (SBP) <90mm Hg or mean arterial pressure (MAP) <65mm Hg for greater than 15 minutes. SBP and MAP values were summarized for each patient, counting the total time monitored, the number of minutes monitored with each marker below specific thresholds, and the maximum amount of time spent below specific thresholds during the monitoring period. We counted the number and percentage of patients who recorded at least 1 SBP or MAP event below each threshold, computed the mean number of minutes per hour beneath each threshold, and computed the mean of the longest episode below each threshold. Results: A total of 663 patients were analyzed and monitored for incidences of hypotension lasting longer than 15 minutes. Over 50% of the sample experienced approximately 0 minutes per hour with SBP <90mm Hg and 25% of the sample experienced it for 1 minute or more per hour. Similarly, over 75% of the sample had 0 minutes per hour with MAP <65mm Hg. Conclusions: Although the incidences of hypotension are a lower number than anticipated, this may be due to the use of ViSi monitors, which automatically alerts healthcare teams of perturbations in vital signs. This allows the healthcare team to rapidly respond to acute changes in patient vital signs, which may reduce the incidence of hypotensive events and may reduce the risk for postoperative complications, such as myocardial injury, acute kidney injury, and cerebrovascular injuries. It remains to be determined if sophisticated monitoring alone reduces the incidence or if there are other factors that influence the frequency of hypotensive episodes. Further research is warranted to investigate potential causality. Source of mentor's funding or other support that funded this research: Department of Anesthesiology, Atrium Health Wake Forest Baptist

2. Correlation between Total knee arthroplasty (TKA) implant sizes and patient demographics

Komi Afetse, BS/BA Maxwell Langfitt, MD

Maxwell Langfitt
Surgery-Orthopedics
CLINICAL SCIENCE-Student

Background: When cartilage wear becomes significant (osteoarthritis), it is accompanied by significant pain which then leads to a serious loss of mobility. In most of the cases of osteoarthritis, the last resort is a total knee arthroplasty. Total knee arthroplasty (TKA) is one the most common procedures worldwide. Total knee arthroplasty is not completely risk free, and some of the procedures can result in complications which might require several revisions. One of the most common cause of complications is aseptic loosening which might be prevented with an accurate preoperative planning, specifically the selection of proper implant size. Indeed, with the increase in healthcare cost, an accurate preoperative planning can be the solution to avoid an increase in economic burden and improve patients' quality of life. Even though traditional preoperative planning has been successful, they have shown variability in efficiency; thus, explaining the projected increase in total

knee arthroplasty (TKA) revisions. Decreasing the economic burden and improving the outcomes of TKA procedures have led surgeons to seek out methods of templating in TKA based on demographics such height, weight, and sex. Hypothesis: Implant sizes can be predicted with patient's BMI and sex alone. Methods: A retrospective chart review was performed to identify eligible patients 18 years and older who have undergone total knee replacement at the Wake Forest Baptist Health Medical Center. Participant data was recorded from medical records. Study staff recorded age, sex, race, and ethnicity. The implant component sizes were also recorded in the patient's chart. Height and weight were also recorded and used to calculate body mass index (BMI). Results: For this study, 260 chart of patients that have had TKA from July 2020 to September 2022 chart were reviewed. The size reported was based on the sizing used by the following manufacturers: Stryker orthopedics and smith and nephew. The femoral implant size ranged from 2 to 7, the tibial implant size ranged from 1 to 7, and the patellar implant size was between 29 mm and 38 mm. Most of the patients were female. The calculated BMI was between 23 kg/m2 and 46 kg/m2. Overall, there was a stronger correlation between implant sizes and height alone compared to the calculated BMI. Conclusions: Our results show that demographic variables such as height, weight, and sex can be used to predict final TKA implant size to within one size for manufacturers such as Stryker orthopedics. Based on these results, a database can be created that will allow surgeons to have an idea of the implant size by purely looking at demographics, and thus to simplify the preoperative planning process while concomitantly reducing unnecessary trays, trials, and implant storage. This may result in significant process streamlining and potential cost reduction in hospitals.

3. Risk Stratification Triage Tool for Orbital Fractures by Non-Ophthalmologists

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Purpose: To evaluate the efficacy of a risk stratification triage tool for orbital fractures and their concomitant injuries by non-ophthalmologists through comparing the accuracy of collected data (ocular exam and ocular symptoms) by non-ophthalmologists needed for practical application of the Wake Forest Screening Criteria Tool and the UT Houston Screening Criterial tool. The secondary purpose was to roughly compare the two screening criteria tools put forth by Wake Forest and by UT Houston (acknowledging different endpoints to those tools) Methods: Prospective data from emergency department (ED) providers and staff were gathered along with a retrospective chart review of all ED orbital fracture consultations from August 2021 to February 2022 (n = 135). Reported data by ED staff, fracture details, comorbid ocular injuries, and recommendations by ophthalmology were gathered and analyzed, comparing reported findings of both the ED staff and the ophthalmologist being consulted. Results: A profile orbital fracture injuries and co-morbidities was gathered along with assessment data from ED providers and ophthalmologists. Moderate agreement of assessment (51.0-70.6%) was found in subjective measures included in the screening criteria. Stronger agreement was found with more objective criteria of the screening measures (74.5-94.1%). Both screening criteria showed good capture of patient's with serious injury needing to be seen in the ED. Conclusions: Use of either UT Houston's criteria or Wake Forest's criteria would help identify serious injuries than need to be seen in the ED and risk stratify patients that could be seen safely in clinic. Education programs to help further refine ED providers skills in ophthalmologic exam and data would likely improve the efficacy of any risk stratification tool and help identify high-risk patients who are likely to benefit from ophthalmology consultation while in the ED.

4. Endocrine-targeting therapy shifts the breast microbiome to reduce estrogen-receptor-a breast cancer risk

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Background: Studies indicate breast tissue has a distinct microbiome that is shifted by malignant tumors or diet. However, whether orally administered endocrine-targeting therapies used post-surgery in the adjuvant setting to reduce ER+ breast cancer recurrence modifies the breast microbiome is unknown. We demonstrate endocrine-targeted therapies, such as tamoxifen, modulate the breast microbiome, suggesting a potential role for specific bacterial species to enhance therapeutic responsiveness and reduce breast cancer risk. Methods: DNA isolated from female C57BL/6 mouse mammary gland (MG) tissue administered tamoxifen citrate for 16 weeks and breast tissue from ovariectomized (OVX) non-human

primates (NHP) or OVX NHP administered tamoxifen citrate for 2.5 years was used to perform 16S bacterial sequencing. Western diet-fed MMTV-PyMT mice were injected with Lactobacillus bacteria into the MG. 16S sequencing was performed on DNA isolated from ER+ breast tumors from patients that did or didn't display tumor recurrence on endocrine-targeted therapies within 10 years from initial diagnosis. Breast tumor sections from ER+ patients treated in the neoadjuvant setting with aromatase inhibitors (AI), Faslodex, or combination were stained for Gram-positive bacteria (lipoteichoic acid; LTA), Gram-negative bacteria (lipopolysaccharide; LPS), or Ki67. Results: In both models, tamoxifen significantly shifted β-diversity and was associated with increased Firmicutes phyla proportional abundance. Tamoxifen elevated proportional abundance of Lactobacillus spp., Streptococcus luticea, and Staphylococcus sciuri compared to untreated animals. Immunohistochemistry revealed differences in anti-inflammatory macrophage and Gram-positive bacteria abundance with oral endocrine therapy. Elevating MG Lactobacillus presence reduced tumorigenesis and multiplicity with an associated decrease in Ki67 tumor proliferation. Elevated intratumoral LTA positivity was associated with decreased proliferation. Conclusions: Results suggest oral endocrine targeting therapies promote breast Gram-positive bacterial presence, increase the anti-inflammatory macrophage infiltration, and bacterial-processed metabolites that decrease proliferation, which may reduce mammary cancer risk.

5. Neonatal mandible cephalometric changes following mandibular distraction osteogenesis for infants with Robin Sequence

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Background: Upper airway obstruction (UAO) in infants with Robin Sequence (RS) is secondary to micrognathia and resultant posterior displacement of the tongue. Mandibular distraction osteogenesis (MDO) is a safe and effective treatment for significant UAO, but there is a paucity of data examining associated cephalometric changes. This study carefully examines mandibular cephalometric changes of infants with RS who underwent MDO using internal devices to more deeply understand both immediate and longer-term effects of distraction on mandibular shape. Methods: Consecutive infant MDO cases (n=53) performed by the same surgeon were analyzed using preoperative and postoperative lateral cephalograms and CT scans of the mandible. Population averages for preoperative and postoperative time points were assessed using a two-sample t-test with equal variance. Results: Significant post-operative morphologic changes were seen in 19 of 21 cephalometric parameters. Length, height, width, and airway parameters improved on average by 20.3 mm (60.7%), 9.8 mm (49.7%), 12.6 mm (36.1%), and 211%, respectively. Conclusions: Cephalometric measurement is a powerful tool that provides a concrete metric to understand how MDO affects not just the immediate but also long-term growth of the mandible. Understanding the more quantifiable effects of mandibular distraction will allow for fine-tuning of surgical practice and optimization of outcomes.

6. Infection-driven migration in osteomyelitis

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Background: The incidence of osteomyelitis in the United States is estimated to be approximately 50,000 cases annually, or 1 in every 675 hospital admissions. It is most commonly diagnosed following trauma, ischemia due to diabetes mellitus or pressure ulcerations, or after implantation of foreign bodies (Dudareva et al.). Following such events, bone becomes susceptible to opportunistic microorganisms. Osteomyelitis is defined as an acute or chronic bone infection that is typically colonized by Staphylococcus aureus, a facultative intracellular anaerobe. Intracellular S. aureus, may disrupt homeostasis by stimulating osteoclastogenesis and decreasing osteoblast mechanisms that form bone matrix. Because osteoblast and osteoclast homeostasis play such an important role in bone integrity, increased activity of osteoclasts and decreased activity of osteoblasts is believed to be a leading cause of osteonecrosis in osteomyelitis. Once bacteria are internalized by osteoblasts they can evade the host immune system, and sustained infection within the bone is resistant to antibiotics. However, osteoblasts still secrete cytokines, chemokines, and growth factors, including inflammatory markers include IL-6, IL- 8, IL-12, CCL2, CCL3, and CCL5 that mobilize macrophages and potentially osteoclasts. Hypothesis: This study

proposes that infected osteoblasts secrete factors that recruit osteoclasts to the site of infection, thus leading to osteonecrosis. The study aims to explore what mediators are secreted by infected osteoblasts, and the impact of intracellular infection with S. aureus on osteoclast recruitment. Methods: Human osteoblasts were cultured and subsequently infected with S. aureus (Xen40) with a multiplicity of infection of 0.1 and 1. Human osteoclast precursor cells were differentiated and cultured on transwell migration inserts. These inserts were placed in 24-well plates containing uninfected and infected osteoblasts to determine whether infection induced greater migration of osteoclasts toward osteoblasts over 7 days. qRT-PCR analysis was utilized to quantify the presence of IL-6 and CCL2 from infected osteoblasts as potential mediators of osteoclast migration. Results: After 1 day of exposure to uninfected and infected osteoblasts, there was a 630% increase in osteoclast migration toward the infected osteoblasts with an multiplicity of infection(MOI) of 0.1 and a 540% increase in migration toward an MOI 1 as compared to undifferentiated osteoclast controls. After 7 days of exposure, there was only a 4% increase in osteoclast migration toward MOI of 0.1 and a 176% increase in osteoclast migration toward MOI of 1 as compared to undifferentiated controls. qRT-PCR data for quantification of IL-6 and CCL2 was inconclusive and further works needs to be completed in order to understand their potential roles in osteoclast migration in osteomyelitis. Conclusions: S. aureus-infected osteoblasts enhance the migration of osteoclasts towards the infection, thereby demonstrating the potential role of intracellular infection in osteomyelitis, and subsequent bone necrosis. This suggests potential therapy targets for preventing intracellular signaling responsible for this migration increase. Source of mentor's funding or other support that funded this research: The project was supported by the Department of Plastic and Reconstructive Surgery at Wake Forest School of Medicine.

7. Photothermal Cytotoxicity of Silver Nanoparticles on Melanoma

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More people are diagnosed with skin cancer in the U.S. than all other cancers combined, with melanoma being a leading cause of mortality. The annual cost of treating melanoma cancers in the U.S. is estimated at $3.3 billion and even though most melanomas are caused by the sun, intratumoral bacteria might indicate that infection may play a role in its aggressiveness. Staphylococcus aureus is a well-established pathogen associated with skin lesions, including skin cancer. S. aureus has recently been discovered within melanoma cells, and novel strategies to eliminate and evaluate downstream effects are needed. Photothermal therapy (PTT) has been used as an alternative approach for treating different diseases by focally applying heat. Nanoparticles such as gold, stimulated with near-Infrared lasers have previously shown a cytotoxic effect on cancer cells. Other nanoparticles like silver nanoparticles (AgNPs) have been used independently as a treatment for their antimicrobial effect against bacteria, fungi, and viruses. However, AgNPs can absorb light and transform it into heat making localized thermal therapy possible. The present work evaluates the cytotoxicity of photothermal AgNPs in infected and non-infected melanoma cells. To assess the relationship bacteria may have on cancer growth and treatment inhibition, melanoma cells were infected with S. aureus. Silver nanoparticles were created and characterized to have an optical absorption of 800 nm to generate heat when stimulated with this wavelength of infrared light. Different thermal doses were used by varying laser power (1-5 W), time (36-180 S), and energy (180-540 J), with different concentrations of AgNPs (10 µg/mL, 25 µg/mL, 50 µg/mL, 100 µg/mL, 250 µg/mL). Cell viability following exposure to AgNPs without laser stimulation decreased by 19% and 51% in non-infected cells with 10 µg/mL, and 250 µg/mL of AgNPs respectively, whereas infected cells showed an increase in viability of 28-12% from 10 µg/mL, to 100 µg/mL up to the highest concentration of AgNPs (250 µg/mL), when a 29% decrease was observed. Meanwhile, when incubated at 42 ºC for 2 hours with 10 µg/mL, and 25 µg/mL cell viability decreased 7% and 13% in non-infected and increased 4% in infected for both concentrations. On the other hand, both non-infected and infected cells showed a greater decrease in viability with 250 µg/mL when PTT was applied at 3 W for 60 s, 62% and 57% respectively, with the infected cells being the most resistant to therapy. Additionally, increasing laser power from 3 W to 5 W with 10 µg/mL, raised temperature from 47 ºC to 50 ºC and further decreased infected cells viability from 92% to 71% without decreasing non-infected cells viability, while increasing laser power from 3 W to 5 W with 25 µg/mL did not raise the temperature, but decreased infected cells viability from 62% to 3% and non-infected cells viability from 47% to 21%. Furthermore, by increasing laser's energy from 180 J to 540 J at 3 and 5 W, infected cells showed 31% and 43% reduction with 10 µg/mL and 49% and 55% with 25 µg/mL respectively. Also, non-infected cells showed 25% and 40% reduction with 10 µg/mL; and 30% and 61% with 25 µg/mL. In comparison to the control group, AgNPs plus laser irradiation had no decrease in bacteria with any concentration. These results demonstrate that AgNPs effectively reduce melanoma cell viability, and that AgNPs plus laser irradiation are more cytotoxic. In addition, infected melanoma cells are more resistant than non-infected melanoma cells for almost all treatments, but an increase in energy affects infected cells more than non-infected. These results also show that both lower laser power and time of exposure, within same energy range, are equally effective for non-infected, but do show a decrease in infected cells, but

higher laser energy increases cytotoxicity for both non-infected and infected. The proposed treatment is currently being evaluated to determine bacterial toxicity and cell recovery after exposure. This work represents a new frontier for the use of AgNPs, which are currently used clinically, for killing melanoma cells, especially those which may have an intracellular infectious component that could be driving aggressive cell phenotypes.

8. Regional and Global Measures for Craniosynostosis

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Introduction: Craniosynostosis is the premature fusion of the skull's bones. This results in both impaired brain growth as well as atypical cranial aesthetics. Clinical evaluation attempts to evaluate the presence and severity of abnormality; however, objective metrics are needed to assist in appropriate diagnosis and postoperative evaluation. Single-center studies are ill-equipped to generate sample sizes needed to power the quantification of these abnormalities. Further, the cranium has few reproducible anatomic landmarks, therefore, impeding reproducible measurement. For these reasons, no tool yet exists for improved diagnosis outside of CT imaging for direct observation of suture fusion. For tools to be clinically useful, they must be simple enough for interpretation, backed by population data to aid in comprehension, automated to allow for integration into rapid clinical workflow, and finally not dependent on radiation to allow for implementation in a pediatric population. Here we describe the creation of measurement tools for sagittal craniosynostosis (SC) which is difficult to differentiate from typical head shape and lambdoid craniosynostosis (LC) which is difficult to differentiate from deformational plagiocephaly Methods: A multicenter database was utilized to identify CT scans or 3D photographs of patients with SC, LC, deformational plagiocephaly, and typically developing individuals. These images were then used to create models of scalp anatomy. Three sets of 11 equidistant planes were created based on cranial length, width, and height. Plane overlay creates a Cartesian grid on the scalps surface with intersections acting as reproducible surface landmarks. Patterns in cranial posterior length, anterior length, width, and height were described, and differences in symmetry and overall displacement were used to create metrics with the ability to differentiate SC and typical individuals as well as LC and plagiocephaly. The performance of these tools was evaluated using area under the curve analysis (AUC). These metrics were then automated. Results: Image series were identified for 360 individuals with SC were identifies, 53 individuals with LC, 210 typical individuals, and 64 individuals with deformational plagiocephaly. Individuals with SC had elongated skulls with a flattened anterior and a pointed posterior cranium. Width was reduced globally with superior regions showing the most severe restriction. Regional metrics were created capturing these trends in SC with their combination having high diagnostic performance with AUC of 0.999, sensitivity >99%, and specificity >99% relative to typical controls. LC and plagiocephalic populations illustrated classically described trends with the LC population showing restricted anterior growth on the side of suture fusion while those with plagiocephaly showed parallel anterior shifting of the entire lateral hemisphere. Further, as expected, in both populations the posterior cranium was more affected than the anterior. With regard to height and width, those with plagiocephaly showed lower degrees of asymmetry globally. These trends were trialed on a variety of measurement tools. Tools involving aspects of posterior length were consistently lower performing, indicating that while LC typically has a greater effect on posterior length, those with severe plagiocephaly likely approach a similar degree of abnormality. Thus, a final tool was selected which captures the differential degrees of anterior growth, height asymmetry, and width asymmetry. This measure functions well with an AUC of 0.983, sensitivity of 92.5%, and specificity of 95.3%. Conclusions: By evaluating objective population trends in cranial growth, conserved patterns are observed which allow effective identification of those with craniosynostosis without the need for radiation. Most simply these assists in diagnosis and limit unnecessary radiation exposure. By applying these metrics to post-operative data, surgeons can better understand their patients' long-term outcomes and make evidenced-based decisions for future patients

9. 3D Spheroids of Human Primary Urine-Derived Stem Cells in the Assessment of Drug-Induced Mitochondrial Toxicity

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Mitochondrial toxicity (Mito-Tox) risk has increased due to the administration of several classes of drugs, particularly some

life-long antiretroviral drugs for HIV+ individuals. However, no suitable in vitro assays are available to test long-term Mito-Tox (≥4 weeks). The goal of this study is to develop a 3D spheroid system of human primary urine-derived stem cells (USC) for the prediction of drug-induced delayed Mito-Tox. The cytotoxicity and Mito-Tox were assessed in 3D USC spheroids 4 weeks after treatment with antiretroviral drugs: zalcitabine (ddC; 0.1, 1 and 10 μM), tenofovir (TFV; 3, 30 and 300 μM) or Raltegravir (RAL; 2, 20 and 200 μM). Rotenone (RTNN, 10 μM) and 0.1% DMSO served as positive and negative controls. Despite only mild cytotoxicity, ddC significantly inhibited the expression of oxidative phosphorylation enzyme Complexes I, III, and IV; and RAL transiently reduced the level of Complex IV. A significant increase in caspase 3 and ROS/RNS level but a decrease in total ATP were observed in USC treated with ddC, TFV, RAL, and RTNN. Levels of mtDNA content and mitochondrial mass were decreased in ddC but minimally or not in TFV- and RAL-treated spheroids. Thus, 3D USC spheroid using antiretroviral drugs as a model offers an alternative platform to assess drug-induced late Mito-Tox.

10. Angiogenesis development within Gelatin Methacrylate Hydrogels

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Angiogenesis is important to the majority of regenerative medicine techniques for repair or replacement of damaged tissues. Endothelial cells can naturally form tubular structures depending on the supportive media they are maintained. The difficulty arises when they are placed into a 3D construct to visualize them through standard brightfield microscopy. Utilization of green fluorescent protein (GFP) transfected to be expressed by these endothelial cells is important for visualizing and tracking cells in culture. The principal aim of this project is to develop a 3D angiogenesis model from gelatin methacrylate (GelMA) hydrogels. Additionally, incorporating this 3D construct into a chip model that incorporates a lumen to determine adherence of cells to form a fully functional microvascular structure. Moreover, 3D hydrogels can be notoriously difficult to visualize GFP depending on the geometric shapes they are polymerized into. Fixation protocols tend to be very harsh on cell membranes that sustain GFP within the cytoplasm of cells. Subsequently, permeabilization causes significant damage to the cell membrane allowing transfer of GFP from the cell to the hydrogel. In order to find the least destructive method to preserve GFP within cells, this study performed various tests with the aim of determining the optimal fixation and permeabilization steps. This will maintain the GFP expression in cells and prevent GFP leaking out into solution. Specifically, for this experiment, gelatin methacrylate (GelMA) droplets were seeded with HUVECs transfected with GFP to visualize their activity in culture. Typically, once these cultures are terminated, standard fixing protocols cause GFP-HUVECs to leak GFP into the GelMA hydrogel, weakening the fluorescent signal. Using this study's protocol found that reducing the concentration of paraformaldyde (PFA) to 1% along with incubating for 5 minutes at 4C resulted in more GFP stayed within the cytoplasm of HUVECs within GelMA droplet. By altering the typical permeabilization procedure, switching from typical 0.02% trypsin incubation to a tris buffered salt with 0.2% tween-20 (TBST) solution for 10 minutes, significant strengthening of the GFP signal within cells was visualized from fluorescent imaging. These changes allow for better evaluation of the cells ability to form vascular structures.

11. Introducing the "Surgical Subspecialties Certificate Program" for Medical Students

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Objective: The objective of the "Surgical Subspecialities Certificate Program" is to provide lecture, simulation, and clinically based learning to preclinical medical students to aid them in 1) defining their interest in surgery and 2) connecting them with resident and faculty mentorship in specialties of interest. Setting: A Plastic Surgery resident and a medical student facilitator developed and administered the certificate program with the Plastic Surgery Residency Program Director serving as a faculty mentor. An application was sent to all first-year medical students at Wake Forest School of Medicine via RedCap. Participants: Applications were blinded and 8 students (4 women, 4 men) were selected. Students in the program were required to attend class sessions, observe surgical cases, shadow a resident on call, and attend a surgery department grand rounds. To facilitate access to clinical settings, students were paired with two residents from different surgical specialties of their choosing. A total of 8 class sessions were conducted over 4 months during Fall 2021. Results: A Kenevsky methodology based on Post-Pre Survey was administered at the program's final class session. Following

completion of the certificate program, all but one student had a change in their level of interest in surgery from before the program to after. Students reported increased comfort in the operating room setting and had developed meaningful relationships with surgical residents and faculty. Participants attended an average of 6.0 (+/- 1.8) surgical cases, and met with their resident mentors 3.8 (+/- 1.1) times. Conclusions: A formalized program for exposing preclinical students to surgical specialties is effective for helping students define their interest in surgery and connect with surgical mentors.

12. Effects of Amniotic Fluid Stem Cells Conditioned Media for Treating PTOA in a Rat Model

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INTRODUCTION: Osteoarthritis (OA) is a chronic disease with few treatment options. Many of the treatments on market for OA are broad in their effect and contain underlying mechanisms that are unclear. Similar to OA, posttraumatic osteoarthritis (PTOA) is a progressive disease with surgery being the only definitive treatment option. Amniotic fluid stem cells (AFSCs) have the potential to be a promising new treatment for both OA and PTOA. AFSCs derive much of their therapeutic potential from the growth factors and cytokines they contain. These growth factors and cytokines can be isolated in the media of conditioned AFSCs. Preclinical and Clinical studies with intra-articular injections of AFSC-conditioned media (AFSC-CM) have shown mitigation of PTOA and OA symptoms. However, the precise mechanisms by which AFSC-CM functions remain poorly understood. In this study, we used a rat PTOA model evaluating the effects of AFSC-CM on functional and histological outcomes. We also measured cytokine levels to elucidate the inflammatory pathway AFSC-CM specifically targets. METHODS: All animals used for the study were approved by IACUC at Wake Forest University School of Medicine. PTOA was introduced in both female and male rat cohorts (n=12 per group) with destabilization of the medial meniscus (DMM) and anterior cruciate ligament (ACL) transection on the left knee. Right knee was used as contralateral control. Intra-articular injection of AFSC-CM or saline was administrated at 2 weeks post injury. Animals were followed up for 1, 2, or 3 months for outcomes (n=4 per time point in AFSC-CM and saline group, respectively). Gait analysis was performed using Digigait Imaging system (Mouse Specifics Inc.) to calculate various kinematic and gait dynamics related to the rat's motion. Microcomputed tomography (microCT80, Scanco Medical AG) was used to scan the knees. MicroCT data were analyzed using Mimics Innovation suite (v.18.0x64) for cartilage volume on the medial tibial plateau. After microCT imaging, the knees were decalcified, embedded then sectioned for histological staining. Slides were stained with hematoxylin and eosin (H&E; Abcam) and safranin-O (SigmaAldrich) for Osteoarthritis Research Society International (OARSI) scoring to evaluate arthritis severity. Multiplex cytokine analysis was performed on the serum at different time points following treatment. To compare differences in saline control versus AFSC-CM cohorts, unpaired and paired t-tests were performed on OARSI score and microCT analysis. T- tests were also performed on Cytokine levels 2 weeks post injury prior to saline administration versus AFSC-CM. One-way analysis of variance test was performed on Digigait parameters between groups. Probability level of 0.05 was considered significant for both tests. RESULTS: Gait analysis showed a difference in mean paw length, paw area and increased paw variability in saline control in comparison to AFSC-CM treatment at 1 month and 3 months ($p=0.010$, $p=0.043$, $p=0.038$ respectively). OARSI score comparing safranin-O staining of medial tibial plateau cartilage between AFSC-CM and saline treatments at 1 month (1 month AFSC-CM vs. Saline, $p=0.205$) and at 2 months (AFSC-CM vs. Saline, $p=0.040$) showed decreased OARSI score with AFSC-CM treatment. Sagittal and cross-sectional microCT analysis of Saline vs. AFSC-CM treatment at 1 month (sagittal analysis $p=0.020$; cross-sectional analysis $p=0.030$) and at 2 months (sagittal analysis $p=0.770$; cross-sectional analysis $p=0.791$) showed increased cartilage volume at 1 month with AFSC-CM treatment. Cytokine analysis of IL-1α and TNF-α at 1 month, 2 months and 3 months post AFSC-CM treatment compared to 2 weeks post injury (IL-1α 1 month AFSC-CM vs. 2 weeks post injury, $p=0.086$, 2 month AFSC-CM vs. 2 weeks post injury $p=0.309$, 3 month AFSC-CM vs. 2 weeks post injury $p=0.413$; TNF-α 1 month AFSC-CM vs. 2 weeks post injury, $p=0.881$, 2 month AFSC-CM vs. 2 weeks post injury, $p=0.468$, 3 month AFSC-CM vs. 2 weeks post injury, $p=0.052$) showed decreased IL-1α at 1 month and decreased TNF-α at 3 months both approaching significance. DISCUSSION: Improved cartilage volume was significant at 1 month on microCT analysis and at 2 months on histological safranin-O staining. Decrease in cytokine inflammation approached significance at 3 months for TNF-α and 1 month for IL-1α, a finding that would likely be significant if the sample size were larger, but a promising response to AFSC-CM treatment given the widely reported effects of TNF-α and IL-1α driving OA pathology. Gait analysis is a validated method of analyzing locomotive parameters such as mechanical allodynia and evaluating the functional effects of biomechanical pathophysiology as in the case of DMM and ACL transection with AFSC-CM treatment. Differences in paw length, paw area and increased paw variability all suggest possible temporal and spatial differences in gait due to increased pain in the absence of AFSC-CM treatment in rats. SIGNIFICANCE/CLINICAL RELEVANCE: PTOA of the knee has few treatment options with the only curative treatment being joint replacement. AFSC-CM is a promising new therapy for the treatment of PTOA and may be used to temporize both PTOA and OA pathology before eventual surgical intervention.

13. Ketorolac Safety in Breast Free Flap Surgery

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Background: Ketorolac is a well described adjunct in peri-operative pain control and enhanced recovery after surgery (ERAS) protocols. Ketorolac can decrease peri-operative opioid use. Ketorolac's mechanism of action functions as analgesic and platelet aggregation inhibitor. Ketorolac is yet to become fully adopted in free tissue transfer surgery due to operations that involve large surface areas, extensive soft tissue undermining, and donor site morbidity. Complications related to ketorolac administration remain poorly described in free flap breast surgery. Our study aims to examine the impact of ketorolac on complications and free flap outcomes in breast surgery. Methods: With institutional IRB approval, a retrospective chart review of 520 patients who underwent DIEP flap breast reconstruction from January 2019-March 2022 at Atrium Health was completed. Patient demographics, medical history, operative course, and postoperative complications were collected. Patients were separated based on whether they received ketorolac during their initial hospitalization or not. Descriptive statistics were performed and further analysis was completed using Chi-Squared testing. Results: We describe results from 520 patients, and 863 free flaps for breast reconstruction. 89 patients received ketorolac peri-operatively and 431 patients did not. When assessing clinical hematoma, patients who received ketorolac developed hematoma 5.6% compared with 5.1% in the non-ketorolac group ($p > 0.05$). When assessing hematoma that required operative intervention, patients who received ketorolac developed hematoma requiring operative intervention 4.5% compared with 2.5% in the non-ketorolac group ($p>0.05$). When comparing free flap failure as a global measurement between groups, there was no difference in free flap failure rates between groups. Conclusions: No statistically significant differences in hematoma rate were identified when comparing patients who received ketorolac compared to those who did not. The concern for increased bleeding complications is not borne out in a large data set. There was no difference in overall free flap failure. Ketorolac is an important adjunct to consider in peri-operative pain management for breast free flap surgery.

14. Mitochondria Infusion to Mitigate Ischemia Reperfusion Injury in Porcine Kidney Models

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Aim – to mitigate IRI in ex vivo porcine kidney model using autologously derived mitochondria.

Background: Many kidneys are rejected for transplantation due to a variety of reasons. One such reason is the hypoxic conditions created by the mode of death. Mitochondria have a naturally occurring ability to transfer from healthy cells to damaged or stressed cells; ischemia-reperfusion injury presents an opportunity to investigate artificial mitochondrial transfer (AMT). This study aims to assess the impact of autologously derived mitochondria delivered directly to excised porcine kidney vasculature.
Methodology: – For the ex vivo experiment, three pairs of porcine kidneys were procured from 60kg pigs. Each kidney was subjected to 30 minutes of warm ischemia (37°C) to simulate ischemia-reperfusion injury (IRI). Meanwhile, mitochondria were isolated from 1g of psoas muscle of the same pig. For each pair, one kidney was injected with 10^8 mitochondria in PBS and the other injected with PBS only. Both organs were then housed in the CaVESWave perfusion system and perfused for 24 hours. Samples of the perfusate were collected every six hours and biopsies were taken at 0 and 24 hours. After 24 hours, KIM1 and NGAL concentrations were evaluated by ELISA.The mitochondrial content of 1g of psoas muscle was assessed by fluorescence microscopy, protein and ATP extraction. BCA, Bradford assay, and nanodrop were performed for protein quantification and cell titer-glo 2.0 was used for ATP quantification.
Results – ELISA results show that each treated kidney presents a lower concentration of renal damage markers than its control counterpart. Cell Titer-Glo assay, BCA, Bradford, and nanodrop all show presence of protein and indicate that respiration competent mitochondria are present.
Conclusion/discussion – This study shows the isolation process produces viable mitochondria, isolated mitochondria are taken up by injured kidney cells, and they are able to provide protection to the damaged cells. The next steps are to better understand the mechanisms by which the mitochondria enter into damaged cells and to investigate the effects of mitochondrial dosing and timing using human islets.

15. ARE BREAST CANCER PATIENTS PRESENTING WITH HIGHER STAGE SINCE THE COVID-19 PANDEMIC?

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The impacts of the COVID-19 pandemic have been far reaching in many aspects of healthcare, particularly oncologic detection and cancer care. As much of the progress in reducing morbidity and mortality related to breast cancer have resulted from screening and public health measures, we analyzed the stage at which patients with breast cancer presented for surgery from 2019 to 2021. From 2019-2021, retrospective analysis was performed on breast cancer patients, comparing differences in patient demographics and cancer stage pre- and post- recommendation to postpone mammographic screening on March 26, 2020 (pre- vs. Covid-era). Proportion analysis was performed to identify similar percentages for each stage and a weighed stage severity score with sign test was crafted to compare overall stage for a given timeframe. Overall, 1,107 breast cancer patients were included in the breast cancer surgery registry. Four hundred and forty-nine patients were included in the pre-pandemic phase from 2019 to March 26, 2020 and 658 patients since the COVID pandemic era from March 26, 2020 to 2021.These groups were similar demographically; the average age was 63 in pre- and 61 in the COVID-era. The majority of patients were female pre- 99.6% and 99.5% Covid-era. In both groups, the majority of patients were white, non-Hispanics 78.2% pre- vs. 79% COVID-era, 19.7% black patients pre- vs. 18.8% COVID-era, 1.36% Asian/other patients in pre- vs. 1.12% COVID-era, 1.0% white, Hispanic patients pre- vs. 0.89% COVID-era. We performed analysis comparing pre- COVID and COVID-era stage severity score. This showed a statistically higher stage presentation of disease when comparing pre-COVID to COVID-era data (p=0.0027). Additionally, we identified a higher rate of stage 3 disease presentation or greater in the COVID-era with 7.79% pre- vs. 12.3% COVID-era (p=0.016). However, we did not identify a difference in DCIS rates pre- vs. COVID-era, 17.5% vs 14.7% (p=0.28). We found that in comparing pre- to COVID-era data that breast cancer patients presented with higher stages, in particular, stage 3 or more disease. This analysis reveals the impact COVID is having on the multidisciplinary treatment of breast cancer patients. Further efforts are needed to address the stage migration, the disproportionate burden of disease, and the access to care.

16. Trending: Liver Function Tests after Laparoscopic Common Bile Duct Exploration are not Similar to Post-Endoscopic Retrograde Cholangiopancreatography Lab Trends

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Introduction: Choledocholithiasis treatment is often a two-stage process consisting of endoscopic retrograde cholangiopancreatography (ERCP) followed by laparoscopic cholecystectomy (LC). Increasingly, a single stage approach consisting of LC with laparoscopic common bile duct exploration (LCBDE) is gaining traction, with equivalent safety profiles and shorter hospitalizations. Clinical presentation of choledocholithiasis is typically associated with elevated liver function tests (LFTs). Yet, it is unknown whether the choice of therapeutic intervention impacts LFT trends in similar fashions. We compared periprocedural LFTs in ERCP vs LCBDE. Methods: We retrospectively reviewed 115 patients over the age of 18 who underwent either ERCP or LC+LCBDE for choledocholithiasis. We excluded 28 patients due to insufficient laboratory data, a diagnosis of cholangitis, or unsuccessful LCBDE or ERCPs. eighty-seven patients were included, 53 of which had ERCPs and 34 had successful LC+LCBDEs. Biochemical data obtained included total bilirubin (Tbili), aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP). All patients had one LFT prior to the procedure. All patients had at least one pre- and one post-procedural LFTs, while all of the ERCP patients and 20 of 34 LC+LCBDE patients had a second set of post-procedural LFTs. Statistical analysis was done using Wilcox signed-rank tests. Results: In patients undergoing ERCP, there was a consistent and significant decrease in all LFTs post procedure (n = 53; p = <0.001 for all) with a continued downtrend on the second set of LFTs (n= 53; p = <0.001 for all). For successful LC+LCBDEs, the Tbili, AST, ALT, ALP did not consistently downtrend and were similar between the preoperative baseline and 1st post-operative labs (n = 34; p = 0.505, p = 0.694, p = 0.151, and p = 0.675, respectively) and the 2nd post operative labs (n = 20; p = 0.227, p = 0.412, p = 0.246, and p = 1.000, respectively). Conclusion: These two therapeutic approaches

for choledocholithiasis have different post-procedural LFT profiles. After ERCP, LFTs consistently downtrend. In contrast, there is no consistent direction in LFTs following LC+LCBDE, which may be explained by increased pressurization of the biliary system during LCBDE due to flushing and the lack of sphincterotomy. This is an important distinction to note as clinicians may be expecting a rapid LFT normalization after LC+LCBDE similar to the one observed with ERCPs. This appreciation will decrease reliance on laboratory tests and shorten length of stay.

17. Evaluating Surgical Residents' Attitude Toward Laparoscopic Colorectal Simulation: A Porcine Model

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Introduction: Minimally invasive surgical techniques have replaced open approaches in many of the most commonly performed surgical procedures. Several factors pose challenges in mastering laparoscopic techniques during resident surgical training, such as: 80 hour work week restrictions, decreased autonomy, case competition with fellows, and the steep learning curve associated with laparoscopic techniques. Therefore, with our study, we aimed to determine the effectiveness of utilizing porcine models to improve surgical resident comfort with standard hemostatic and laparoscopic colorectal techniques. Methods: Nine surgical residents between PGY2 and 5 completed a course focused on colorectal laparoscopic technique and the proper use of hemostatic agents. The course was designed by colorectal faculty with input from industry sponsors who also assisted with funding and supplementation of laparoscopic instruments and hemostatic agents. The course started with a pretest evaluation, followed by a didactic lecture, and a skills session using a porcine model to practice laparoscopic hemostatic and colorectal techniques. Participants performed laparoscopic procedures such as a right hemicolectomy and sigmoidectomy with a variety of laparoscopic staplers and energy devices. Then, residents attempted hemostatic techniques utilizing hemostatic agents after a structured series of bleeding injuries occurred. The lab concluded with the completion of a post-test survey focusing on competency and confidence surrounding laparoscopic colorectal techniques and hemostasis adjuncts. Results: Nine residents completed training using the porcine model. There was a 100% pretest and 100% posttest evaluation completion. Pretest surveys demonstrated that 8/9 residents had an intermediate level of confidence in using hemostatic adjuncts in laparoscopic surgery, while 1/9 had a beginner level. Regarding laparoscopic bowel resection and anastomosis, 6/9 residents had a beginner level of experience with the remaining 2/9 reporting an intermediate level. Post-test surveys showed that 8/9 residents strongly agreed that porcine models were useful for resident training in laparoscopic colorectal and hemostatic techniques. All residents (9/9) felt the lab provided valuable improvements to their surgical abilities and would recommend the lab to their peers. Conclusion: Our study shows that surgical residents' level of comfort with laparoscopic and hemostatic technique is often suboptimal regardless of the post graduate year of the resident. A paired didactic and porcine lab model for laparoscopic colorectal and hemostatic techniques is a valuable method for improving resident knowledge and skills in a low-stakes environment.
Funding: This work was supported by Ethicon US, LLC, Cincinnati, OH

18. Health Care Disparities in Surgical Management of Facial Trauma

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Introduction While many studies have demonstrated healthcare disparities and access inequalities, few have elucidated the impact of disparities within surgical management of facial trauma. Facial fractures are found throughout demographic cohorts, but disproportionately affect those of lower socioeconomic status, making the importance of addressing health care disparities as they relate to social determinants of health all the more necessary. Literature within otolaryngology regarding health disparities in facial trauma patients is not existent. The aim of this project is to investigate treatment disparities in patients with facial fractures as it relates to surgical management. Methods A retrospective review of the North Carolina Trauma Registry state database from 2013-2021 was performed. The primary aim was to compare demographic features of patients treated nonoperatively to those who underwent surgical intervention. Age, gender, race, ethnicity, comorbidities, type of surgical management, and primary payer were extracted for analysis. Zip code and county residence were utilized in socioeconomic (SES) calculations. Results 19,244 patients with facial bone fractures were identified within the database. Comparing patients treated nonoperatively versus operatively, the patients treated operatively were younger

(46 vs 42, p < 0.0001), more likely to live in a county above the state poverty line (56.8% vs 50.7%, p=0.0094), have multiple medical comorbidities (87.9% vs 82.4%, p=0.0004), and have private insurance (39.7% vs 33.8%, p<0.0001). There was no statistically significant difference in treatment as it relates to race or Hispanic ethnicity. Discussion Our study suggests that disparities as they relate to age, socioeconomic status, insurance status, and co-morbidities may exist within facial trauma surgical care. Of the few published studies on facial trauma disparities, this study provides the most expanded set of variables of social determinants of health to date.

19. Health Disparities in Facial Trauma Management

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Introduction While many studies have demonstrated healthcare disparities and access inequalities, few have elucidated the impact of disparities within surgical management of facial trauma. Facial fractures are found throughout demographic cohorts, but disproportionately affect those of lower socioeconomic status, making the importance of addressing health care disparities as they relate to social determinants of health all the more necessary. Literature within otolaryngology regarding health disparities in facial trauma patients is not existent. The aim of this project is to investigate treatment disparities in patients with facial fractures as it relates to surgical management. Methods A retrospective review of the North Carolina Trauma Registry state database from 2013-2021 was performed. The primary aim was to compare demographic features of patients treated nonoperatively to those who underwent surgical intervention. Age, gender, race, ethnicity, comorbidities, type of surgical management, and primary payer were extracted for analysis. Zip code and county residence were utilized in socioeconomic (SES) calculations. Results 19,244 patients with facial bone fractures were identified within the database. Comparing patients treated nonoperatively versus operatively, the patients treated operatively were younger (46 vs 42, p < 0.0001), more likely to live in a county above the state poverty line (56.8% vs 50.7%, p=0.0094), have multiple medical comorbidities (87.9% vs 82.4%, p=0.0004), and have private insurance (39.7% vs 33.8%, p<0.0001). There was no statistically significant difference in treatment as it relates to race or Hispanic ethnicity. Discussion Our study suggests that disparities as they relate to age, socioeconomic status, insurance status, and co-morbidities may exist within facial trauma surgical care. Of the few published studies on facial trauma disparities, this study provides the most expanded set of variables of social determinants of health to date.

20. Development of a Synthetic Extracellular Matrix for Augmentation of Placental-Derived Stem Cell Central Nervous System Therapy

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Background: In the United States, there are approximately 300,000 people living with paralysis secondary to spinal cord injury. Stem cell therapy to treat spinal cord repair has been widely studied; however, a clinically effective stem cell therapy to treat paralysis has yet to be developed. After spinal cord injury, a glial scar forms, which acts as a barrier to neuronal axons. These axons, which transmit signals from the brain to muscles to induce movement, cannot reconnect through the glial scar, leaving patients with permanent paralysis. Recent studies have shown that placental-derived stem cells (PSCs) are able to induce neurogenesis and angiogenesis. Development of a therapeutic, injectable synthetic extracellular matrix (sECM) that reverses the inhibition of the glial scar on axonal repair and augments stem cell therapy may prove to be beneficial to patients with paralysis secondary to spinal cord injury. In this study, we develop a hyaluronic acid-based sECM with bioactive peptides that transitions from a liquid to a hydrogel at 37°C and augments PSC therapy to overcome the inhibitory properties of glial scars to facilitate neural repair. Hypothesis: We hypothesize that a modified hyaluronic acid-based hydrogel with peptides that induce neurogenesis and angiogenesis can be used in conjunction with PSCs to induce neuronal cell spreading and network formation in vitro. Methods: Hyaluronic acid (HA-60,000 Da, Genzyme, Cambridge, MA) was functionalized with an acrylate group using a two-step process spanning over four weeks and lyophilized, with HA-AC as the end product. Adhesion peptides were added to 3% w/v HA-AC and incubated at 37°C for 30 minutes. A linkage/cleavage peptide was added to the mixture and incubated at 37°C for 30 minutes. Neurons and PSCs in experimental groups of neurons, PSCs, and neurons and PSCs were incubated in sECM in a non-adherent 96-well plate at 37°C for

30 minutes then EGM-2 media was added. Cells in sECM were kept in a 37°C incubator for 7 days with daily monitoring under microscope before being fixed and immunostained for analysis. Rheology was also conducted to determine the stiffness of the sECM/hydrogel. Results: The current sECM composition transitions from a liquid to a hydrogel at 37°C (body temperature), has a stiffness of 350-400 Pa which emulates the softness of the brain and spinal cord, and forms a hydrogel at 37°C with cells present within the initial liquid solution. Neurons co-cultured with PSCs in the sECM formed tissue in which neurons spread and formed neurites and neuronal networks. Conclusion: In combination with neurons and PSCs, this novel sECM supports in vitro tissue formation with viable neurons, neurites, and most importantly, the formation of neuronal networks.

21. Clinical Results of Endoscopic Gluteus Medius Repair

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Background: Gluteus medius tears are common causes of greater trochanteric pain. Tears to this muscle occur after trauma or through everyday wear and tear and are predominantly seen in women (4:1 versus males) between ages 40-60 years. Gluteus medius tears are typically suspected in female patients with persisting lateral hip pain, decreased strength and range of motion, and a positive Trendelenburg sign. Due to the generic nature of these symptoms, the condition can sometimes be misdiagnosed as bursitis or iliotibial band syndrome. Further evaluation of these tears with magnetic resonance imaging (MRI) can confirm the diagnosis and expand the possible interventions to include surgery for the patient's pain. Based on the complexity and nature of the tear determined by MRI and the patient's pain and functional impairment, open versus endoscopic repair approaches are thoroughly evaluated for each patient. Overall, the endoscopic approach is fairly new, first formally introduced in 2009 by Voos et al's report. Of the limited studies analyzing the outcomes of endoscopic gluteus medius repair, the largest sample size is less than 60 hips. This study will aim to further evaluate the effectiveness of the endoscopic approach and help standardize this repair method by analyzing the short-term outcomes of a 100-patient cohort. Hypothesis: After an endoscopic gluteus medius repair procedure, patients are anticipated to experience improved hip pain levels and overall functionality compared to before surgery. Methods: The study consists of an over-the-phone conversation with patients who are at least six months post-endoscopic gluteus medius repair surgery with Dr. Hubbard. The first section assesses pain level on a 0-10 scale before surgery, 1-week after and at least 6months after surgery. Then, two modified Harris Hip Score assessments are used to further evaluate pain and functionality before surgery versus 6months after surgery. The results will be analyzed using descriptive statistics and additional inferential statistical analysis as appropriate upon the completion of enrollment. Results: This study is ongoing and continuing to enroll patients. Based on preliminary patient responses, the overall trend demonstrates improved modified Harris Hip Scores and pain level following the procedure. Conclusions: The overall goal of this project is to understand the endoscopic gluteal repair approach and its efficacy amongst patients. As the study continues to enroll new patients, we will further evaluate the effectiveness of the endoscopic approach and help standardize the method of gluteus tears repairs.

22. Dietary patterns associated with increased abundance of Akkermansia muciniphila potentiate anti-PD-L1 immune checkpoint blockade response in triple-negative breast cancer

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Immune checkpoint blockade (ICB) therapies targeting programmed cell death protein 1 pathway (PD-1/PD-L1) have advantageously impacted triple-negative breast cancer (TNBC) patient survival; however, there remains a need to improve therapeutic response. Recent studies from our lab, and in collaboration with others, have associated gut Akkermansia muciniphila as a therapeutic-response related microbe in breast cancer models, independent of diet. As diet is a main modifier of the gut microbiome, we investigated if we could harness diet-gut microbiome interactions to potentiate ICB response in TNBC. Using EMT-6 (n=5-7/group) and E0771 (n=8-10/group) syngeneic models of TNBC, tumor-bearing mice consuming either a low-fat control, high-fat Western, or Mediterranean diet, were treated with 3 doses of 200 μg of IgG or anti-PD-L1 antibodies. Tumor progression was monitored throughout the study by caliper measurement and response to therapy was determined using the final tumor volume at the end of the study. To assess modulation on the gut bacterial

microbiome by diet and ICB, 3M read depth metagenomic sequencing was performed on DNA isolated from fecal samples from both models. To further implicate the microbiome, we performed a fecal microbiota transplant (FMT) model (n=8-10/group), where mice consuming a control diet were supplemented via oral gavage with either a control diet-derived FMT, a Western diet-derived FMT, or Mediterranean diet-derived FMT. EMT-6 bearing-mice on each FMT were treated with IgG or anti-PD-L1 antibodies. In our E0771 model, immune response (F4/80 macrophages, granzyme B, and CD8+ cytotoxic T cell infiltrate) in the tumor microenvironment (TME) were examined in residual tumor tissue by immunohistochemistry (n=9/group). Regulation of PD-L1 protein by diet was assessed by Western blot hybridization in corresponding tumor sample lysates (n=9/group) and short chain fatty acid (SCFA) analysis was measured in plasma samples from this model (n=8/group) by LC/MS-MS metabolomics. In EMT-6 bearing-mice, PD-L1 treatment and consumption of a Western or Mediterranean diet significantly reduced both tumor volume and tumor weight when compared to control diet-fed mice ($p<0.05$). In E0771 bearing-mice, consumption of a Western diet and PD-L1 treatment resulted in a modest increase in ICB response (56%), with the highest efficacy observed in Mediterranean diet-fed mice (70%), when compared with IgG control animals. Western and Mediterranean-fed mice in both models displayed a 25-45% increase in gut Akkermansia muciniphila proportional abundance. Anti-PD-L1 therapy in EMT-6 bearing-mice given an A. muciniphila enriched FMT showed enhanced ICB responsiveness ($p<0.05$, 70-80%). Mediterranean-diet fed E0771 tumor-bearing animals treated with anti-PD-L1 antibodies showed elevated plasma butyrate SCFA metabolites. E0771 model results also show Western and Mediterranean diet intake regulated expression of PD-L1, macrophages, and cytotoxic T cell function proteins in the TME. Taken together, these data indicate PD-L1 response in TNBC is potentiated by diet-microbiota interactions and suggests increasing levels of Akkermansia may enhance ICB efficacy.

23. Influence of Donor and Recipient Sex on Outcomes Following Simultaneous Pancreas-Kidney Transplantation in the New Millennium: Single Center Experience and Review of the Literature

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The influence of sex on outcomes following simultaneous pancreas-kidney transplantation (SPKT) in the modern era is uncertain. Methods: We retrospectively studied 255 patients undergoing SPKT from 11/2001 to 8/2020. Cases were stratified according to donor (D) sex, recipient (R) sex, 4 D/R sex categories, and D/R sex-matched vs mismatched. Results: D-male was associated with slightly higher patient ($p=0.08$) and kidney ($p=0.002$) but not pancreas ($p=0.23$) graft survival rates (GSR) compared to D-female. There were no differences in recipient outcomes other than slightly higher pancreas thrombosis (8% R-female vs 4.2% R-male, $p=0.28$) and early relaparotomy rates in female recipients (38% R-female vs 29% R-male, $p=0.14$). When analyzing the 4 D/R sex categories, the two D-male groups had higher kidney GSRs compared to the two D-female groups ($p=0.01$) whereas early relaparotomy and pancreas thrombosis rates were numerically higher in the D-female/R-female group compared to the other three groups. Finally, there were no significant differences in outcomes between sex-matched and sex-mismatched groups although overall survival outcomes were lower in the sex-mismatched group ($p <0.10$ for pancreas GSR). Conclusions: The influence of D/R sex following SPKT is subject to multiple confounding issues but survival rates are highest in D-male/R-male and lowest in D-female/R-male categories.

24. Fluorescent Intracellular Nanoparticles for Tracking Adipose Derived Stromal Cells

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Background: Adipose derived stromal cells (ADSC) are a recent topic of interest in regenerative plastic surgery due to their relative ease of collection, rich quantity of stem cells, and ability for long term in vivo retention. The application of ADSCs has been particularly useful in procedures such as fat grafting, facial rejuvenation, and wound healing. However, after ADSCs are implanted, it is not entirely understood what happens to them and where they go. Tissue migration and reabsorption are always possibilities. It is essential to be able to monitor these implanted cells to determine long term safety and efficacy of these procedures. To safely track implanted ADSCs, it is essential to find a marker that is non-toxic, easily imaged, and retained well in target cells. Hypothesis: Fluorescent polymer nanoparticles will remain associated with ADSCs and can be used for in vivo tracking preferentially compared to unlabeled cells or other fluorescent means. Methods: Green

fluorescent protein (GFP)-labelled ADSC cells were cultured in vitro with fluorescent polymer nanoparticles, using 50 µg nanoparticles/mL of media. Discarded media was imaged using UV/VIS to quantify the number of nanoparticles in the supernatant to determine intracellular concentration. Nanoparticle-containing GFP labeled ADSCs were then prepared for intra-peritoneal injection into C57/BL6 strain mice, along with control samples of GFP labelled ADSCs without nanoparticles, and samples of 50 µg/mL nanoparticles only. Each of these three groups contained 5 animals, all of which were imaged using a fluorescent detection in vivo imaging system (IVIS) once a week for five weeks. After five weeks, all animals were euthanized, following which an intra-peritoneal lavage was performed to collect cells remaining in the abdomen. Samples of the lungs, liver, spleen, inguinal lymph nodes, and peritoneal tissue were also collected and analyzed using UV/VIS and IVIS to quantify GFP cells or nanoparticles. Results: Fibrotic masses were found attached to tissues of the intraperitoneal space in all animals belonging to trial groups containing GFP-labelled ADSCs, with or without nanoparticles. Imaging with IVIS and UV/VIS showed that these masses were positive for both GFP and nanoparticle signal. In nanoparticle only trials, the highest concentration of nanoparticle signal was seen in the liver, with trace amounts in peritoneal tissue and the spleen. Conclusions: After intraperitoneal injection, ADSCs became attached to various intraperitoneal sites, which underwent fibrotic change. In the absence of GFP cells, nanoparticles are retained primarily in liver tissue. IVIS imaging showed trace signals from nanoparticles contained in the liver but was not sensitive to the lower concentrations of nanoparticles in other tissues. The fluorescent polymer nanoparticles indicated that ADSCs were retained near the injection site, with limited migration due to and inherent fibrotic response to the cells, regardless of whether the ADSCs contained nanoparticles or not. The fluorescent nanoparticles facilitated visualization of the lack of ADSC migration following injection. Source of mentor's funding or other support that funded this research: WFSOM Department of Plastic and Reconstructive Surgery

25. A Dopamine-functionalized Hydrogel System for Therapeutic Delivery of Extracellular Vesicles

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Extracellular vesicles (EVs) are small nanovesicles that are involved in cell communication, protein transfer, the delivery of small RNAs to the surrounding cells and exhibit therapeutic potential for tissue engineering and regenerative medicine applications. Current hurdles such as large-scale production and low delivery efficiency reduce their efficacy for regenerative medicine applications. Systemically delivered EVs are rapidly cleared from the target site before delivering their bioactive molecules, so in order to enhance therapeutic efficacy there is a need for improved delivery methods of EVs. Herein, we describe a novel hydrogel material that is capable of sustained EV delivery which can thereby improve outcomes of EVs. Hyaluronic acid (HA) was functionalized with dopamine (Dopa), the adhesive molecule responsible for marine mussel adhesion. The catechol groups of Dopa have strong adhesive properties and exhibit the capability to adhere to both proteins and lipids which are exhibited on the EV surface. Next, two copper-free click chemistry molecules were conjugated to HA-Dopa to allow for in situ formation of the hydrogel. The material properties were then characterized via UV-Vis spectroscopy, H-NMR, and rheological analysis. Release kinetics were modeled with two model molecules in order to simulate EV release. Next, the Dopa-functionalized hydrogel system was validated with placental stem cells (PSCs) in terms of their viability and differentiation capacity using osteogenic EV delivery. Dopamine functionalization was achieved at two concentrations: HA-Dopa 4% and HA-Dopa 14% and click chemistry crosslinkers were conjugated at 15, 30, and 60 mmols. For the storage modulus, HA-Dopa 4% had 675.0±30.9, 871.63±18.7, and 893.4±134.9 Pa for 15, 30, and 60mmol crosslinker concentrations respectively. For HA-Dopa 14% the storage modulus was 790.1±47.8, 992.7±27.8, and 1498.72±117.2 Pa for 15, 30, and 60 mmol crosslinker concentrations respectively. Dopa functionalization increased the total time of release to 10 and 14 days for HA-Dopa 4% and HA-Dopa 14% respectively, compared to total release of <24h with the non-dopamine functionalized control group. The hydrogel exhibited viability over 80% and the addition of osteogenic EVs lead to enhanced osteogenic differentiation. Herein, we have developed and characterized a platform delivery system that can sustain the release of multiple types of bioactive molecules. We plan to use this system to sustain release of therapeutic EVs at a target site. By sustaining release of EVs at the target site, limitations associated with EVs can be greatly reduced and clinical outcomes of EVs can be improved. The hydrogel system allows for both non-invasive delivery to a target site or the creation of patient specific scaffolds through 3D bioprinting. Our next steps are to validate this novel hydrogel system in an in vivo rat calvarial model. In this model we will deliver 100ug/mL of previously characterized osteogenic-EVs to the defect site and analyze bone mineral deposition and bone volume of a 16-week treatment period.

26. Prepectoral, Direct-to-Implant Breast Reconstruction: The Role of Autologous Dermal Flaps in the Setting of Obesity and Breast Ptosis

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Background: Direct-to-implant prepectoral breast reconstruction is becoming increasingly favored, though many are reluctant to perform this procedure in obese women due to a concern for increased perioperative morbidity. The goal of this study was to review surgical outcomes after direct to implant, prepectoral breast reconstruction in a patient population with a wide range of body mass indices (BMI). Methods: A retrospective chart review identified all patients who underwent prepectoral, direct-toimplant breast reconstruction from May 2019 - July 2022 by a single surgeon. Patient demographics, medical history, operative course, and postoperative complications were reviewed. Patients were subdivided into groups by BMI of less than or greater than 30 kg/m2. Results: Thirty-one patients (54 breasts) were reviewed with an average BMI of 30 kg/m2 . Mastectomy type included wise pattern skin reducing (55%), skin sparing (33%), and nipple sparing (9%). Immediate reconstruction occurred in 58% of cases, while 42% required a vascular delay (less than 30 days) before implant placement. Sixteen patients' body mass indices were less than 30 kg/m2 , while 15 patients were greater than 30 kg/m2 . Major complication rates were similar in the lower BMI and higher BMI groups, respectively 32% versus 20%. A summary of the results is shown in Table 1. Conclusions: This study demonstrates that prepectoral direct-to-implant reconstruction is a viable option for women with a higher BMI. The complication rate in this cohort of patients remains similar to those previously described.

27. The Role of PKCβII Inhibition in Skeletal Muscle Oxidative Stress

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Disclosures: None. INTRODUCTION: Tourniquets are widely used in orthopedic surgeries to reduce intraoperative blood loss and improve surgical visualization. While beneficial, tourniquet use can cause ischemia-reperfusion (I/R) injury leading to muscle atrophy, impaired contractility, and delayed functional recovery [1].Tourniquet-induced I/R injury is mediated by excess mitochondrial reactive oxygen species (ROS) production to induce apoptosis of skeletal muscle [2]. Protein kinase C beta-II (PKCβII) regulates mitochondrial ROS production by phosphorylating redox p66shc protein, which translocates and accumulates in mitochondria to induce apoptosis. Ruboxistaurin (RBX) is a selective PKCβII inhibitor that has been shown to block PKCβII-mediated p66shc activity to protect against ROS-mediated I/R injury in the heart by reducing infarct size and improving cardiac function [3]. PKC is represented by a family of serine/threonine kinases that mediate a range of physiological functions that can vary among different cell types [4]. The aim of this study is to determine if PKCβII modulates ROS production in skeletal muscle. We hypothesize that mouse myoblasts treated with Ruboxistaurin (RBX) will decrease ROS levels using an in vitro model of chemically induced oxidative stress. METHODS: C2C12 mouse myoblasts were incubated with a broad-spectrum PKC activator, phorbol 12-myristate 13-acetate (PMA), for 1h at variable concentrations (100 nM - 1 uM) to stimulate ROS production. Pre-treatment with 200 nM RBX was 30-min prior to and at the onset of PMA stimulation. Cell viability was evaluated with a colorimetric assay. Diacetyldichlorofluorescein (DCFH) detection of intracellular ROS was quantified using a fluorescent microplate reader. Live-cell imaging was performed with Hoechst nuclear stain and DCFH for visualization of nuclei and ROS using fluorescent microscopy. Fluorescence intensity for nuclei and ROS regions of interest were quantified using ImageJ. The corrected total cell fluorescence (CTCF) was calculated by subtracting the background intensity from the integrated fluorescence density within the regions of interest. All data were tested for normality and homogeneity of variance with Levene's test. Student-test and ANOVA Tukey method were used to compare means between groups with an alpha level of 0.05 to determine significance. RESULTS: PMA stimulation resulted in a four-fold increase in ROS levels at all tested concentrations compared to untreated controls ($n=3$, $p<0.05$). PMA concentrations (100 nM - 1uM) were not significantly different from each other. Cell viability of cells ($n=4$) stimulated with PMA (100 nM) with and without RBX were similar to untreated controls. In ROS regions of interest in DCFH-positive cells, RBX ($n=5$) significantly attenuated ROS by 45% compared to PMA controls ($n=7$; $p<0.05$). CTCF units for nuclei regions of interest were similar for PMA and RBX-treated samples. DISCUSSION: The data suggests that treatment of C2C12 mouse myoblasts with RBX attenuates PMA-stimulated ROS production. Reductions in ROS were

not likely due to cell death since neither PMA nor RBX were toxic to cells. Selective PKCβII inhibition may represent a novel therapeutic approach for the prevention of tourniquet I/R injury of skeletal muscle. In future studies, we will further characterize ROS production using a mitochondrial-specific fluorescent ROS indicator. Western blots of cytosolic and membrane fractions will be compared to confirm PKCβII redistribution and p66shc activity in C2C12 myoblasts. SIGNIFICANCE/CLINICAL RELEVANCE: Tourniquet use is often necessary but can induce I/R injury to skeletal muscle, ranging from impaired function to threatened limb loss. The long-term goal of this study is to investigate an effective therapeutic to minimize muscle damage and accelerate recovery from tourniquet I/R injury. REFERENCES: 1. Fitzgibbons, P. G., Digiovanni, C., Hares, S., & Akelman, E. (2012). Safe tourniquet use: a review of the evidence. The Journal of the American Academy of Orthopaedic Surgeons, 20(5), 310-319. https://doi.org/10.5435/JAAOS-20-05-310 2. Lejay, A., Meyer, A., Schlagowski, A. I., Charles, A. L., Singh, F., Bouitbir, J., Pottecher, J., Chakfé, N., Zoll, J., & Geny, B. (2014). Mitochondria: mitochondrial participation in ischemia-reperfusion injury in skeletal muscle. The international journal of biochemistry & cell biology, 50, 101-105. https://doi.org/10.1016/j.biocel.2014.02.013 3. Kong, L., Andrassy, M., Chang, J. S., Huang, C., Asai, T., Szabolcs, M. J., Homma, S., Liu, R., Zou, Y. S., Leitges, M., Yan, S. D., Ramasamy, R., Schmidt, A. M., & Yan, S. F. (2008). PKCbeta modulates ischemia-reperfusion injury in the heart. American journal of physiology. Heart and circulatory physiology, 294(4), H1862-H1870. https://doi.org/10.1152/ajpheart.01346.2007 4. Steinberg, S.F. (2008). Structural basis of protein kinase C isoform function. Physiological reviews, 88(4), 1341-1378. https://doi.org/10.1152/physrev.00034.2007

28. A Systematic Review of Cutibacterium Acnes in Breast Surgery & Related Adverse Outcomes

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Introduction: Cutibacterium acnes (C. acnes; formerly Propionibacterium acnes) is a bacterial species that resides in a range of human organs, including the skin, and was thus previously considered a contaminant in intraoperative cultures. With recent advancements in diagnostic technology, C. acnes is cited as a leading source of infection in orthopedic literature for shoulder surgery and within plastic surgery it is ubiquitously present in breast capsules. However, the role of C. acnes has yet to be fully appreciated or understood in breast surgery. Methods: A systematic review was completed identifying all original research papers or case reports discussing breast surgery and C. acnes. PubMed, Embase, and Web of Science were searched with the terms shown in Table 1. Articles were then reviewed for duplicates and excluded based on title, abstract, and full paper revision Figure 1. Results: Final papers are represented in Table 2. 14 of the 16 papers examine the role or prevalence of C. acnes in capsular contracture. Staphylococcus Aureus is frequently cited as the most commonly isolated organism, with C. acnes also isolated from implants/capsules in 14 of 15 papers. This literature search highlights the potential implications of C. acnes as a contributory organism to biofilms and capsular contracture. Conclusion: For nearly three decades C. acnes has been a prevalent organism in breast surgery literature, although little remains known about its clinical implications. A need exists for novel research surrounding the impact C. acnes has on patient outcomes and the requisite to evolve clinical practice.

29. Acetylsalicylic Acid Dosage and Duration Effects on Deep Inferior Epigastric Perforator (DIEP) Flap Breast Reconstruction

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Background: The deep inferior epigastric perforator (DIEP) flap has emerged as the gold standard for breast reconstruction following mastectomy.1 The employment of microvascular techniques causes endothelial trauma activating coagulation paths increasing microthrombosis risk.2,3 Multiple pharmacological agents have been investigated for thrombosis prevention in the setting of DIEP flaps with one of these agents being acetylsalicylic acid, or aspirin. Current literature evaluating postoperative aspirin in DIEP flaps varies on the dosage, duration, timing, and respective patient outcomes.2-5 Methods: With IRB approval, a retrospective chart review of 508 patients (843 flaps) who underwent DIEP flap breast reconstruction from January 2019-March 2022 at Atrium Health was completed. Patient demographics, medical history, operative course, and postoperative complications were collected. Results: Patients were grouped by no aspirin, 81mg, or 325mg postoperative aspirin. The no aspirin group experienced no flap failures. There was no significant difference in flap failure

incidence between the 81mg and 325mg groups (p=0.11). There was no significant difference in incidence of hematoma requiring return to OR when comparing the no aspirin group to patients taking 81mg or 325mg (p=0.09). Additionally, no difference was found in hematoma incidence for the 81mg versus 325mg group (p=0.97). Conclusion: No difference in hematomas requiring operative intervention or flap failures was found in regards to postoperative aspirin use. There was also no difference in hematoma incidence with 81mg compared to 325mg of aspirin.

30. Regional Morphologic Outcomes in Spring-mediated Cranioplasty and Cranial Vault Remodeling

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Background: Spring-mediated cranioplasty (SMC) and cranial vault remodeling (CVR) are widely used surgeries for repair of sagittal craniosynostosis (SC). This study evaluates the pre-and post-operative three-dimensional regional morphology of SC patients who have undergone either SMC or CVR using the frontal bossing index (FBI), occipital bulleting index (OBI), vertex narrowing index (VNI), and scaphocephalic severity index (SCI) to capture differences in anterior protrusion, posterior protrusion, width restriction, and global dysmorphology, respectively. Methods: CT and 3D photographs (n= 788) of 222 SC patients from 2001 to 2022 who underwent SMC (489) and CVR (299) were analyzed longitudinally to quantify anterior, posterior, biparietal, and global change. Short-term post operative trends were evaluated based on post-operative time in 6-month intervals from 0-12, followed by a yearly 12-24 interval through two years postoperatively, and long-term trends were evaluated based on age in 2-year intervals up to 10+ years of age. A combination of analysis of variance, Tukey-Kramer post-hoc analysis, and independent t-tests were used with $p < 0.05$ significance level. Results: The mean age (months) at time of surgery was older in the CVR cohort (mean 22.35 ± 15.83) than in the SMC cohort (mean 4.43 ± 2.25; $p<0.05$) with SMC comprising 152 cases and CVR 70 cases. Pre-operatively, the SMC cohort had more severe regional dysmorphology in FBI, VNI, and SCI ($p<0.05$) relative to the CVR group. The FBI, VNI, and SCI improved in short-term (12-24 months post-operative) and long-term (10+ yrs. of age) analysis of both cohorts ($p<0.05$). In the initial post-operative period (0-2 yrs.), the difference in FBI between the two cohorts was maintained ($p<0.05$). However, SMC had a larger percent improvement in FBI for the first 12 months postoperatively ($p<0.05$). The VNI improved rapidly in the first 6 months after surgery in both cohorts and was statistically equivalent between the cohorts in the two-year postoperative period. However, percent change was significantly better in the SMC cohort at all time points ($p<0.05$). On long-term age-based analysis, the difference in FBI between surgical approach disappeared in the 6-8-year-old group ($p= 0.57$) at which point the two cohorts improved at statistically equivalent rates. Despite a narrower head preoperatively, the SMC cohort achieved a statistically equivalent VNI at all age groupings. The global SCI trended towards superiority in SMC by 10 years of age ($p=0.087$) despite more severe preoperative morphology. Conclusions: SMC and CVR achieve similar long-term regional morphologic outcomes with SMC achieving better percent improvement in FBI, VNI, and SCI. SMC trended towards significance in achieving better maintenance of morphologic improvements while CVR trended to have early improvement that is less durable over time. Surgical repair with SMC and CVR impacted cranial width more than anterior protrusion and posterior protrusion in the short and long-term.

31. Patient-derived Organoids as a Model to Assess Tumor Specific ECM Architecture

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Introduction: Tumor growth and malignancy are heavily influenced by the tumor microenvironment (TME), a tightly integrated structure composed primarily of tumor cells, cancer associated fibroblasts (CAFs), immune cells, endothelial cells, signaling molecules, and extracellular matrix (ECM) proteins. In many cancers, crosstalk between tumor cells and nearby stromal cells results in a “stromagenic switch” in which the stroma flips from a suppressive to a supportive role in tumorigenesis through the induction of the CAF phenotype. These reprogrammed fibroblasts are particularly active and are the primary remodelers of the ECM through the formation, degradation, and realignment of structural ECM components, especially collagen. The resulting architectural changes in the TME mediated by CAFs influence tumorigenesis and cancer progression and leads to a tumor-promoting desmoplastic stroma implicated in 20% of cancers. The complexity of these

interactions has made it challenging to map the contribution and interplay of factors including tumor origin, location, and progression in the development of tumorigenic stroma, and calls for the development of novel approaches to model this behavior. In this study, we aim to characterize the remodeling response induced by the crosstalk between cancer and stromal cells using an organoid model. Methods: Stromal cells were isolated from tumor (colorectal or appendiceal) or normal liver sites and cultured in pro-fibroblastic conditions. In parallel, spheroids were formed from patient-derived appendiceal cancer cells as well as two colorectal cancer cell lines (HCT-116 and Caco-2). Each stromal cell type was embedded in a collagen type I solution which was then used to suspend the spheroids and allowed to crosslink to form organoids. A portion of these organoids were treated with TGF-β, a potent fibroblast activator, which served as a positive control. After one week in culture, organoids were collected and measurements were taken to assess overall stiffness as well as collagen fiber density, length, width, straightness, and angle. Results: Picrosirius red staining followed by polarized light imaging and hue analysis indicated that cancer cells alone were insufficient to remodel collagen, and significant remodeling only occurred in the presence of stromal cells. This effect was pronounced in regions of the organoids bordering the cancer cell spheroids. Treatment of organoids by TGF-β tended to produce stiffer collagen fibers as assessed by rheological measurements, and this effect was somewhat strengthened by the presence of spheroids. Differences in remodeling between primary stromal cells were not pronounced, though increased bundling of collagen fibers was observed compared to a hepatic stellate cell line (LX-2). Conclusion: This project demonstrates a working system for the study of architectural changes in patient-derived tumors and provides evidence for interactions which are most pronounced at the tumor-stroma interface. Future work will expand on the number of tumor samples, with special interest in exploring the differences between high and low grade appendiceal tumors and further characterization of the molecular factors implicated in these tumor-stromal interactions.

32. Fasciocutaneous Parascapular Free Flap: A Reliable Reconstructive Option for Complex Head and Neck Surgical Defects

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Objective: This study aimed to define perioperative factors and surgical outcomes for patients that underwent fasciocutaneous parascapular free flap reconstruction of complex head and neck defects after tumor extirpation. Study Design: Retrospective cohort study Setting: Tertiary academic hospital Methods: This study included patients who underwent reconstruction of complex head and neck surgical defects using fasciocutaneous parascapular free flap at a single tertiary care center between October 2005 and December 2018; with a focus on patient demographic characteristics, post-operative flap and donor site complications, frequency of need for flap revision, and 30-day all-cause mortality. Results: One hundred twenty-nine patients were included in the study. A total of sixty-seven patients had received radiation, chemotherapy, or a combination prior to surgery (51.9%). Primary defect locations included cutaneous (28.7%), oral cavity (29.5%), oropharynx (3.9%), nasopharynx (3.1%), sinus/orbit (19.4%), infratemporal fossa (3.1%), hypopharynx (3.1%), and larynx (9.3%). Flap complications occurred in forty-three patients (33.3%), including venous congestion (6), hematoma (7), dehiscence (18), anastomotic leak (5), fistula (7), infection/abscess (1), partial necrosis (8), and complete necrosis (7). Donor site complications included wound dehiscence (6), hematoma (5), and a combination of the two (1). Operative flap revision was required in 28 patients. The overall success of the reconstruction was 94.6%. Conclusion: Fasciocutaneous parascapular free flaps are an attractive choice for reconstruction of head and neck surgical defects due to the availability of a large skin paddle, consistency of the vascular supply, ease of flap harvest, versatility and resiliency of the donor tissue.

33. Utilizing Organoids to Study Perfusate Selection in Appendiceal Cancer Patients Undergoing Repeat HIPEC

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Introduction Repeat cytoreductive surgery (CRS) with HIPEC offers survival advantage in select patients with peritoneal surface disease. Patient-derived tumor organoids (PTOs) established after the 1st CRS/HIPEC may generate additional selection parameters for patients who are candidates for repeat cytoreduction. Herein, we explore PTO drug efficacy in

patients who have undergone repeat CRS/HIPEC. Methods After IRB approval, tumor samples were obtained from patients with appendiceal cancer undergoing CRS/HIPEC at our institution. PTOs were biofabricated utilizing unsorted tumor cells resuspended in a collagen-based hydrogel and underwent HIPEC treatment with mitomycin C (MMC) and oxaliplatin and endpoint analysis with ATP viability. Significant PTO responses demonstrated <50% post-treatment viability and were significantly different than untreated controls ($p<0.05$). Results From June 2019 through June 2022, 74 specimens were collected from 51 patients who underwent CRS/HIPEC for low grade appendiceal (35/68, 51.5%) and high grade appendiceal (16/68, 23.5%) cancer. 7 patients (13.7%) underwent repeat CRS/HIPEC. Successful PTO studies were conducted in 67/74 specimens (90.5%). MMC demonstrated improved cytotoxicity in repeat HIPEC PTOs compared to oxaliplatin (32.5% vs. 46.2%). When oxaliplatin was utilized as the perfusate during the first CRS/HIPEC, only 2/8 (25%) PTOs fabricated from repeat CRS/HIPECs of the same patient displayed significant treatment efficacy to MMC (n=1, 17% viability) and oxaliplatin (n=1, 25.6%) with an average viability of 45.9%. When MMC was utilized as the first HIPEC, 9/10 (90%) PTOs fabricated from repeat CRS/HIPEC demonstrated significant treatment responses to both MMC (n=5, avg viability 26.8%) and oxaliplatin (n=4, avg viability 41.4%), with an average viability of 34.1%. Further, repeat PTOs fabricated from patients who received MMC during their first HIPEC demonstrated improved cytotoxicity to both oxaliplatin (38.8% vs. 61.0%) and MMC (25.2% vs. 47.2%) compared to those receiving oxaliplatin. Conclusions Tumor organoids represent a unique platform to study drug sensitivity in CRS/HIPEC patients. PTO studies performed from specimens HIPEC patients may help improve selection of perfusates utilized in subsequent cytoreduction surgeries.

34. Assessing the Mucolytic and Cytotoxic Activity of Bromelain in Appendiceal Cancer Organoids

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Introduction Mucin production in appendiceal cancer (AC) has been hypothesized to serve as a barrier to HIPEC drug delivery and treatment resistance. There is no currently approved mucolytic agent for AC. Bromelain is a pineapple extract with mucolytic properties that has generated research interest. We explored the cytotoxic and mucolytic effects of bromelain against mucinous AC in a patient-derived tumor organoid (PTO) model. Methods After IRB approval, tumor specimens were obtained from patients with AC undergoing cytoreductive surgery with HIPEC. PTOs were biofabricated using an unsorted tumor cell suspension in a collagen-based hydrogel. PTOs underwent HIPEC mimicry treatment with bromelain, cisplatin, and mitomycin C (MMC) under 37C and 42C conditions. Bromelain was also assessed as a pre-treatment agent to MMC and cisplatin HIPEC treatments. Results From October 2020 - March 2022, 11 specimens were collected from 10 patients with low grade appendiceal (7/11, 63.6%) and high grade appendiceal cancer (4/11, 36.4%). Testing was successful in all 11 specimens. Mucin depleting effects of bromelain (600 ug/ml) were greatest in the presence of N-acetylcysteine (NAC, 3% w/v) compared to bromelain alone (50% residual mucin vs 85%, $p=0.002$) and NAC alone (85% residual mucin, $p=0.003$). The cytotoxicity of bromelain increased with time and reached statistical significance only 60 minutes after treatment exposure (>50% post-treatment viability reduction, $p<0.01$). The cytotoxicity of cisplatin and MMC increased with the addition of bromelain under 42C HIPEC conditions compared to cisplatin (70% greater reduction in post-treatment cell viability, $p=0.03$) and MMC (60% greater reduction in viability, $p=0.002$) alone. IHC studies demonstrated reduced Ki67, CK20, and MUC2 expression after treatment with bromelain. We also found increased expression of annexin V and caspase 3/7 in bromelain treated PTOs compared to untreated controls, suggesting bromelain's anti-tumor activity induces apoptosis pathways. Antiapoptotic-prosurvival proteins Bcl-2 and Bcl-xL were significantly reduced after treatment with bromelain compared to untreated controls ($p=0.009$ and $p=0.01$, respectively). Conclusions Bromelain demonstrates mucolytic and cytotoxic activity against appendiceal cancer PTOs both as a single agent and in combination with traditional perfusates. Bromelain may induce its cytotoxic effects through activation of apoptosis.

35. Chronic Cough: Evaluation of Patients' Success in Completing Cough Suppression Therapy

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Background: Chronic cough is highly prevalent amongst many patients in the US. Behavioral interventions with speech-

language pathologists (SLP) can improve quality of life but require patient-centered motivation, therapy attendance, and compliance with therapy techniques. Previous studies have shown the internal factors of self-efficacy and goal commitment are integral to patient motivation to pursue cough suppression therapy (CST). In this study, the authors aim to identify the motivational factors that prompt patients' progression from the contemplation to action stage of change and attend cough suppression therapy. Methods: A retrospective chart review was performed on patients > 18 years presenting to a tertiary care laryngology clinic with chronic cough. The patients were previously surveyed between February 2021-July 2021 to determine motivational factors for attending CST. Patient compliance with CST was identified (yes/no) as well as the number of visits and cough severity index (CSI) at therapy, if available. Results: Thirty-five patients were identified with ages ranging from 33-76 (mean 57.6 years, SD: 12.3). The majority were female (n=25) with a mean presenting CSI of 19.9 (10.3). After expressing intent, 71% of patients entered the action phase of change and attended CST with an average improvement in CSI of 4.4. Conclusion: The most common motivational factors overall were cough bothersome to self and desire for cough to improve, however, the extrinsic motivation of cough bothersome to others was more often reported by those attending therapy. Understanding patients' motivations to participate in CST may be useful when assessing candidacy and helping patients remain in the action stage required for success in behavioral therapy.

36. Impact of Lingual Adiposity on Obstructive Sleep Apnea

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Title: Impact of Lingual Adiposity on Obstructive Sleep Apnea Purpose: There is growing evidence that excess adipose tissue within the head and neck contributes to obstructive sleep apnea (OSA), particularly in obese patients. This subset of the population is often difficult to treat with surgical therapies. We theorized that tongue fat is a key factor in the development of OSA in obese patients; however, it is not clear if tongue fat also plays a role in the normal and overweight patient population. Our study was designed to determine if tongue fat plays an important role in this population. Methods: This is a prospective case-control study. Patients were prospectively recruited immediately after undergoing an overnight polysomnogram at the WRNMMC sleep clinic. The results from the sleep study were not known at the time of consent. A total of 86 patients were recruited. Subjects underwent magnetic resonance imaging (MRI) utilizing a three-point Dixon sequence. Volumetric reconstruction algorithms were used to evaluate the size and distribution of tongue fat deposits within subjects with sleep apnea and their matched controls without. Results: 86 patients were identified; mean age of 42.2 (SD, 11.2) years, 16% female. Patients on average had BMI 27.5 (SD, 2.89), with 18.6% (n=16) normal BMI, 61.6% (n=53) overweight, 19.8% (n=17) obese. Logistic regression lines were plotted for significant predictors of AHI score, and a positive correlation was found for AHI vs BMI and AHI vs age. No significant correlation was found for AHI vs tongue fat volume, or BMI vs tongue fat volume. No correlation was found for AHI vs tongue fat fraction or BMI vs tongue fat fraction. Logistic regression of predictors for apnea presence AHI ≥5 (n=48) vs <5 (n=36) demonstrated higher average age (45.4 years) and BMI (28.3) in those with AHI ≥5 vs average age (38.2 years) and BMI (26.5) in those with AHI <5. While tongue volume and fat fraction were found to be higher in the patients with AHI ≥5, the difference between this population and patients with AHI <5 was not found to be statistically significant. Conclusion: Our study demonstrates that tongue fat does not play a significant role in the pathophysiology of OSA in the non-obese (BMI< 30) patient population. When analyzed with prior literature in the obese population, this suggests that tongue fat likely plays a significant role in the development and severity of OSA in the obese population and may explain, in part, why obese and morbidly obese patients are difficult to treat. Based on this study, we believe selective treatments targeting tongue fat should be designed and limited to the obese and morbidly obese population. Clinical Implication: These results may help determine criteria to consider whether individual patients would benefit from a novel, minimally invasive OSA treatment via cryoablative tongue fat reduction.

37. Blocking Inositol-requiring enzyme-1 (IRE1) affects triple-negative breast cancer chemotherapy sensitivity and prevents chemotherapy-related cardiotoxicity

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Triple-negative breast cancer (TNBC) is one of the most highly aggressive breast cancer types that predominately affect young and minority women. TNBC patients are more likely to receive cytotoxic chemotherapy regimens since they have limited targeted options. This results in severe side effects resulting in chronic cardiac dysfunction. Another issue compounded in the risk of developing cancer and chemotherapy-related toxicities is obesity. Obesity is associated with worse overall survival in women with TNBC. Inositol-requiring enzyme-1 (IRE1) is an arm of the unfolded protein response (UPR) pathway that plays a crucial role in tumor development. It has been shown that IRE1/XBP1 protein levels are upregulated in TNBC. Preliminary data suggested that targeting IRE1 in combination with Doxorubicin (DOX) enhances chemotherapy responsiveness in the 4T1 breast cancer model and reduces metastasis. Moreover, inhibiting IRE1 prevents long-term DOX-mediated cardiac damage by reducing fibrosis. Therefore, to determine the role of obesity and IRE1 targeting on chemotherapy response and the development of therapy-related cardiac toxicity, female BALB/c mice were placed on control (low fat) and Western (high fat) diets and injected mammary gland tissue with 4T1-luciferase murine TNBC cells. Mice were treated with doxorubicin (DOX) with or without IRE1 blockade. Cardiac function was measured by ultrasound at baseline and at the end of the study. Our data demonstrate that a high-fat diet promotes primary tumor growth and potentiates cardiac dysfunction. Furthermore, we found that the combination of targeting IRE1 with DOX enhanced chemotherapy responsiveness in TNBC preclinical models. Moreover, DOX treatment alone reduces cardiac function, but this effect was prevented by targeting IRE1 in the high-fat diet model. Also, targeting IRE1 increases mitochondrial respiration suggesting that IRE1 blockade may enhance mitochondrial function during stress as a potential cardio-protective mechanism. Overall results suggested that systemic suppression of IRE1 protected cardiac tissue in mice treated with doxorubicin while enhancing anthracycline-mediated tumor killing.

38. Routine Fungal & Acid-Fast Cultures in Diabetic Foot Infections: Are They Worth the Cost

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Background: Diabetic foot infections (DFIs) are a complication of diabetes mellites (DM) that can add to the already costly care for patients with DM. One incurred cost relates to intraoperative cultures. It is well documented that DFIs are commonly polymicrobial; therefore, it is common practice to send an intraoperative specimen for gram stain, aerobic/anaerobic, acid fast and fungal cultures. Each added microbiology evaluation increases overall treatment cost, but do they add to a higher rate of successful treatment? Previous literature suggests that osteomyelitis due to fungal and mycobacterial organisms are rare. The purpose of this study was to examine the prevalence of positive acid-fast and fungal cultures. In addition, we aimed to determine if certain clinical characteristics yielded an increased number of positive acid-fast and fungal cultures and lastly to calculate the cost and potential cost savings related to the routine ordering of these two cultures. Hypothesis: Our study hypothesized that (1) few surgical cases of diabetic foot infections will result in positive acid-fast or fungal cultures, (2) certain patient characteristics and comorbidities will predict increased rates of positive acid-fast and fungal cultures, and (3) there can safely be cost savings for patients by abstaining from routinely ordering these tests. Methods: We examined the medical records of surgical patients between 09/2018 to 04/2022 from two foot and ankle surgeons that included a diagnosis of DM as well as fungal, acid-fast, gram stain, and anerobic/aerobic cultures taken at the time of surgery. 445 patients met the inclusion criteria and demographics, comorbidities, and culture results were recorded. Three logistic regressions were run to look at the odds of positive fungal cultures based on sex, immune state, and IDDM. The cost at AHWFB of each culture was determined by the associated laboratory codes for each respective test. Results: Of the 445 cases analyzed, only 1 case had a positive acid-fast culture, and 21 had positive fungal cultures. None of the three predictor variables were significantly associated with the odds of having a fungal infection. The following odds included: immunocompromised patients 2.054 (CI 0.724-5.826), female 0.783 (CI 0.280-2.183), and IDDM 6.921 (CI 0.918-52.177). Although none of the variables reached statistical significance, additional exploration of the data indicated that 20 of the 21 cases of positive fungal cultures were IDDM. The cost of the microbiologic cultures to patients at AHWFB was aerobic/anaerobic: $155, fungal: $143, gram stain: $77, acid-fast: $51. By not routinely ordering rarely positive acid-fact and fungal cultures, the savings per patient would be $194 and for total patients in our study would be $86, 330. Conclusions: In conclusion, this study supported our hypothesis that relatively few patients with DFIs have positive acid-fast and fungal cultures. We were unable to find statistically significant characteristics leading to positive fungal cultures. It should also be noted that of those who went on to heal after a positive fungal culture without subsequent surgery, more than half healed without treatment with anti-fungal medication. From this analysis, we can suggest that by routinely adding fungal and acid-fast cultures to microbiology assessments, the cost incurred by the patients will increase; but these cultures may not lead to increased rates of successful treatment.

39. Distraction osteogenesis and endoscopic suturectomy in the treatment of rachitic craniosynostosis: a case series and literature review

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Background: Patients with genetic or nutritional rickets frequently suffer from craniosynostosis. Surgical options described in the literature include various forms of craniectomy, but descriptions and outcomes following distraction osteogenesis and endoscopic approaches are scarce. Here, we first perform a comprehensive review of published surgical outcomes in patients with rachitic craniosynostosis. We then describe two patients with rachitic craniosynostosis who successfully underwent distraction osteogenesis at our institution. Case description: Two two-year old boys with rachitic craniosynostosis, one genetic and one nutritional, presented with pan-craniosynostosis. The patient with nutritional rickets had received an endoscopic suturectomy at another hospital 19 months prior. Both patients underwent PVDO with distractor devices activated daily for 30 days to achieve a target distraction of 30 mm. Blood loss was 5mL (genetic) and 40mL (nutritional). Complete distraction was confirmed by x-ray and both patients recovered without complication. There was no evidence of resynostosis at 18 month follow-up, although the patient with genetic rickets did undergo cranial vault remodeling to correct persistent turricephaly. Conclusion: PVDO successfully treated rachitic pan-craniosynostosis associated with both genetic and nutritional etiologies, although longer follow-up is needed to fully appraise outcomes. Endoscopic craniosynostosis surgery also temporarily relieved elevated intracranial pressure in the patient with genetic rickets, who was just 6 months of age at the time of surgery, but reoperation was ultimately necessary to relieve pan-resynostosis.

40. Comparing Anesthetic Techniques and the incidence of Perioperative Hypotension After Surgical Hip Fracture Repair

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Background: Two commonly employed methods of providing anesthesia for hip fracture repair are general or spinal anesthesia. General anesthesia employs a combination of medications to render the patient unconscious. Spinal anesthesia is performed via the injection of a local anesthetic into the subarachnoid space. With sensory anesthesia at or above the surgical site, the patient may not need significant sedation to tolerate the surgical stimulus. The most common anesthetic complication encountered in surgical hip repair is postoperative hypotension. In this investigation, hypotension was defined as systolic blood pressure (SBP) < 90 mmHg or mean arterial pressure (MAP) < 65 mmHg, and it was sought to compare two groups of patients who had surgical repair of hip fractures receiving spinal or general anesthesia. Hypothesis: Because spinal anesthesia induces sympathetic blockade leading to decreased venous return and reduced peripheral vascular resistance, we hypothesize that patients who received spinal anesthesia for hip fracture repair would be more likely to experience perioperative hypotension compared to those receiving general anesthesia. Methods: Using electronic medical records queried from WFBH Atrium Health, we identified 663 patients underwent surgical hip fracture repair. In descriptive analyses, we computed the mean number of minutes per hour in a hypotensive state. Our primary outcome was a hypotensive episode lasting 15 minutes or longer. We applied logistic regression to test for an association between anesthesia type and each outcome, separately, with multi-variable adjustment for ASA grade, age at surgery, sex, race, and ethnicity. In a sensitivity analysis, propensity score matching was performed using logistic regression with nearest neighbor 1:1 matching to create two balanced groups of patients who received either regional or general anesthesia. Results: 253 patients receiving regional anesthesia were matched with 253 patients receiving general anesthesia. The odds ratio (95% CI) for a hypotensive event at SBP less than 90 mmHg was 1.1 (0.72, 1.6), while the odds ratio for a MAP less than 65 mmHg was 1.0 (0.62, 1.7). The confidence interval for both ratios did not imply significance. Hypotensive events among the two groups were low as no patient recorded an episode of MAP of less than 65 mmHg lasting 15 minutes or more. Conclusions: Choice of anesthetic did not impact the incidence of hypotension, even when the two populations were matched. We suspect this is due to improved medical technology and monitoring, as the patients in this study were being monitored as frequently as every 15 seconds. An incidental finding is the extremely low rate of hypotension, even among the older cohort. This implies that the elderly may be more resilient to anesthetic procedures than the literature suggests.

41. Postoperative Opioid Use in Patients Undergoing Functional Endoscopic Sinus Surgery

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Background: Endoscopic sinus surgery is a commonly performed outpatient procedure where opioids are frequently used. Few prospective studies have been conducted to address opioid prescription after sinus surgery. Our goal was to further examine our practice habits in opioid prescription and its relation to patient experience. Methods: Prospective, observational study. Patients were consented prior to surgery between September 2018 and March 2020. All patients were given equal postoperative pain control recommendations and initial prescription for 20 tablets of hydrocodone-acetaminophen. One to two weeks postoperatively, the patients were called and asked to respond to five questions regarding the amount of opioid taken, the stop date following surgery, non-opioid pain regimen, how opioids were discarded, and if the patient felt opiate helped. The data was analyzed using binomial regression. Results: Twenty patients were included in the study with an average age of 52 years and an equal distribution of men and women. The median number of pills taken postoperatively was 3. Eighty percent of patients reported taking less than 5 pills, 10% used from 5-10 pills, and 10% used greater than 10 pills. Seventy percent of patients kept the remaining prescription after initial use. Thirty five percent of patients used no over the counter medications in addition to Norco. Seventy percent of patients felt the narcotic helped their pain following sinus surgery. A higher average narcotic was used in patients with a history of pain related diagnoses, multiple medical diagnoses, lung disease, diabetes, and any narcotic use. This was only found to be significant with history of any reported narcotic use (Mean 7.1 vs 2.4 pills taken, p=0.0161). Conclusion: The addition of a narcotic to postoperative pain regimen positively impacted patients' perception of pain control. Despite this, 90% of patients consumed less than half of what was prescribed. This information coupled with a detailed preoperative assessment will lead to judicious use of narcotics in the postoperative analgesic armamentarium.

42. Analyzing the Impact of a Chief Resident Service on Practicing Surgeons

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Introduction: Graduates of surgical residencies often feel unprepared for independent practice. A chief resident service designed to provide graduated entrustment through a faculty-supervised elective general surgery rotation might increase their self-perceived preparedness for practice. Therefore, we aimed to evaluate the perceived effect of a chief resident service experience on our graduates' transition to independent practice. Methods: We distributed an anonymous electronic questionnaire to all graduates from 2006 through 2021 who participated in the Chief Resident Service and for whom we could obtain a functioning email address. Scaled responses were measured on a scale of 0 to 100, with 0 indicating the respondents' experience on the Chief Resident Service greatly decreased the ease of their transition in a particular domain and 100 indicating the service greatly increased their ease of transition. Results: Out of 76 graduates between 2006 and 2021, we obtained working email addresses for 62 (81.6%) and obtained 48 responses (77.4% response rate). Participants completed residency training 6 years prior to survey completion on average, and currently describe their practice as academic (55.3%), community-based (23.4%) and community-based with an academic affiliation (21.3%). Overall, 93.8% of graduates indicated that they felt comfortable enough to enter practice immediately after graduation, and all respondents indicated that their experience on the service increased their sense of responsibility for patient outcomes. In fact, most reported their experience on the chief service increased their confidence in the operating room (97.9%), increased their ability to run an efficient clinic (100%), and eased their transition to practice (97.9%). For all self-reported competencies regarding the impact of the Chief Resident Service, median scores ranged from 77 to 100. Most respondents (89.5%) also provided open-ended responses describing their experience on the service with the majority (95.3%) reflecting positively on the service. Predominant themes identified by open-ended responses included increased confidence ("the Chief Service significantly increased my operative confidence and decision-making"), autonomy ("there is nothing like the Chief Service as a gauge of your technical autonomy"), and ownership ("I grew as a surgeon as I took true ownership"). Conclusions: Most graduates reported that their experience on the chief resident service eased their transition to clinical practice, specifically noting that the chief service increased their operative confidence, provided them with an unmatched opportunity for graduated entrustment, and increased their perception of ownership regarding patient outcomes.

43. Combined Hyperthermic And Antibiotic Therapy In The Treatment Of Surgical Implant Related Biofilm Infections

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Background: The purpose of the current study was to demonstrate the effectiveness of localized hyperthermia in augmenting the effectiveness of antibiotics against Staphylococcus aureus (S. aureus) and Pseudomonas aeruginosa (P. aeruginosa) biofilm. S. aureus and P. aeruginosa are two common bacteria associated with surgically implantable devices, and their development into biofilms impedes antibiotic effectiveness. Current research shows hyperthermic therapies may be useful in altering the composition of the extracellular polymeric matrix of biofilms which decreases the protective ability of the biofilm, increasing the effectiveness of antibiotics. The current study used Photothermal Therapy (PTT) as a method to induce hyperthermia. PTT uses near-infrared (NIR) light to stimulate photothermal nanoparticles (NPs) for the generation of heat. By embedding NPs in medical-grade silicone-based implants, localized hyperthermia at the interface of the implant and biofilm leads to rapid bacterial cell death, and precision treatment. Methods: PTT nanoparticles were developed using the polymer poly[4,4-bis(2-ethylhexyl)-cylopenta[2,1-b;3,4-b'] dithiophene- 2,6-diyl-alt22, 1,3-benzoselenadiozole-4,7-diyl] (PCPDTBSe), and dispersed at a ratio of 10mg of nanoparticles into 1g of silicone to form disks 5 mm in diameter and 1mm thick. Stimulation with 800 nm rapidly increases nanocomposite (BSe) temperature. S. aureus (XEN29) and P. aeruginosa (PA01) were cultured on BSe disks for 24hr. Planktonic bacteria was removed, and biofilms were treated with 200ug/mL Ciprofloxacin (CPFX) and simultaneously exposed to 800 nm light at 5W for 25 seconds (PTT). Bacteria were quantified by counting colony-forming units (CFU) immediately following PTT. CFU data was compared to control biofilms grown on silicone disks with no NPs (Si disks). Results: XEN29 biofilms grown on BSe disks showed a 0.6 log reduction when treated with CPFX. When treated with CPFX and PTT, XEN29 biofilms grown on BSe had a 0.7 log reduction compared to biofilms grown on Si disks exposed to CPFX and PTT. After treatment with CPFX, PA01 biofilms grown on BSe had a 1.5 log reduction in CFU. CPFX and PTT led to 100% ablation of PA01 biofilms grown on BSe, a 2.7e7 CFU difference from treatment with CPFX alone, and a 1.2e7 difference from biofilms grown on Si exposed to the same treatment. XEN29/PA01 cocultured biofilms grown on BSe disks showed a 1 log reduction when treated with CPFX. When treated with CPFX and PTT, XEN29/PA01 biofilms grown on BSe had a 1.3 log reduction compared to CPFX alone and a 1.6 log reduction compared to biofilms grown on Si disks exposed to CPFX and PTT. Conclusions: We have shown that the potential new treatment of using PTT for biofilm growth on surgical implants using medical-grade silicone embedded with PCPDTBSe nanoparticles does increase the effectiveness of relevant antibiotics in inhibiting S. aureus and P. aeruginosa biofilm. Further research using animal models is needed to demonstrate continued efficacy of PTT when used through tissue barriers.

44. One-step 3D bioprinted liver-on-a-chip (LOC) for drug cytotoxicity screening

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Liver-on-a-chip (LOC) is a 3D in vitro hepatic micro-physiological system aiming to recreate the conditions of hepatocytes and the dynamic physicochemical hepatic environment on a microscopic scale. Conventional LOC fabrication uses an assembly of chip parts such as polydimethylsiloxane (PDMS), glass slide, and polymethyl methacrylate (PMMA). However, it requires a lot of steps with manual labor and has limitations in reproducibility from sample to sample. The study aimed to automate the fabrication process of LOC for high throughput drug cytotoxicity screening. We utilized a 3D integrated tissue and organ printing (ITOP) system to allow one-step bioprinting of LOC that can automatically fabricate a whole chip within 25 min. The bioprinted LOC consists of an outer layer of polycaprolactone (PCL) and inner fluidic channels with liver organoids and hydrogel. After LOC is moved to the chip platform inside the incubator, it is dynamically cultured using a peristaltic pump, and its cell viability and metabolic activities after drug administration are further assessed. The human liver carcinoma cell (HepG2) organoids showed high cell viability (>70%), an increase in organoid size, consistent ATP production, and an increase in albumin production up to day 14. The effect of acetaminophen (APAP), which is a nonsteroidal anti-inflammatory drug and the primary cause of induced acute liver failure in the United States, was observed in LOC.

Compared to the non-treated group, APAP treated LOC group showed a significant loss in cell viability (< 40%), lower ATP production, and smaller spheroid size at day 7. The LOC fabricated using the one-step bioprinting process showed high cell viability and metabolic activities for 14 days of culture and could be used to detect the liver cytotoxicity of drugs. Thus, we believe it has the potential to serve as a high throughput Liver in vitro model for the accurate study of in vivo biological processes such as monitoring the tissue response to administered drugs.

45. Heparin-functionalized bioink for digital-light-processing (DLP) 3D bioprinting

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Like a native extracellular matrix (ECM), the bioink hydrogel system should not only provide structural support for the cells to reside within but also provide various biochemical (e.g., cell adhesion sites and growth factor reservoir) and biophysical (e.g. structural features and mechanical stiffness) cues for guiding cell behaviors. However, there are limited biomaterials for DLP bioink that has been utilized to serve these roles. The aim of this study was to utilize heparin, which is one of the glycosaminoglycan (GAG) known for its growth factor immobilization, in DLP bioink. We developed a heparin-based bioink by modifying heparin to have thiol (-SH) groups to form a covalently crosslinked hydrogel network of methacrylated gelatin (GelMA) and poly(ethylene) glycol diacrylate (PEGDA) during the UV-crosslinking process. DLP printability of heparin-based bioink was assessed using an artifact with six design metrics. The growth factor-binding effect in the heparin-based bioink was characterized by premixing the FGF2 in bioink and assessing the viability and proliferation of 3D bioprinted immortalized mouse myoblasts (C2C12). The thiol modification of thiolated heparin (HepSH) was roughly 50%, which allowed a proper heparin conjugation to GelMA and PEGDA hydrogel with an increase in mechanical/rheological properties compared to non-thiolated heparin. The bioink with 1 w/v% HepSH (PGHS1) showed higher print accuracy in square and circle designs and similar results in other designs compared to the bioink without HepSH (PG). Additionally, PGHS1 with pre-mixed FGF2 (PGHS1-FGF2) showed the highest cell viability and ATP activity on day 1 compared to PG, PG-FGF1, and PGHS1. PGHS1 showed high printability and its growth factor immobilization allowed a faster proliferation of encapsulated C2C12 cells in the early culture. The heparin-based DLP bioink has the potential to mimic the native ECM and be further used in Tissue Engineering and DLP bioprinting applications.

46. Neuropathy is associated with increased risk of amputation, revascularization, and death in patients with peripheral vascular disease

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Objectives: Peripheral neuropathy is associated with amputation risk among patients with diabetes mellitus and critical limb threatening ischemia (CLTI). The association of neuropathy and adverse limb events has not been clearly defined in patients with peripheral arterial disease (PAD) without diabetes mellitus or in those patients with intermittent claudication. Methods: Patients referred to vascular surgery clinic for PAD were recruited from a single center. Exclusion criteria were a documented history of neuropathy or prior lower limb amputation. Screening utilized the Michigan Neuropathy Screening Instrument (MNSI). Scores >2 were considered abnormal and scores >4 were considered positive for peripheral neuropathy. Limb-specific outcomes of amputation and revascularization as well as a composite outcome including death were modeled using time to event analysis. Results: 86 patients were recruited. Mean age was 67±10.2 years, 30% were women, 24% were black. Mean ankle brachial index (ABI) was 0.74±0.3. PAD symptoms at initial evaluation were claudication in 52% of patients and CLTI in 38% of patients. Neuropathy was present in 20% of the cohort with a significantly higher proportion in diabetics (34% vs. 3%; p=0.0009). Neuropathy was more common in patients with CLTI compared to claudicants (36% vs. 9%;p=0.011). Forty patients (47%) reached the composite outcome of amputation, revascularization, or death with a median time to event of 16 months. Abnormal MNSI examination was significantly associated with the increased risk of the composite outcome (HR=3.19; p 0.0005)(Figure 1). Conclusions: A significant proportion of patients presenting to vascular specialists for PAD have undiagnosed neuropathy. Patients with PAD and neuropathy have an increased risk of amputation, revascularization, and death. Expanding neuropathy screening in vascular surgery clinic visits may help to identify patients at higher risk.

47. Microfluidic Incubation of Patient Derived Tumor and Immune Cells Boosts Lymphocyte Cytotoxic Phenotype

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The human immune system possesses a remarkable capacity to recognize and eliminate a cell based upon specific antigens. In cancer therapy, a patient's own immune cells can be used to eradicate their tumor. Past research improved anti-tumor immune cell response by administering immune checkpoint blockade therapeutics (ICB). Other treatments seek to isolate, expand, and infuse tumor-derived immune cells (tumor infiltrating lymphocytes, TILs) or genetically modified T cells (chimeric antigen receptor (CAR) T cells) to target and eradicate cancer cells. Unlike CAR T cells which recognize only 1 antigen on a tumor, TILs recognize multiple tumor antigens. Being in 79 clinical trials, TILs have a promising record of treating melanoma, cervical, ovarian, lung, and colorectal cancer. Given their autologous nature, TILs have less associated side effects than engineered CAR T cells. However, TILs have poor proliferative capacity and viability which limits treatment availability and efficacy. Recent advances in ex vivo 3D cell culture biofabrication might enable improved TIL production. Specifically, the formation of tumor organoids (i.e. tumor microenvironment cells [cancer, stromal and immune cells] which are isolated from a tumor biopsy of an individual patient and encapsulated in extracellular matrix (ECM)-like hydrogel) closely mimics the in vivo environment and allows for high throughput analysis. We recently coupled patient-derived tumor organoids (PTOs) with patient-specific immune cells from peripheral blood mononuclear cells (PBMCs) and showed good response to ICB in these immune-reactive tumor organoids (iPTOs). To further mimic in vivo physiology, and potentially improve TIL production for clinical treatment efficacy, we seek to utilize microfluidics due to their close approximation of a circulatory system. We propose to emulate the in vivo activation of PBMC-derived T cells by exposing them to PTOs in a microfluidic chip. We hypothesize this method will generate large amounts of viable tumor-specific T cells, similar to TILs, but with increased viability, cell expansion propensity, and cytotoxic responsiveness. We hypothesized that the close contact of antigen presenting cells (APCs), tumor cells, and peripheral blood mononuclear cells through a microfluidic device would emulate lymph node activation of an immune cell to its target, characterized by an increase in markers of activation, cytotoxicity, proliferation, homing markers, and production of inflammatory cytokines. These factors were measured via flow cytometry, immunohistochemistry, and cell culture medium proteomic analysis. Experimental groups to be analyzed consisted of negative (untampered PBMCs) and positive (patient TILs) controls compared to a co-culture of PBMC, APC, and PTO (OILs) in a microfluidic device. The microfluidic chip design as well as its success to boost T cell cytotoxic phenotype will be presented.

48. Examining the incidence of Intraventricular Hemorrhage and Hydrocephalus in Patients with Non-Traumatic Intracerebral Hemorrhage: A Gender-Based Inquiry

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Introduction: Non-traumatic Intracerebral Hemorrhage (ICH) accounts for 2 million strokes annually worldwide. This stroke burden disproportionately impacts minorities, and results in severe neurological deficits. Sex differences in brain structure and function, such as a larger mean length of frontal horn in males and increased global cerebral blood flow in women, can contribute to hematoma volume and expansion of ICH into nearby structures. No studies have yet to investigate sex differences in the incidence of Intraventricular Hemorrhage (IVH) and hydrocephalus as sequelae of ICH, both or which correlate with poor long-term outcomes. Objective: To investigate sex differences in the incidence of Intraventricular Hemorrhage and hydrocephalus in patients with non-traumatic Intracerebral hemorrhage. Methods: A retrospective review of a comprehensive stroke center spontaneous ICH database from 2019-2022 was performed, including patient characteristics such as history of diabetes mellitus, hypertension, coronary artery disease, tobacco use, and anticoagulant use in addition to ICH characteristics such as hematoma location volume, expansion, incidence of IVH and hydrocephalus. A logistic regression model controlling for these covariates was built to investigate sex differences in incidence of IVH and hydrocephalus. Results: This cohort had 100 patients with spontaneous, non-traumatic ICH, of which 39% were female.

Overall, 52/100 (52%) patients had IVH and 21/100 (21%) patients developed hydrocephalus. Among males, 29/61(48%) had IVH as opposed to 23/39 (59%) in females, p = 0.264. There was similar development of hydrocephalus in both males 13/61(21%) and females 8/39 (21%). Logistic regression showed females had higher odds of IVH. Higher diastolic blood pressure and anticoagulant use on admission also had higher odds of IVH. Conclusion: This pilot study demonstrates a trend towards higher incidence of IVH among females when controlling for history of diabetes mellitus, hypertension, coronary artery disease, tobacco use, and anticoagulant use. Higher odds of IVH in patients with higher diastolic blood pressure on admission adds to the previously investigated association between systolic blood pressure and ICH hematoma volume. Our sample validated the higher odds of IVH in patients with anticoagulant use on admission.

49. Optimization of Functionalized Electrospun Vascular Scaffolds for Coronary Artery Bypass Grafting

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Cardiovascular disease is the leading cause of mortality in the US and worldwide. In particular, coronary artery bypass grafting is a procedure used to treat coronary artery disease (i.e., narrowing issues). The allografts and xenografts have immunogenic responses, and autografts are limited in supply and dimensions. In this study, we aimed to develop and optimize a biofunctional electrospun vascular scaffold for anti-thrombogenic effects and in situ endothelialization by controlling functional parameters. PCL/Collagen scaffolds were fabricated with different ratios using electrospinning system. Then, we conducted collagen crosslinking and heparin conjugation with various EDC/NHS ratio and reaction steps to immobilize endothelial cell (EC)-specific antibodies. We observed the crosslinking degree of collagen, heparin conjugation, and antibody conjugation onto the PCL/collagen scaffolds. Especially, we confirmed amount of heparin conjugation according to reaction steps that one-step showed more conjugation than two-step. In addition, the tensile strength of two-step was increased due to the collagen crosslinking degree increased, but the one-step showed low tensile strength. The antibody-conjugated scaffolds showed good anti-thrombogenic effects by the platelet adhesion test and in situ endothelialization by EC capturing test. We successfully prepared functionalized electrospun vascular scaffolds by heparin conjugation and EC-antibody immobilization.

50. The effect of basement membrane matrix co-localized with 3D bioprinted breast cancer spheroids on cancer aggressiveness

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Breast cancer is the most common cancer in pregnant and postpartum women. Triple-negative breast cancer (TNBC) is a type of breast cancer (10-15%) that is usually more aggressive and more likely to recur than other breast cancer subtypes. Since the treatment option of TNBC is limited to receptor-targeted therapy, only chemotherapy which is the systemic treatment has been applied. However, the responses to chemotherapeutic agents are varied according to the patients and the cancer characteristics. In addition, chemotherapeutic agents have undesirable adverse reactions. Thus, there is a need for developing an in vitro breast cancer model for personalized drug response examinations. In this study, we developed a breast cancer model using TNBC spheroids combined with the basement membrane (BM) matrix that could reproduce different levels of cancer aggressiveness. The cancer spheroids co-localized with the BM matrix were deposited into alginate-based constructs using the 3D bioprinting process. As a result, the 3D-printed breast cancer spheroids demonstrated higher viability and proliferation, and drug resistance. And the outcomes strongly suggested that the BM matrix could enhance nuclear polymorphism, proliferation (Ki-67+), and extracellular matrix (ECM) accumulation. Herein, our 3D bioprinting platform to fabricate the in vitro cancer model can be utilized as a high-throughput screening system for various tissue-derived cancers for personalized and precision medicine.

51. Accuracy of Blood Loss Estimation in the Operating Room

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Background: Hemostasis during surgery is a primary contributor to the patient's blood management. Accurate blood loss estimation from surgery can help teams with postoperative management. Our goal of the study is to analyze the accuracy of medical workers' estimations of blood loss on different operating room items. Methods: A survey was sent out to medical students, residents, and attendings in a single situation. The survey asked participants to estimate the amount of simulated blood from pictures of a lap, raytech, towel, and drape. Results: All average estimations were greater than the actual amount of simulated blood on the operating room item. The average estimation for laps was over twice the actual amount of simulated blood, 38.2 cc estimated and 16 cc actually. On a soaked raytec, the estimated fluid was 60.8 cc when in reality it had 18 cc of fluid. On the non-soaked raytec the estimated fluid was 14.9 cc but in reality, was 3 cc. The towel had 14 cc of fluid on it with the average guess being 39.7 cc. Lastly, the participants guessed the drape had 40.1 cc of fluid when it reality it had 12 cc. Conclusion: All in all, our study found a substantial overestimation of blood on operating room items by residents, students, and attending physicians. Our study suggests estimation of surgical blood loss by analysis of soaked raytecs, laps, and towels may be inaccurate.

52. Retrospective Review of Reoperation and Reamputation Rates of Two Techniques for Proximal Margins Analysis on Toe Amputations

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Background: Toe amputations are a common podiatric procedure for osteomyelitis. Whether or not the surgeon obtains a surgical cure for osteomyelitis can be difficult to assess. Using a proximal margin of the bone can assist the treatment team in deciding the duration of postoperative antibiotics. In our study, our two senior authors use separate ways to analyze the proximal margin. The first surgeon has the pathologist analyze the proximal aspect of the toe amputated for osteomyeltiis. The second surgeon takes a sample from the metatarsal head following the removal of the toe to be reviewed for osteomyeltiis. Our goal is to analyze the re-operation rate and re-amputation rate between these two techniques. Methods: A retrospective chart review was performed on all isolated toe amputations from our two senior authors from March 2017- September 2022. Patients were excluded that did not have cultures performed. Re-operation and re-amputation rates were analyzed for positive and negative margins. Results: Our study found an overall 29.7% reoperation rate after negative margins and 25.5% reamputation rate after negative margins. For the proximal margin group, there was an overall 50% reoperation rate and 43.8% reamputation rate. There were no significant differences in reamputation or reoperation rates between the two proximal margin techniques. Conclusion: All in all, both techniques demonstrated similar results drawing us to conclude both are adequate techniques for proximal margin selection. Our study did find that a proximal margin had almost double the rate for reoperation and reamputation compared to patients with a negative margin.

53. The Need for Additional Surgery Following Passive versus Active Approaches to Syndromic Craniosynostosis - a Meta-Analysis and Review

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Background: Endoscopically assisted craniofacial surgery (EACS), including endoscopic strip craniectomy (ESC), has numerous advantages over traditional, open approaches such as fronto-orbital advancement (FOA) in treating nonsyn-

dromic craniosynostosis. However, several papers report high reoperation rates in syndromic patients treated with EACS. This meta-analysis and review examines undesirable outcome rates (UORs), defined as reoperation or Whitaker category III/IV, in syndromic patients undergoing primary EACS compared to procedures which actively expand the cranial vault. Methods: PubMed and EMBASE were searched in June, 2022 to identify all papers reporting primary reoperation or Whitaker outcomes for syndromic patients undergoing cranial vault expanding surgery or suturectomy. A meta-analysis of proportions was performed comparing UORs in passive (EACS) and active procedures. A trim-and-fill adjustment method was used to validate sensitivity and assess publication bias. Results: A total of 721 articles were screened. Five EACS papers (83 patients) and 22 active approach papers (478 patients) met inclusion criteria. Average UORs for EACS and active approaches were 26% (14-38%) and 20% (13-28%), respectively (p=0.18). Meta-regression showed no effect of operative age or follow-up length (after two-years) on UOR. Reoperation occurred earlier in EACS patients (13.7 months post-primary surgery versus 37.1 months for active approaches, p=0.003). Relapse presentations and reason for reoperation were also reviewed. Subjectively, EACS UORs were higher in all syndromes except Apert, and Saethre-Chotzen patients had the highest UOR for both approaches. Conclusion: There was no statistically significant increase in UORs among syndromic patients treated with EACS compared to traditional approaches, although EACS patients required revision significantly sooner. Limited EACS data is a limitation of this analysis, and overlapping patient populations in EACS studies is a shortcoming in the literature. Uncertainties regarding the long-term efficacy of EACS in children with syndromic craniosynostosis should be revisited as more data becomes available.

54. Inflammation-mediating Piezo1 receptor expression in settings of altered hemodynamics

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Background: Brain intracranial aneurysms affect six million people in the United States. About 500,000 people worldwide die annually due to ruptured intracranial aneurysms. The exact pathophysiology of aneurysm formation is still largely unknown. Piezo1 is a mechanoreceptor expressed in endothelial cells of developing blood vessels and are implicated in diseases such as hypertension and arteriosclerosis. In addition to hemodynamic forces, Piezo1 has been shown to play an inflammatory role, as mechanically activated Piezo1 modulates macrophage polarization and stiffness-sensing macrophages lacking Piezo1 exhibit reduced inflammation and enhanced wound healing responses. Malfunction of Piezo1 mechanoreceptors has recently been demonstrated as a novel mechanism of abdominal aortic aneurysm (AAA) development. With the increasing evidence of relationship between AAA and intracranial aneurysms, it is important to study Piezo1 dysregulation as a potential cause of intracranial aneurysm development and/or rupture. Hypothesis: We hypothesize that vascular shear stress leads to Piezo1 overexpression and disorganization in arterial smooth muscle cells, resulting in altered calcium influx, increased cytoskeletal cross-linking and stiffening, and aneurysmal formation. We further hypothesize that the Piezo1 mechanoreceptor upregulation may influence activation of pro-inflammatory macrophages. Methods: Following craniotomy and verified aneurysm clipping for ruptured and unruptured intracranial aneurysms, we excised and collected the domes of the aneurysms in patients consented for the Wake Forest Cerebrovascular Tissue Bank. We also collected vascular malformation specimens-AVMs and dural arteriovenous fistulas. These specimens were stained with CD31 to co-localize Piezo1 in the endothelial cells, a-SMA to co-localize in smooth muscle cells, and CD68 to co-localize pro-inflammatory macrophages. Results: Piezo1 mechanoreceptor overexpression was found in the smooth muscle layer of intracerebral aneurysms, but not in other vascular lesions such as the AVMs or dural arteriovenous fistulas, or extracranial vessels such as the superficial temporal artery (STA). Elevated Piezo1 mechanoreceptor expression was found in human cerebral aneurysms along with pro-inflammatory macrophages. Additionally, there was significant dysregulation of Piezo1 mechanoreceptors in the intracerebral aneurysms compared with the regular appearance seen in the control human STA. Conclusions: Our preliminary data is the first demonstration of overexpression of Piezo1 mechanoreceptors in a disorganized manner in the walls of human intracerebral aneurysms. The findings further suggest that upregulation of Piezo1 mechanoreceptors may influence activation of pro-inflammatory macrophages. Our results are a critical step in knowledge of intracranial aneurysm development and may represent a therapeutic target. Future steps will be to explore the inflammatory role of Piezo1, studying the positive feedback loop between Piezo1 mechanoreceptor function on macrophages and modulation of polarization responses. Source of funding: The Aneurysm and AVM Foundation, The Bee Foundation, Brain Aneurysm Foundation

55. Otolaryngology-Head & Neck Surgery Mentorship Program for Pre-Clinical Wake Forest Medical Students: A New Program to Encourage Diversity

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Otolaryngology-Head & Neck Surgery Mentorship Program for Pre-Clinical Wake Forest Medical Students: A New Program to Encourage Diversity Introduction: Without prior knowledge or interest, many medical students may not have the opportunity for formal exposure to the competitive field of Otolaryngology-Head & Neck Surgery (Oto-HNS). Traditionally, Oto-HNS has not been a diverse specialty. Only 30% of Otolaryngologists are women. Men comprise 92% of professors. African Americans comprise only 2.3% of all trainees.1 Given such statistics and increasing competitiveness, students from underrepresented backgrounds may overlook Oto-HNS as a potential career. In response, we have initiated a pre-clinical mentorship program for students from diverse backgrounds in order to provide an early introduction to the field and to provide a faculty mentor. Methods: In 2022, two female Wake Forest medical students from diverse backgrounds who completed their M1 year were selected via a written application process. They participated in a six-week program rotating weekly with a different Oto-HNS subspecialty at Atrium Health Wake Forest Baptist. They rounded with residents, observed faculty and residents in clinics and ORs, attended resident lectures, and were introduced to audiometric testing. They were exposed to patient care, operations, networking, research opportunities, and more. Students were evaluated on attendance, clinical performance, professionalism, teamwork, and a formal case presentation. Future participants may expect similar experiences. Results/Conclusion: Students will complete an exit questionnaire and will be followed through their Match Day and beyond, to determine the impact of the program on their education and ultimate career pathway. We anticipate benefits of: increased medical knowledge, exposure to patients and the surgical environment, developing networking opportunities, and having a faculty mentor. Longitudinal study concerning their ultimate career choices will serve as one way to measure our goal of increasing diversity in Oto-HNS. We hope the program will become a model to motivate other medical educators and institutions to initiate similar programs in Oto-HNS and other surgical specialties in order to inspire a new generation of surgeons to become passionate about education, surgery, diversity, and mentorship.

56. An Optically Active Compression Orthosis Improves Hand and Finger Tissue Oxygenation in Induced Ischemia

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Introduction: Increasing tissue perfusion to the hand and fingers is desirable in patients with vascular insufficiency due to injury, vasospasm, or occlusive disease and in patients with peripheral neuropathy after peripheral nerve injury. A novel optically-active compression (OAC) orthosis was created with a far-infrared (FIR) emitting fabric for the purpose of increasing local tissue perfusion to the hand and fingers. We hypothesize that in an induced, in-vivo ischemic condition, the OAC orthosis can restore tissue perfusion to the native, non-ischemic state as measured by tissue oxygen saturation using near-infrared spectroscopy. Materials & Methods: A prospective, split-body cohort study was designed to enroll consecutive patients undergoing Wide Awake Local Anesthesia No Tourniquet (WALANT) hand surgery to test the efficacy of the OAC orthosis on restoring tissue perfusion. WALANT patients were selected because injection of lidocaine with epinephrine into the surgical site generates a relatively ischemic region of tissue. Both an experimental and a sham orthosis was applied to each patient, so that the non-operative hand served as each patient's own control. Tissue oxygenation was measured on bilateral hands using a handheld near-infrared spectrometer (ViOptix® Intra.Ox®) at four time points in triplicate. Results: 25 patients undergoing WALANT hand surgery were enrolled. Localized ischemia and decrease in tissue oxygen saturation was detectable by the handheld spectrometer in the experimental ($p<0.001$) but not the control arm indicating the administered epinephrine had no systemic effects. In the setting of epinephrine-induced ischemia via local injection, the OAC orthosis, but not the sham orthosis, reversed the ischemic state ($p<0.001$) based on tissue oxygen saturation levels. Conclusions: Our results demonstrate that an adequately ischemic state was created by the injection of lidocaine with epinephrine and that this effect was successfully reversed by use of the OAC orthosis. Tissue oxygen saturation levels in the induced ischemic state significantly differed from the baseline pre-ischemic state in the experimental group. After ap-

plication of the OAC orthosis, tissue oxygen saturation significantly increased and was restored to control and pre-surgical levels. This demonstrates that the OAC orthosis has a profound effect on tissue perfusion. This introduces many exciting future applications in replantation, revascularization, steal syndrome after vascular access, connective tissue disorder digital ischemia, vasopressor-induced digit ischemia, decreasing mastectomy flap necrosis, etc.

57. Google Search Analysis in Laryngology: What do people want to know and where do they find the answer?

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Background: Patients recently diagnosed with a new medical condition frequently turn to the internet to learn more about their diagnosis. We aimed to identify specific questions people are asking regarding common laryngological diagnoses by evaluating “People Also Ask” (PAA) questions generated by Google and to determine if the sources accessed were of high quality. Methods: The terms “subglottic stenosis,”(SS) “Zenker’s diverticulum,” (ZD) and “vocal fold paralysis,” (VFP) and related terms, were entered into Google, and PAA questions and associated websites were extracted using. Questions were categorized into specific topics and websites were categorized by type then assessed using Journal of the American Medical Association (JAMA) benchmark criteria. A search engine optimization tool (SEO) was used to determine search volume for individual topics. Results: 144 PAA questions (SS n=52, ZD n=49, and VFP n=43) and their associated websites were extracted and most commonly related to disease etiology (34%), management (27.1%), and signs/symptoms (16.7%). Sources linked to PAA questions were academic (37.6%), government (25.6%), and commercial (16.2%) websites, while medical practice (7.69%), single surgeon (3.42%), and social media (9.40%) websites were less frequently referenced. JAMA scores were highest for government websites (mean 3.35, SD = 0.54) and lowest for academic websites (mean 0.77, SD = 0.14). Conclusion: The most commonly asked questions related to SS, ZD, and VFP are related to etiology and management. Academic medical institution websites are most frequently viewed to answer these questions. It is important for academic laryngological professionals to ensure that information on their academic website is accurate and up-to-date.

58. Suture fusion and midface hypoplasia in Crouzon syndrome

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Background: Early onset of minor suture fusion in syndromic craniosynostosis is associated with midface dysplasia and is a common indication for craniofacial surgery. This study seeks to describe the impact minor suture fusion severity has on midface morphology in Crouzon syndrome. Hypothesis: We hypothesize that a direct relationship exists between minor suture fusion and midface growth restriction. A primary purpose of this study is to identify which suture(s) or synchondrose(s) are implicated. Using statistical modeling we examine the effects of degree of skull base suture fusion on various cephalometric measures of midface growth, while controlling for diagnosis, age and gender. Methods: Pre-operative computed tomography images (CT) of 63 patients with Crouzon syndrome and 63 normocepahlic controls were included. Degree of skull base suture fusion for 7 sutures was scored on a 5-point scale introduced by Madeline and Elster. The sella (S), nasion (N), A point (A), basion (BA), and anterior nasal spine (ANS) landmarks were used to calculate the SNA angle, BA - ANS length of the lower midface, and N - S length of the upper midface. All analyses were performed using multiple linear regressions. Results: The mean age was 42.9 ± 75.5 months (43.9% female) and the control group was significantly older ($p < 0.01$). Advanced spheno-occipital synchondrosis fusion in Crouzon syndrome correlates with regression of the BA - ANS length by 0.563 mm per incremental increase in suture fusion ($p < 0.01$). The lower midface (BA - ANS) growth was restricted to a greater degree than the upper midface (N - S) with ratios of the two ranging between 0.559 and 0.93. Fusion severity did not impact SNA angle. Conclusions: These results suggest sheno-occipital synchondrosis fusion severity in Crouzon syndrome is correlated with lower midface regression. Similarly, all anterior skull base sutures limited lower midface growth to a greater degree than the upper midface.

59. Representation of Women in Medical Leadership Positions at an Academic Medical Center

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Women are generally underrepresented in medical leadership positions, making gender equity an area of focus. Despite women making up nearly half of medical school graduates, women in academic medicine are less commonly full-time faculty members and advanced to higher positions less frequently. For example, a 2018-2019 AAMC report noted only 18% of medical department chairs were held by women. Absence of women in medical leadership has the potential to diminish research, medical training, and policy decisions benefitting women's health. We surveyed 22 clinical departments, 14 clinical department sections, and 9 science departments at an academic medical center, questioning which funded leadership roles, if any, were held by women. Leadership positions included department chair, vice chair, residency director, fellowship director, clerkship director, or section head. 22.7% (5/22) of clinical department chairs and 55.5% (5/9) of science department chairs are currently held by women. Vice chair position is held by women in 31.8% (7/22) of clinical department positions and 11.1% (1/9) in the science departments. Twenty-nine medical departments and sections reported having a residency program, of which 55% report having a woman residency director. 66% of the medical and science departments that offer a fellowship program (20/30) report having at least one woman fellowship director. Additionally, 25% of departments with fellowships (5/20) have two or more women holding fellowship director positions. Although the total number of section chairs could not be calculated per department, 50% of clinical departments surveyed (11/22) reported having at least one woman section head. Our survey was limited in that we could not determine the percentage of inter-departmental gender representation for most groups and assume there is variability depending on the medical specialty. For example, one department reported having 5 section head positions, each held by women faculty, whereas another department with 8 section head positions reported only one position held by a woman. Three clinical departments (3/22, 13.6%) and two medical sections (2/14, 14.3%) reported having no women in the listed leadership positions at this time. Overall, we are encouraged by the distribution of women in leadership in the clinical and science departments, especially regarding residency and fellowship director positions, although more work should be done to encourage women's representation to some degree in every medical department. Diversity in medical leadership is critically important when training the next generation of physicians and researchers to understand and advocate for women's health.

60. Total Ankle Arthroplasty Medial Malleolus Fractures and Use of Prophylactic Screw: A Retrospective Review

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Ankle arthritis is a debilitating condition that negatively impacts a patient's quality of life. A total ankle arthroplasty procedure continues to gain traction as a viable treatment option for end-stage ankle arthritis that has failed conservative treatment. While newer total ankle models have shown improvement in complications and survivorship, intraoperative and postoperative medial malleolus fractures continue to be a concern. We created two novel radiographic measurements of the bone bridge between the total ankle prosthesis and the tibial cortex. Using 72 patients, we analyzed the correlation between the bone bridge and intraoperative and postoperative fractures. We found patients with no fractures had a larger transverse and short bone bridge,12.67+/- 2.93 mm and 11.24 +/- 2.7 mm respectively, than patients who experienced an intraoperative or postoperative medial malleolus fracture. While patients who received a prophylactic screw had over 4mm smaller of a bone bridge than the group with no fractures, it was successful in preventing further fractures. We recommend in patients with a transverse bone bridge of 12 mm or short bone bridge of 10mm that the surgeon considers placement of a prophylactic screw.

61. Intracranial sub-second dopamine measurements during a risky decision-making task in patients with Alcohol Use Disorder suggest diminished dopaminergic signals about 'relief'

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Objective: To our knowledge, no data have been reported on dopamine fluctuations, on subsecond timescales, in humans with Alcohol Use Disorder (AUD). Here, we monitored dopamine release in two patients with and two patients without a history of AUD during a risky decision-making task to begin to characterize how sub-second dopamine responses to counterfactual information (related to psychological notions of regret and relief) in AUD may be altered. Methods: We made measurements of extracellular dopamine levels once every 100-milliseconds, using human voltammetric methods. Measurements were made in the caudate during deep brain stimulation (DBS) electrode implantation surgeries (for treatment of movement disorders) in patients who did ("AUD", n=2) or did not ("non-AUD", n=2) have a history of AUD. Participants performed a risky decision-making task in which they made choices between "Sure bets" or 50/50, monetary, "Gamble" outcomes. Results: We report fast changes in dopamine levels that appear to be modulated by what "could--have-been" and by patients' AUD-status. Positive counter-factual-prediction-errors (related to relief) differentiate patients with versus without a history of AUD. Conclusions: Dopaminergic encoding of counterfactual information appears to differ between patients with AUD and patients without AUD. The current study has a major limitation of a limited sample size, but these data provide a rare insight into dopaminergic physiology during real-time decision-making in humans with an addiction disorder. We hope future work will expand the sample size and determine the generalizability of the current results.

62. Thirty- and ninety-day survival is better in patients who have pre-planned transaortic Impella placement

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Thirty- and ninety-day survival is better in patients who have pre-planned transaortic Impella placement Kimberly M Linden MD; Elizabeth Wood MD; Gabriel Cambronero MD; Adrian Lata MD Background: Mechanical circulatory support (MCS) has been shown to have improved survival when used in patients in cardiogenic shock or with high-risk percutaneous coronary intervention (PCI). Transaortic Impella is a retrograde placed MCS device placed into the left ventricle (LV) through the aortic valve. With increased use and familiarity, there have been case reports using early placed Impellas for postoperative support after cardiac surgery in high-risk patients. We hypothesize that early and planned use of transaortic Impella will lead to improved outcomes in patients with low ejection fraction (EF) post-cardiac surgery compared to those who undergo cardiac surgery and require salvage Impella placement. Methods: This is a retrospective review of patients who underwent coronary, valvular, or aortic surgery and had a transaortic Impella placement between from January 1, 2017- September 25, 2022. Primarily 30-day and 90-day survival was evaluated with secondary outcomes being intraoperative EF, postoperative EF, pre-Impella removal EF, discharge EF, post operative stroke, major bleeding, immediate graft infection, delayed graft infection, and finally acute renal failure. Results: Of 62 patients, 43 patients had planned placement compared to 19 unplanned. Planned Impella had a 88% 30-day survival and 83% 90-day survival compared with 84% 30-day survival and 79% 90-day survival in salvage patients. Major bleeding events were higher in salvage patients. Conclusions: Planned Impella patients had higher rate of 30-day and 90-day survival and lower rates of major bleeding.

63. Response of Infected/Non-infected Breast Cancer Cells to Silver Nanoparticle-induced Photothermal Therapy

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ABSTRACT Background: According to the American Cancer Society, breast cancer is the most common cancer diagnosed among women in the United States, except for skin cancers. Breast cancer is the second leading cause of cancer death in women, and it has recently been discovered that intracellular bacteria reside in breast cancer cells, having an impact on therapeutic responses. Photothermal therapy is an alternative approach for treating breast cancer, using materials that absorb light to generate heat. Silver is widely used as an antibacterial agent, and silver nanoparticles (AgNPs) have been shown to be advantageous for wound healing, yet they can also be designed to have photothermal properties. Previously, our lab developed AgNPs stabilized with biocompatible polymer chitosan. The resulting AgNPs had a triangle shape, with optical absorption in the infrared, which could generate heat upon exposure to infrared light. Hypothesis: We hypothesized that AgNPs stimulated with infrared light can induce heat to kill both infected and non-infected breast cancer cells. Methods: Triangular AgNPs containing strong absorption at 800 nm was synthesized by reducing silver ions in the presence of silver seeds. Breast cancer cell lines MDA-MB-231 and MCF7, and epithelial breast cell line MCF 10A were infected with Pseudomonas aeruginosa 27853. All infected and non-infected cell lines were incubated with different concentrations (0, 0.01 or 0.025 mg/mL) of AgNPs respectively. Cell lines in experimental groups were exposed to 5 W of 800 nm light for 36 seconds. Cellular response to photothermal ablation was measured using proliferation and clonogenics assays. Results: Infected/Non-infected breast cells incubated with AgNPs alone in the absence of infrared light exhibited no change in the number of cells or surviving colonies. Upon exposure to 800 nm light, cell and colony numbers decreased with increasing AgNPs concentration (and hence increased temperature). The temperature increases for 0, 0.01 or 0.025 mg/mL of AgNPs were 6 °C, 27 °C and 50 °C respectively. Infected breast cells formed more colonies than their non-infected cells with the treatment of 0.01 mg/mL of AgNPs and laser exposure for all three cell lines. For infected/non-infected MDA-MB-231, infected/non-infected MCF 10A and non-infected MCF7, 0.025 mg/mL AgNPs concentration with laser (5W, 800 nm, 36s) induced sufficient heat to cause nearly all cell death and no colony formation. A significant reduction in colony number was also observed for infected MCF7 under this condition. Conclusions: Triangular AgNPs have been demonstrated as an effective photothermal therapy against breast cancer cells upon exposure to infrared light. In this work, 0.025 mg/mL AgNPs concentration with laser (5W, 800 nm, 36s) generated sufficient heat, leading to the death of both infected and non-infected breast cells, though infected breast cells appeared to be more resistant to AgNPs-induced hyperthermia. No colony formation indicated that AgNPs-induced cellular damage is irreversible, indicating less potential for regrowth. These results highlight a new utility of AgNPs, while also corroborating that breast cancer cells with intracellular infection may be more resistant to anti-tumor therapies. Source of mentor's funding or other support that funded this research: The project described was supported by the Department of Plastic and Reconstructive Surgery.

64. The Impact of Postoperative Antibiotic Type & Duration After Implant Based Breast Reconstruction on Resistance Among Cultured Species

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ABSTRACT Background: There is a growing presence of literature within plastic surgery that establishes best practice for postoperative antibiotics after implant based breast reconstruction (IBBR), though it has not been widely adopted or translated into clinical practice. This study aims to determine how antibiotic type and duration affects patient outcomes. We hypothesize that IBBR patients who receive a longer duration of postoperative antibiotics will demonstrate higher rates of antibiotic resistance as compared to the institutional antibiogram. Methods: A retrospective chart review included patients that underwent IBBR between 2015 and 2020 at a single institution. Variables of interest included patient demographics, comorbidities, surgical techniques, infectious complications, and antibiograms. Groups were classified by antibiotic duration (≤ 7days, 8-14days, and >14 days) and by antibiotic type (Cephalexin, Clindamycin, or Trimethoprim/Sulfamethoxa-

zole (tmp/smx)). Results: There were a total of 70 patients who experienced infections included in this study. Onset of infection did not differ based on antibiotic type during either device implantation (post-expander p=0.391; post-implant p=0.234). Antibiotic duration and type did not have an established relationship with explantation rate, either (p=0.154). In patients that had Staph aureus isolated, there was significantly increased resistance to Clindamycin when compared to the institutional antibiogram, sensitivities of 43% and 68% respectively. Conclusions: Antibiotic duration nor type displayed a difference in overall patient outcomes, including explantation rates. In this cohort, S. Aureus strains isolated in association with IBBR infections demonstrated a higher level of resistance to Clindamycin compared to strains isolated and tested within the broader institution.

65. Perioperative Outcomes in Head & Neck Surgery Following ERAS Protocol Implementation

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Introduction: Enhanced recovery after surgery (ERAS) protocols are multimodal care pathways designed to improve recovery rates after surgery. The current study compares outcomes in patients undergoing head and neck free flap reconstruction prior to and after implementation of a free flap-specific ERAS protocol. Methods Chart review of head and neck cancer patients who underwent free flap reconstruction at a tertiary referral academic institution (2013-2021). Outcomes include complication rates, ED visits/hospital readmissions, all-cause mortality and length of stay. Fisher's Exact Test was used for all tests other than the ED visits/readmits (Wilcoxon Two-ample Test) and length of stay (two sample t-test). Results Thirty patient charts were reviewed (15 pre-protocol, 15 post-protocol). Sixty-seven percent of pre-protocol patients incurred non-wound related complications compared to 33% post-protocol (p=0.14). Sixty percent of pre-protocol patients experienced wound complications compared to 20% of post-protocol (p=0.06). Total complications were less for the post-protocol compared to the pre-protocol group (40% and 80% respectively, p=0.06). All-cause mortality within 6 months was 17% for pre-protocol group and 0% for post-protocol (p >0.99). There were 14 ED visits/readmissions in the pre-protocol group compared to 2 in the post-protocol group (p=0.16). Average length of stay was unchanged (p=0.45). Discussion Preliminary results show that ERAS protocol implementation does not significantly alter perioperative outcomes, however there is a trend toward less total complications (p=0.06) and wound related complications (p=0.06) post-protocol. Study power is currently limited by sample size however additional data collection is planned and should improve power to detect any such trends. Conclusion ERAS protocol implementation showed trends toward improved perioperative outcomes, although not statistically significant in this small cohort. These trends warrant further investigation

66. Assessing Flexion Gap Changes and Component Rotation Before and After PCL Resection with a Robotic-Assisted System for Total Knee Arthroplasty

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ABSTRACT Background: During a Total Knee Arthroplasty (TKA), the extension and flexion gap between the femur and the tibia are matched before the implant is placed to allow for proper leg kinematics and to prevent excessive device wear or instability. The extension gap is the distance from the distal femoral condyle to the proximal tibia and is measured when the knee is in full extension; this can be altered by removing bone from the distal femur and the tibia as well as soft tissue releases. The flexion gap is the distance between the posterior femoral condyle and the tibia when the knee is in 90 degrees of flexion; this distance can be altered by removing bone from the posterior femoral condyle and tibia, soft tissue releases, changing the posterior tibial slope, or resecting the PCL. During a TKA, the PCL can be retained or removed if a viable one remains pre-operatively. Previous literature demonstrated that removal of the PCL affected the flexion gap, but does not quantify the extent of this change, particularly with a robotic system and tensioner that allows for precise gap measurement. The purpose of this study is to determine the extent to which the PCL affects the flexion gap and component rotation. Hypothesis: Resection of the PCL will create a statistically significant change in the medial and lateral flexion gap during total knee arthroplasty measured by the MAKO robotic system. Methods: Patients who underwent TKA with Dr. Langfitt were retrospectively analyzed for six different measurements: medial and lateral initial flexion gap, medial and lateral flexion gap before PCL resection, and medial and lateral flexion gap after PCL resection. The knee capsule was opened using the standard medial parapatellar approach. The ACL was resected. Pins were inserted into the femur

and tibia, and the MAKO system arrays were placed. Checkpoint and bone registration points were collected to match the points on the MAKO robot to the CT previously collected. The knee was placed in 90 degrees of flexion and predicted femoral and tibial cuts were input into the MAKO system. Using these inputs, the MAKO system measured medial and lateral flexion gap distances when varus and valgus strain was placed on the knee. Distal femur and tibial cuts were made, with care taken to avoid PCL fibers. The distal femoral and proximal tibial cuts were removed. The knee was then placed in 90 degrees of flexion, and a tensioner was placed between the femur and tibia. The medial and lateral flexion gaps were measured and collected. The PCL was resected with electrocautery, and the medial and lateral flexion gap measurements were again collected. The TKA was completed. Normally distributed variables were analyzed using paired T-tests. A Bonferroni correction was utilized, and a significance was set at .0083. Results: PCL resection produced significant medial flexion gap changes (.875 mm p<.001) and lateral flexion gap changes (.750 mm p<.001). Distal femur and tibial cuts also produced significant medial flexion gap changes (1.21mm p<.001) and lateral flexion gap changes (1.81mm p<.001). Conclusions: Resection of the PCL results in a significant change in the medial and lateral flexion gap. Secondarily, tibial cuts result in an increase in the medial and lateral flexion gap.

67. Caging the Dogma: Surgical treatment of Pyoderma Gangrenosum is Effective with Careful, Multidisciplinary Medical Optimization

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Background: Pyoderma gangrenosum (PG) is an autoimmune neutrophilic dermatosis with debilitating sequela including wounds, incapacitating pain, and disability.1 Until recently, PG wounds have been treated conservatively or with medical therapy only.2 Many surgeons have heard the adage, “never operate on pyoderma gangrenosum,” due to the potential for pathergy, in which minor trauma or surgical insult leads to an inflammatory “snowball effect. This has been known to result in paradoxical and often rapid wound progression that is disproportional to the inciting event.1-4 In this case series, we report our success in carefully timed surgical debridement and reconstruction of PG wounds, which has seldom been reported in the literature. Methods: We performed a retrospective review of consecutive patients presenting with PG wounds who were treated with medical therapy followed by surgical debridement and reconstruction over a 10-year period at Wake Forest Atrium Health. All patients who received surgical treatment were included. Patient and surgical characteristics as well as wound healing outcomes and complications were analyzed. Results: 3 patients underwent surgery during the review period for treatment of PG. 100% of patients were female with a mean age of 64. Mean duration of PG wounds were 1.6 years and all received high dose corticosteroid treatment. 1 of 3 was treated additionally with weekly methotrexate. All followed closely with dermatology and only proceeded to surgery after careful inter-team discussion regarding surgical candidacy and perceived clinical risk. Average wound size was 250 cm2. Average skin graft take and total time to healing was 97% and 3.3 weeks, respectively. Average time to healing after skin graft placement was 1.3 weeks. One of three patients suffered a complication, requiring 3 total operations due to failed first stage of reconstruction with a dermal regeneration template. Two of three patients developed eventual venous stasis dermatitis resulting in separate wounds, but there were no cases of pathergy, donor site complication, or clinical worsening of pyoderma gangrenosum in our study. Follow up was on average 10.2 months. Conclusion: In this series of three consecutive patients with PG wounds treated with pharmacotherapy and surgery, we suggest that surgical reconstruction may be both safe and effective in treatment the treatment of PG. All subjects healed in two weeks or less after placement of a split-thickness skin graft. This challenges the widely-accepted dogma of non-surgical PG treatment. Keys to success in surgical reconstruction are medical treatment by a dermatologist, careful clinical response monitoring, objective data measurement including frequent wound examinations, and eventual medical clearance for surgery based on the individual patient response and inter-disciplinary discussion. High-powered studies are needed to develop this overlooked treatment modality, which may significantly lessen patient suffering and health care expenditures. References: 1. Hickman JG, Lazarus GS. Pyoderma gangrenosum: a reappraisal of associated systemic diseases. Br J Dermatol. 1980 Feb;102(2):235-7. 2. Moon JH, Huynh J. Pathergy in Neutrophilic Dermatosis. N Engl J Med. 2021 Jan 21;384(3):271. 3. Pompeo MQ. Pyoderma Gangrenosum:Recognition and Management. Wounds. 2016 Jan;28(1):7-13 4. Acharya N, Chattopadhyay A, Jain S. Rhupus With Pyoderma Gangrenosum Treated With Immunosuppression and Skin Grafting. J Clin Rheumatol. 2021 Aug 1;27

68. Methodologies of Reconstruction of the Anterior Skull Base

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Introduction: Anterior skull base defects range in size and complexity. Regardless of extent, skull base defects are recommended to undergo reconstruction to establish a barrier between the intracranial contents and the sinonasal cavity to prevent cerebrospinal fluid leak. The aim of this review is to describe the range of reconstruction techniques available for skull base reconstruction. Methods: A literature review of published data on reconstruction methods for anterior skull base defects was conducted. The reconstruction materials and surgical techniques used for skull base reconstruction are reviewed. Results: A range reconstructive methods exist for anterior skull base defects, including synthetic grafts that are amenable to small defects of the sella often associated with endoscopic endonasal surgery. Moderate size defects are commonly reconstructed with the nasoseptal flap, however a broad range of novel local flaps using nasal tissues exist to reconstruct defects in areas with poor nasal septal tissue, including the inferior turbinate flap, middle turbinate flap, turbinal flap, and septal flip flap. Large defects associated with large anterior skull base defects following craniofacial resection for malignant pathologies are best reconstructed with autologous free tissue flaps that provide vascularized muscle capable of sealing the intracranial vault, while preventing meningitis. Conclusion: Defects of the anterior cranial vault can be reconstructed with a broad range of reconstructive methods depending on the defect size and pathology associated with the defect.

70. Locoregional Behavior of Head and Neck Cutaneous Squamous Cell Carcinoma with Perineural Invasion of a Named Nerve

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Background: Aggressive cutaneous squamous cell carcinoma presents a challenging clinical scenario, particularly when it involves the head and neck (HNCSCC). Anecdotally, there has been an observed tendency for HNCSCC lesions to present with either named nerve perineural invasion (PNI) or lymphatic metastasis but not both. We aim to further review this pattern of locoregional involvement. Confirmation of such a finding has the potential to contribute to future research initiatives in refining subtypes of these malignancies. In doing so, additional workup and adjuvant therapy options for this patient population may be realized. Method: A retrospective chart review of all HNCSCC patients treated with wide local excision within the Department of Otolaryngology-Head and Neck Surgery from 2012-2016 was performed with IRB approval. Inclusion required at least PNI or lymphatic invasion. Results: A total of 32 lesions met the inclusion criteria. A noteworthy difference in the behavior between subsites was realized. PNI was present in 14 facial lesions; seven of these had named nerve involvement. Of those with named nerve PNI, none had lymphovascular invasion or nodal metastasis on imaging or prophylactic neck dissection when performed. Conclusions: HNCSCC that presents with named nerve involvement may have less likelihood towards nodal metastasis. Further longitudinal study in a larger population is needed to confirm this pattern of locoregional involvement.

71. Optimization and Validation of Utilizing Alginate-Based Casts to Model and Characterize the Physical Properties associated with Bioprinted Tissue Constructs

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Optimization and Validation of Utilizing Alginate-Based Casts to Model and Characterize the Physical Properties associated with Bioprinted Tissue Constructs Jake B. Miller1,2, Mara Suleiman1,2, Lori Byers1,2, Joshua Bowlby1,2, Alice Marchetti1,2, Amish Asthana1,2, Giuseppe Orlando1,2 1. Wake Forest School of Medicine, Wake Forest Institute of Regen-

erative Medicine (WFIRM), 2. Department of Surgery, Wake Forest University, Winston-Salem, North Carolina The field of bioprinting has recently gained heightened attention as providing a promising technology that gives rise to achieving successful therapeutic outcomes where other methods have been met with limitations. However, bioprinting 3-Dimensional (3D), layered tissue constructs requires optimization of the appropriate size/shape of the desired construct, pressures to avoid shear stress, and the amount of bioink needed to sustain the printing process. To measure the behavior of the bioprinted products in response to terminal mechanical assays independent of the aforementioned factors, other models may be suitable. Therefore, I propose that an alginate cast, with the same compositions and crosslinkers of traditional bioink, may be used as a suitable alternative to bioprinting to extrapolate the results of assays aimed at modeling the physical properties of 3D bioprinted tissue constructs in vitro. The alginate casts have demonstrated their capacity to withstand the effects of both physiological and mechanical pressures, suspend 3D cell cultures, and respond to assays designed to measure physical characterization and cytocompatibility. The casts are cylindrical and composed of primarily 1.5% UltraPure Low Viscosity Monolaurate(UP LVM) and crosslinked with 100 mM calcium or 25 mM strontium. The cylinders occupy a volume of ~40 µL with a diameter of 5 mm and height of 2 mm. Previous studies have validated the durability and strength of these biomaterials and highlighted the ability to encapsulate free HepG2 (a liver cancer cell line) cells, HepG2 spheroids, and human islets in the hydrogel. There are several aims and assays designed to assess the rheology of the alginate and evaluate the potentiality of modifying assays designed to measure the viability of 2-Dimensional, monolayer cell cultures to be utilized on 3D cell cultures cast in a 3D structure. The mechanical tests conducted determine the degree of permeability, effect of swelling, compressive strength, and implication of using different alginates/crosslinkers on the casts. To characterize the permeability of the constructs, the LVM alginate casts were crosslinked in either 100 mM calcium or 25 mM strontium and were either subjected to pre-incubation overnight at 37°C or not. The casts were then incubated with FITC-coupled lectins of differing molecular weights: 75 kDa, (Maackia Amurensis, MAL-1), 120 kDa, (Ricinus Communis Agglutinin I, RCA I), and 150 kDa, (Sambuca Nigra, SNA). All solutions contained two dilutions which reflected the lowest and highest values of the lectins' fluorescent range in µg/mL. After a 48-h incubation on a mechanical rocker at 4°C in 2 mL of 0.9% saline and lectins, images were taken on a Leica Confocal microscope with and without washing in 0.9% saline. To test compression, an instron 5544 at a force of 0.01 N/s was also used to generate a Young's Modulus curve to calculate the elastic modulus of the casts in comparison to the compressive strength of the native pancreas (the site of human islets), which is 1500-2000 pascals. The elastic modulus of the casts provides insight to the potential tolerance of the bioprinted construct to physiological conditions such as vascularization. Swelling ratios will be calculated by comparing LVM casts with different bioink compositions: the 0.3% HA will be buffered in either 0.9% saline or in Hank's Balanced Salt Solution without calcium/magnesium (HBSS-/-). The percent change in the swelling ratio will be a ratiometric expression of swollen weight to dry weight (lyophilized form). The two different bioink compositions and two different crosslinkers be used and casts will be subjected to 1-day and 5-day incubations at 37°C in islet media to discern

swelling. To test cytocompatibility of spheroids encapsulated in a cast, the MultiTox-Fluor Multiplex cytotoxicity assay was used. Cell viability was assessed ratiometrically as Live: Dead HepG2 spheroids. The Multitox assay exploits the biological difference between live/dead cells in the capacity of live cells to integrate the dye GF-AFC and cleave AFC, whereas the dye bis-AAF-R110 can only be cleaved by the dead-cells to release R110. After optimizing the assay, the viability ratio of free HepG2 spheroids was comparable with HepG2 spheroids encapsulated in alginate. The results of the permeability test revealed that the highest degree of permeation was achieved by MAL-1, followed by RCA I. However, SNA was nearly entirely excluded from the cast due to the pore size exclusion of the cast. A pre-incubation overnight at 37°C increased the vulnerability of the alginate to permeation. The compression tests yielded Young's Modulus' that revealed each cast was only displaced marginally by a degree of a few millimeters at the average compressive strength of a human pancreas, indicating the mechanical stress of vascularization the constructs may withstand in vivo. Lastly, there was no statistically significant difference ($p < 0.001$) between the resulting viabilities of free HepG2 spheroids compared to HepG2 spheroids in cast obtained from the MultiTox. Thus, the advantages and the applications of using alginate-derived structures to model the characteristics of bioprinted scaffolds are elucidated. Future directions may involve the incorporation of biological compounds such as Extracellular Matrix (ECM). Other cell cultures such as Min6 will also be attempted to be encapsulated in LVM alginate. Further, efforts to model coaxial bioprinting using a tiered cast composed of Gelatin-Methacryloyl and alginate have been undertaken. Ultimately, this provides insight into to the opportunities of using alginate casts to model therapeutic approaches. Giuseppe Orlando, M.D., Ph.D, MCF

72. Raman Spectroscopy analysis of DCD renal allograft urine for the identification of biomarkers of function

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Background: Due to the pathophysiology of donation after cardiac death (DCD) organ donation, 50% of DCD renal allografts will experience delayed graft function (DGF), defined as the need for dialysis within the first week post-transplant. The majority of DGF grafts will eventually resume 'normal' physiological activities, although some will fail. Hypothesis: It is hypothesized that Raman spectroscopy conducted on urine samples will identify molecular fingerprints specific to DGF versus non-DGF allografts. Methods: Twenty patients undergoing a DCD renal transplant were enrolled and stratified into DGF and non-DGF groups. Urine samples were collected before surgery (baseline) and on Days 1, 2, and 3, as well as monthly through the first year. The patients were followed for up to 12 months. Samples were analyzed with Raman spectroscopy. The primary endpoint was the identification of molecular signatures specific to DGF and non-DGF status. A secondary endpoint was the comparison of the above-mentioned signatures with Raman spectra of urine obtained from healthy individuals, stage 4 and 5 chronic kidney disease (CKD) patients, and finally with patients with urinary stones. Results: The urine molecular spectra of DGF and non-DGF patients differed immediately following the transplant (Day 1) and one month after the transplant. Moreover, the spectra of DGF and non-DGF patients were different from urine spectra from healthy individuals, as well as from CKD patients and patients with urolithiasis. Conclusions: Our preliminary data show that Raman spectroscopy can identify differences in the molecular composition of urine, depending on the functionality of the renal allograft, as early as day 1 posttransplant. In conjunction with clinical metrics, one-year, longitudinal analysis of the Raman spectra will be used to identify a fingerprint of viability and function that may help recognize grafts with preserved functional capacity at the time of procurement. Additionally, it could lead to the development of automated measurement technology for multiplexed biomarker detection with high throughput, sensitivity, and precision.

73. Development of a 3D Bioprinted Vascularized Thick Liver Construct

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*Purpose/Objectives: Establishing adequate vascularization to engineered tissues and organs is an everlasting challenge that needs to be solved. This study aims to produce technologies capable of creating a viable thick (>1 cm3) metabolic tissue that can be used to advance research on human physiology, fundamental biology, and medicine. *Methodologies: We designed a tissue construct with a gyroid-shaped architecture with interconnected channels, which allow for uniform flow and surface shear stress that adequately covers the entire inner surfaces of cell-laden tissue constructs. The tissue constructs with a surface dimension of 1x1x1 cm3 were produced with a digital light projection (DLP) printer using a cell-laden bioink combined with human hepatocytes, followed by coating the interconnected vascular channel walls with human endothelial cells (ECs). Finally, the tissue constructs were loaded into watertight flow chambers connected to a media reservoir for continuous perfusion until predetermined trial time points (10, 20, 30 days). *Results: The retrieved constructs retained their initial dimension, and the cells maintained a greater than 85% viability at all timepoints. Immunofluorescent staining confirmed Hepatocytes and ECs using their respective cell-specific antibodies (HNF4A/albumin and vWF, respectively). Endothelial cell layers covering the vascular lumen surrounded viable hepatocyte aggregates in the construct's interior, indicating EC function. In addition, hepatocytes within the printed constructs produced albumin and bilirubin levels comparable to that of humans, indicating the functionality of the liver construct. *Conclusion/Significance: We successfully developed thick, human vascularized liver tissue in an in vitro environment while maintaining metabolic functionality similar to the in vivo native cells throughout the 30 day survival period. The unique gyroid design concept applied to generate organ constructs enables the growth of de novo tissues as an in vitro physiologically relevant organ model.

74. Spare the Needle, Discharge the Child - Trending Post-Op Labs After Laparoscopic Common Bile Duct Exploration (LCBDE) in Pediatric Patients is Not Helpful

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Introduction Post-operative liver function tests (POST-LFTs) are often collected to assess the success of laparoscopic common bile duct exploration (LCBDE). Yet, uptrending POST-LFTs often lead to additional testing and longer stays despite clinical improvement. As the influence of ductal manipulation during LCBDE on POST-LFT trends remains unclear, the utility of POST-LFTs is worth investigating because additional lab draws increase length of stay (LOS) and patient

distress. Our aim was to examine POST-LFT trends for patients undergoing successful laparoscopic cholecystectomy with LCBDE (LC+LCBDE) to determine whether a predictable POST-LFTs trend emerged. We hypothesized that POST-LFTs would not consistently downtrend. Methods A retrospective analysis of all patients undergoing LC+LCBDE at a single children's hospital was conducted. Successful LC+LCBDE was defined as common duct clearance on fluoroscopy without the need for subsequent ERCP. POST-LFTs were classified as increased or decreased from PRE values with Wilcoxon signed-rank testing to assess for differences between PRE and POST-LFTs. Post-op LOS between successful LC+LCBDE with and without POST-LFTs was also compared. Results Thirty-nine patients underwent LC+LCBDE over 4 years, with 25 complete records. In patients who underwent successful LCBDE, there was no significant difference between PRE and POST-LFTs for total bilirubin, AST, ALT, or Alk Phos. Among successful LCBDE cases with post-op LFTs, the following lab parameters (T. Bili, AST, ALT, Alk Phos) increased in 32%, 40%, 40%, and 32% of patients respectively. Post-op LOS was shorter in patients with no POST-LFTs (16hrs vs 26 hrs, p=0.03). Conclusion POST-LFTs after successful pediatric LC+LCBDE do not consistently downtrend. Intraoperative surgical judgment and the patient's post-op status may be better criteria for discharge. While further research is necessary, it appears safe to discharge pediatric patients without post-op LFTs after a clinically successful LC+LCBDE.

75. Effect of Peri-operative Anticoagulation in Total Knee Arthroplasty- Does it Increase Likelihood of Early Post-operative Arthrofibrosis?

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Introduction: Total knee arthroplasty (TKA) is one of the most common surgical interventions for the arthritic knee. Arthrofibrosis is a well-established post-operative complication following TKA, which due to resultant pain or impaired range of motion may require manipulation under anesthesia (MUA). Few studies have examined the relationship between anticoagulation and the development of postoperative stiffness requiring MUA. We hypothesized that patients who received anticoagulation other than aspirin (warfarin, enoxaparin sodium, apixaban, rivaroxaban) following surgery may have an increased risk for development of arthrofibrosis requiring MUA secondary to increased swelling, hemarthrosis formation, or inability to utilize non-steroidal anti-inflammatory drugs (NSAIDs) in the postoperative period. Materials and Methods: A retrospective chart review of patients who underwent surgical management of early arthrofibrosis following total knee arthroplasty at a tertiary care center from 2013-2020 was performed on patients undergoing MUA after a primary or revision TKA met inclusion criteria. A total of 310 patients were included in this study. Exclusion criteria included manipulations completed greater than 18 weeks after TKA and patients with incomplete clinical or radiologic records. Patient demographics, surgical information, perioperative anticoagulation status, and time to MUA were extracted for analysis. Results: 310 patients in the final sample group who underwent TKA were identified, 165 of which underwent subsequent MUA. This group was matched based on similar age, gender, risk factors, and ASA use to a a control group of 145 patients who did not undergo MUA. Using logistic regression modeling, a comparison between control-matched groups for patients who received alternative anticoagulation therapy and those who received ASA only demonstrated the difference in the incidence of MUA was not statistically significant (p=0.5416). Conclusion: This study shows no statistical significance in MUA rate between patients receiving ASA alone or alternative anticoagulation in the TKA post-op period. Therefore, perioperative anticoagulation has a limited effect as a causation factor for MUA. Further biologic studies on the complex development of MUA may help to elucidate relevant risk factors.

76. Effect of Postoperative Thromboprophylaxis after Total Knee Arthroplasty: Likelihood of Arthrofibrosis in Patients on Aspirin and non-Aspirin Blood Thinners

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Introduction: Total knee arthroplasty (TKA) is one of the most common surgical interventions for the arthritic knee. Arthrofibrosis is a well-established postoperative complication following TKA, resulting in poor patient-reported outcomes and often impaired range of motion requiring manipulation under anesthesia (MUA). Current literature on thromboprophylaxis following anterior cruciate ligament reconstruction reported an association with postoperative arthrofibrosis. Few studies

have examined the relationship between specific anticoagulant agents and the risk of arthrofibrosis after TKA. Choice of thromboprophylaxis after TKA entails a wide arsenal of anticoagulants and antiplatelets consisting of aspirin, warfarin, heparin, fondaparinux, and Direct oral anticoagulants (DOACs). This study hypothesizes that patients on non-aspirin blood thinners such as warfarin, heparin, fondaparinux, and Direct oral anticoagulants (DOACs) following TKA will have an increased risk for the development of arthrofibrosis requiring MUA. Methods: A retrospective chart review of patients who underwent surgical management of arthrofibrosis following TKA at a tertiary care center from 2013-2020 was performed. Inclusion criteria included patients who developed arthrofibrosis after a primary or revision TKA. These patients were then filtered into those who required MUA and those who did not. Exclusion criteria consisted of patients having a MUA greater than 18 weeks after the TKA surgery as well as patients with incomplete clinical or radiologic chart records. Patient demographics, surgical information, postoperative anticoagulation status, and time to MUA were extracted for analysis. Using logistic regression modeling, a comparison was made between control-matched groups for patients who received only aspirin and for patients who received alternative blood thinners. Results: 310 total patients meeting the criteria were identified who developed arthrofibrosis after primary or revision TKA. 165 of these patients underwent subsequent MUA prior to 18 weeks after TKA. This group was matched based on similar age, gender, risk factors, and aspirin use to a control group of 145 patients who did not undergo MUA. The final study groups were: 240 on aspirin alone, 70 in the alternative anticoagulation. Statistical analysis demonstrated that in the group of patients who developed arthrofibrosis and received alternative anticoagulants, 40/70 (57.14%) required a MUA. Of the aspirin-only group that developed arthrofibrosis, 125/240 (52.08%) required a MUA, as seen in Table 1. This difference was not statistically significant (p=0.5416). Conclusion: This study shows no difference in developing arthrofibrosis that requires MUA between patients receiving aspirin alone or alternative blood thinners in the TKA postoperative period. Our results demonstrate that the specific agent of choice for thromboprophylaxis has a limited effect as a causation factor for arthrofibrosis requiring MUA after TKA. Further biologic studies on the complex development of MUA may help to elucidate relevant risk factors.

77. Preoperative Activity Status Predicts Postoperative Head and Neck Wound Complications

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Introduction: Preoperative functional activity status (PFAS) is a key component of frailty, a known risk factor for postoperative complications. The association between PFAS and incidence of postoperative wound complications, however, has not been well described in head and neck (H&N) literature. The current study investigates if PFAS as measured by metabolic equivalents (METs) impacts wound complication incidence after H&N cancer surgery Methods: IRB-approved, retrospective review of patients from 2014-20 who underwent resection of non-esophageal, aerodigestive tract Squamous Cell Carcinoma at a single tertiary care center. A standardized MET calculation questionnaire was utilized. METs measure energy cost of activities compared to basal metabolic rate. One (1) MET equates to energy used when sitting. Ten (10) METs correspond to energy used with vigorous activity. Patients were divided into 3 MET groups: 7-10 (Group 1), 5-6 (Group 2), or 1-4 (Group 3). Chart-documented wound complications included flap failure, dehiscence, infection, incisional breakdown, hematoma, and chyle leak. Wound complication incidences were compared to discern if low (<4) MET subgroup patients developed more complications than higher MET subgroup patients. Statistical analysis was done via Welch t-test. A p value <0.05 comprised statistical significance Results: Out of 233 patients, 46 (19.7%) had <4 METs (Group 3), 145 (62.2%) had 5-6 (Group 2), and 42 (18%) had >7 METs (Group 1). Wound complications occurred in 24.4% of patients. Of these, 12.2% were in Group 1, 66.6% in Group 2, and 21.0% in Group 3. Group 1 (METs >7) patients had a significantly lower wound complication incidence compared to Group 2 or 3 (p=0.02). The difference remained significant after adjusting for tobacco or alcohol use, preoperative albumin, and prior chemoradiation Conclusion: Patients with high PFAS (METs >7) had significantly lower incidence of postoperative wound complications compared to patients with METs <7 after adjusting for common risk factors. Functional status, defined by METs, may predict wound complications after H&N cancer surgery

78. Radially Expanding Trocars: A Possible Alternative to Standard Trocars

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Introduction: Access to the abdominal cavity during laparoscopic surgery carries a risk of inadvertent injury to intra-abdominal organs and vascular structures, which can be life-threatening. Postoperatively, port-site complications due to port and fascial defect size may arise such as wound infection, herniation of small bowel, entrapment of the omentum, and bleeding. Conventional trocar systems use sharp pyramidal blades to cut through layers of the abdominal wall. As an alternative to conventional trocars, radially expanding trocar devices, such as The XPAN Universal Trocar System, are emerging. This instrument is designed to decrease the fascial defect incurred from trocar insertion with gradual dilation functioning as a STEP system with 3 millimeter, 5 millimeter, and 12 millimeter sized increments. Our aim is to compare fascial defect size between the XPAN device and conventional cutting trocar in the abdominal walls of porcine cadavers. Methods: Three incisions were made on both sides of the abdominal wall. For conventional cutting trocars, a 5mm, 12mm, and 5 to 12mm STEP were inserted into each incision. The XPAN system requires an initial insertion of a 3mm trocar. After insertion of separate 3mm cannulas into each incision, a 5mm, 12mm, and 5 to 12mm STEP system were inserted. The devices remained in place for five minutes. Both abdominal walls were excised and secured to a square frame by springs. The innermost layer of peritoneal fat was dissected to expose the fascial layer. A taper gauge was inserted into the trocar pathway to measure the area of inner and outer fascial defect and a ruler was used to measure visible fascial defect length and width. Results: Pilot data collected from our cohort of animals (n=3) demonstrates the following results. The median values (IQR) for the XPAN 5mm, 12mm, and 5 to 12mm STEP system for the outer areas were 7.5 mm² (IQR 7.45-8 mm²), 13.1 mm² (IQR 12.65-13.7 mm²),14 mm² (IQR 11.6-13.3 mm²), inner area 6.3 mm² (IQR 6.1- 6.25 mm²) ,11 mm² (10.55-11.3 mm²), 11.5 mm²(10.55-11.25 mm²), fascial defect length 9 mm (IQR 8-9.5 mm),12 mm (IQR 11-13.5 mm), 14 mm (IQR 12-14.5 mm), and fascial defect width 6 mm (IQR 5.5-6.5 mm), 12 mm (IQR 8.5-13 mm), 11 mm (IQR 9.5-15.5 mm) respectively.The median values for conventional cutting trocars were measured for outer area 9mm² (IQR 8.8-9.05 mm²),14.4 mm² (IQR 13.65-14.35 mm²),15 mm² (IQR 14.85-15.25 mm²), inner area 6.3 mm² (IQR 6.15-6.3 mm²),12.6 mm² (IQR 12.55-12.65 mm²),13 mm²(IQR 12.75-14.25 mm²), fascial defect length 9 mm (IQR 7-9 mm),16 mm (IQR 13.5-18 mm), 21 mm (IQR 17-23 mm) and fascial defect width 6 mm (IQR 4.5-6.5 mm), 12 mm (IQR 9.5-13 mm), 21 mm(IQR 17-23 mm), respectively. Mann-Whitney U test for nonparametric data was conducted demonstrating no statistically significant difference between the radially expanding trocars and the conventional pyramidal trocars for outer and inner area at the 5mm, 12mm,and STEP port sites (p=0.081 and 1.0; p=0.19 and 0.081; and p=0.081 and 0.077 respectively). Likewise, there was no significant statistical significance for fascial defect length and width between the conventional trocars and XPAN trocars at 5mm, 12mm, and STEP port sites (p=0.64 and 0.82; p=0.38 and 0.82; and p=0.66 and 1.0, respectively). Conclusions: Our pilot data suggests that when utilizing radially expanding trocars to obtain abdominal access, radially expanding trocars generate a similar traumatic defect to the traditional pyramidal trocas. Given these findings and the small sample size, radially expanding trocars deserve further investigation to determine viability as an alternative for minimizing abdominal wall disruption after laparoscopic surgery and reduce the incidence of port site complications.

79. Probiotics: the future antibiotics

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Background: Staphylococcus aureus biofilm infections are devastating for an innumerable number of patients, especially those with pernicious implantable material infections. For instance, infection remains the most frequently given reason for surgical readmission following breast implant surgery, and S. aureus has been found to be the most common culprit. Current treatment options, such as antibiotics and surgical revision do not prevent biofilm development. Probiotic bacteria, such as lactobacillus species, provide a new option for inhibiting pathogenic biofilms on implant materials. Although probiotics are considered advantageous and non-toxic, as a live organism they may still pose risks, such as inducing a host immune response. However, the biosurfactants produced by probiotic bacteria may be equally advantageous. Methods: The ability of probiotics and probiotic biosurfactants to prevent the development of S. aureus was quantified via zone of inhibition assays. Xen40, a methicillin-sensitive S. aureus strain derived from osteomyelitis isolate was used to develop pathogenic biofilms. Probiotic biofilms of L. rhamnosus, L. plantarum, L. paracasei, or L. lactis were developed on 5 mm punch biopsies of Cortiva, an acellular dermal matrix commonly used in breast reconstruction surgeries. Alternatively, the biosurfactants from each strain were evaluated against Xen 40 at concentrations from 0-181 mg/mL. The antibiotic ciprofloxacin was used as a positive control, and the results were further quantified using colony forming units to enumerate Xen 40 following exposure, and crystal violet assays to measure biomass inhibition. Results: Probiotic biofilms were easily produced on the Cortiva implant material. The zones of inhibition created by the probiotic biofilms L. rhamnosus and L. paracasei were comparable to that created by 2 µg/mL of ciprofloxacin, and L. plantarum biofilms created a significantly greater zone of inhibition than 2 µg/mL of ciprofloxacin. The biosurfactants derived from L. rhamnosus, L. plantarum, L. paracasei, and L. lactis each demonstrated significant antimicrobial ability, decreasing biofilm biomass by an average of

43% at 22.72 mg/mL and 84% at 181 mg/mL. Conclusions: Probiotic bacteria and probiotic biosurfactants can inhibit the development of S. aureus biofilms on the implantable acellular dermal matrix, Cortiva, and should be further explored as a potential suitable alternative to conventional antibiotics.

80. ERCP FINDINGS PROVIDE FURTHER JUSTIFICATION FOR A SURGERY FIRST MINDSET IN PEDIATRIC CHOLEDOCHOLITHIASIS

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Introduction: Endoscopic retrograde cholangiopancreatography (ERCP) first pathway is heavily favored in the management of choledocholithiasis for pediatric patients, despite often requiring two separate general anesthetics. In contrast, a single-stage, “surgery first” approach consisting of LC with cholangiogram and possible laparoscopic common bile duct exploration (LCBDE) has a shorter length of stay with an equivalent safety profile. However, it is unclear what proportion of pediatric patients undergoing initial ERCP have endoscopic evidence of obstructions that would be amenable to clearance with LCBDE. We hypothesized the majority of patients who obtained an ERCP before LC would have been candidates for and benefited from initial LCBDE for choledocholithiasis during LC. Methods: A retrospective review of all patients under the age of 18 at a single children’s hospital who underwent ERCP before LC over a 10 year period was conducted. Twenty-six patients underwent ERCP before LC, with 1 patient excluded due to a failed ERCP attempt. Demographic and endoscopic data were analyzed, including ERCP indications, presence of stones or sludge, stone size and number, and stent placement. Based on accepted criteria, stone size was categorized as small (0-4 mm), medium (5-7 mm), or large (≥8 mm). Findings considered amenable to LCBDE included the presence of no return, sludge, or stones less than 8 mm on ERCP. Results: Of the twenty-five ERCPs analyzed, 10 (40%) had sludge only, 3 (12%) had sludge and stones removed, 9 (36%) had only stones removed, and 3 (12%) had no evidence of stones or sludge. In the 12 patients with stones removed, 3 (25%) had small stones, 4 (33%) had medium stones, and 3 (25%) had large stones; stone size was not specified in 2 patients. Twelve patients had choledocholithiasis with cholelithiasis (48%), making it the most common primary indication for ERCP, followed by primary choledocholithiasis (24%), gallstone pancreatitis (16%), cholecystitis (8%), and concomitant choledocholithiasis with cholecystitis (4%). Of all patients who underwent ERCP, 80% had either findings of sludge, stones amenable to LCBDE maneuvers, or no return of material after balloon sweeps. Conclusion: Our findings suggest that a large majority (80%) of pediatric patients who underwent preoperative ERCP had obstructions that are amenable to LCBDE. Implementing surgery first management for suspected choledocholithiasis can offer an efficient pathway to the more established ERCP first strategy. Renewed efforts are needed to promote LCBDE implementation during LC and disseminate practical training to pediatric surgeons.

81. Continuity of Care in Surgical Resident Education: A Model in Otolaryngology-Head and Neck Surgery Residency

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Background: Continuity of care (CoC) is important for both resident education and patient care. A low percentage of residents who assist in a patient’s operation also evaluate the patient either pre- or post-operatively. We present a model in which a primarily resident-run otolaryngology- head and neck surgery (OHNS) clinic addresses the lack of CoC in OHNS residency training. Methods: This study analyzed retrospectively collected of new patients presenting for OHNS care through the resident-run clinic at an academic medical center from 2013-2020. Patient demographic data, visit diagnosis codes, and procedure codes were examined. The resident involved in pre-operative, operative, and post-operative phases of care was recorded, and perioperative CoC was analyzed. Results: In this CoC clinic, a resident is responsible for all aspects of a patient’s outpatient, operative, and inpatient care in collaboration with a supervising attending surgeon. Of 1,631 new patients in this clinic, diagnosis codes were representative of outpatient clinical OHNS. Some form of perioperative CoC was found in 98.6% of surgical cases while complete CoC was established in 75.7% of cases. Conclusion: The proposed resident CoC clinic is a successful model to address lack of CoC in resident education. Patient diagnoses

encountered in this clinic span the OHNS spectrum of care.

82. Pregnancy Outcomes Comparing First Trimester High-Vaginal Cerclage with Abdominal Cerclage

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Background: Cervical Insufficiency can be diagnosed in patients with a history of painless cervical dilation and recurrent second trimester pregnancy loss (history indicated), following asymptomatic cervical shortening on transvaginal screening ultrasound (ultrasound indicated), or based on physical exam findings of painless dilation (exam indicated).7 Cervical cerclage placement is typically indicated in each of these scenarios. Studies have shown cerclage placement is associated with significant decreases in preterm birth outcomes and improvements in neonatal morbidity and mortality. The standard transvaginal cerclage methods currently used include modifications of the McDonald and Shirodkar techniques. Transabdominal approach is generally reserved for women with previous failed vaginal approach, with extremely short cervices, anatomically deformed cervix, deeply lacerated, or severely scarred from previous failed vaginal cerclage.4 The transabdominal cerclage can be placed early in the first trimester or non-pregnant state and the stitch can be left in place between pregnancies with subsequent c section.7 The high-vaginal cervical cerclage technique developed at our institution aims to obtain a cervical cerclage placement level like the abdominal cerclage. However, pregnancy outcomes of women undergoing abdominal versus high-vaginal cerclage have not been examined. Hypothesis: Women who underwent first-trimester high-vaginal cerclage placement will have similar pregnancy outcomes when compared to women who underwent pre-pregnancy laparoscopic abdominal cerclage placement. Methods: A single institution retrospective cohort of women who underwent abdominal cerclage or high-vaginal cerclage between March 1, 2017 to March 30, 2022. The primary outcome was spontaneous preterm delivery (SPTD) < 37 0/7 weeks of gestation. Secondary outcomes were SPTD < 34 0/7 and a composite of adverse perinatal outcomes. Data collected included maternal demographic characteristics, clinical and delivery data, and neonatal outcomes. Results: A total of 20 cases were identified, two twin gestations were excluded. A total of 9 underwent pre-pregnancy abdominal cerclage (group 1) and 9 had first trimester cervico-isthmic vaginal cerclage (group 2). SPTB occurred in 2 patients (22.2%) in group 1 and in 3 (33.3%) in group 2 (p =.27). One patient in group 1 had SPTB < 32 0/7 weeks compared with no patients in group 2. Maternal demographic characteristics were not significantly different between the 2 groups. Gestational age at delivery was similar between the groups (Table 1). All patients in both groups were delivered by cesarean. Conclusions: High-vaginal cervical cerclage had no significant statistical difference in pregnancy outcomes when compared to abdominal cerclage at our institution. High-vaginal cerclage is a comparable alternative to abdominal cerclage for pregnant women who would otherwise undergo abdominal cerclage and this technique avoids complications associated with an abdominal procedure during pregnancy.

83. Sex Differences in Middle Cerebral Artery Hemodynamics but not Systemic Arterial Stiffness in Normotensive Adult Rats

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Background: Cerebrovascular disease (CVD) is a major risk factor for the development of cognitive impairment. Postmenopausal women are more likely to suffer from CVD and have a greater risk of developing Alzheimer disease and dementia. However the mechanisms underlying greater susceptibility of women to cognitive impairment are not well understood. Previous results from our group indicate sex differences in estrogen receptor-dependent vasodilation of the middle cerebral artery (MCA) in adult rats. In this study we determined whether sex differences in MCA reactivity are associated with hemodynamic changes in cerebral arteries or systemic circulation supplying blood to the brain. Methods: High frequency ultrasound was used to determine the pulsatility (PI) and resistance indexes (RI) of left MCA (LMCA) and intracranial internal carotid artery (LICA) in 25-week-old male and female Sprague-Dawley (SD) rats. Rats were anesthetized and placed on a heated platform. Images were obtained using a LZ250 transducer and Vevo LAZR device. The LMCA and LICA were visualized by directing the transducer through the rat temporal foramen. Peak systolic flow (Vs), end-diastolic flow (Vd), and mean flow (Vmean) were determined by pulsed wave Doppler mode. PI and RI were calculated as follows: PI=(Vs-Vd)/V mean, RI=(Vs-Vd)/Vs. In addition, the pulse wave velocity (PWV) of the thoracic aorta (Ao) and left common carotid

artery (LCCA) were determined as a measure of vascular stiffness. The paraffin-embedded sections of LMCA were stained for cyclooxygenase 2 (COX-2), endothelial nitric oxide synthase (eNOS), and collagen deposition (Masson's trichrome). Results: Female rats had lower body weight (BW) compared with males (317.7 ± 8.8 vs. 601.7 ± 29.9 g, $p < 0.05$; n = 3-7). Female rats had greater organ weight/BW versus males for brain (0.658 ± 0.012 vs. 0.405 ± 0.014 g/100 g BW), heart (0.658 ± 0.012 vs. 0.301 ± 0.035 g/100 g BW), and kidneys (0.658 ± 0.0079 vs 0.316 ± 0.0071 g/100 g BW)($p<0.05$; n = 3-7). There was no difference in systolic - or diastolic blood pressures between sexes, however heart rate was lower in the female rats (340.4 ± 6.8 vs. 422.6 ± 9.8 bpm, $p < 0.05$). LMCA PI and RI were lower in the female compared to male SD rats (PI: 0.745 ± 0.14 vs 1.40 ± 0.27, $p = 0.057$ and RI: 0.477 ± 0.060 vs. 0.696 ± 0.046, $p = 0.087$; n = 3-7). In contrast, there were no differences in LICA resistance between females and males ($p>0.05$; n = 3-7). COX-2 and eNOS immunoreactivities tended to increase in LMCA of females compared to males (COX-2: 2.06 ± 1.7 vs. 0.333 ± 0.20, and e-NOS: 7.25 ± 2.2 vs. 1.19 ± 0.56; n = 3-5). Collagen deposition was similar in LMCA of females compared to males. There were no sex differences in the PWV of LCCA or thoracic aorta. Conclusions: Our results demonstrate sex differences in vascular reactivity and resistance of LMCA with greater expression of COX-2 and eNOS - markers important for vasodilation and maintenance of vascular tone. However, no differences in systemic arterial stiffness were found in the studied rat cohort. Our future studies will focus on older female rats to investigate age and sex effects on cerebrovascular reactivity, cerebral blood flow, and cognitive function.

84. Early Outcomes with Early Weightbearing Utilizing Willits Protocol Following Haglund's Surgery: A Retrospective Review

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Background: Insertional Achilles tendinopathy with Haglund's deformity is a commonly treated condition by foot and ankle surgeons. Literature has been published showing good outcomes following detachment and reattachment of the Achilles with resection of the bone. However, postoperative protocol is variable and has not been well researched. Our purpose is to retrospectively review early mobilization with the Willits protocol following insertional Achilles tendinopathy surgery. Methods: A retrospective chart review was conducted of 24 patients with 28 feet who underwent surgical treatment for insertional Achilles tendinopathy with Haglund's deformity by two foot and ankle surgeons. Following surgery, Willits protocol was initiated for early mobilization. Results: The patients had an average decrease in pain from 6.2 to 1.5 on an 10 point scale postoperatively. There was one postoperative rupture (3.6%) after a trauma. Three patients (10.7%) required reoperation: one debridement for postoperative infection, one achilles rupture after a fall requiring a flexor hallucis longus transfer and v to y lengthening, and one gastrocnemius recession for calf tightness. Conclusion: The Willits protocol, though initially created for Achilles tendon ruptures, provides an early mobilization protocol for patients after insertional Achilles tendinopathy procedures. Our study found low reoperation rate and improved pain level while allowing patients to mobilize earlier than previously reported in literature.

85. Retrospective Comparison of Isolated Haglund's Deformity Surgery versus Combined with Gastrocnemius Recession

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Background: Insertional Achilles tendonitis is a common pathology treated by foot and ankle surgeons that may require surgical intervention. Literature has shown good outcomes following detachment and reattachment of the Achilles for removal of the exostosis. However, there is minimal literature showing the impacts of adding a gastrocnemius recession to the Haglund's surgery. Our goal of the study is to retrospectively review the outcomes of an isolated Haglund's surgery versus a Haglund's surgery combined with a Gastrocnemius recession. Methods: A retrospective chart review of 54 operative extremities were analyzed, 29 with isolated Haglund's surgery and 25 with a Strayer gastrocnemius recession. Results: We found similar decreases in pain between the two groups, 6.1 to 1.5 and 6.8 to 1.8 in the isolated Haglund's and Stray-

ers group respectively. We found decreased postoperative Achilles rupture and reoperation rates in the Strayer group but this did not reach statistical significance. We found a statistically significant decreased rate of wound healing complications in the Strayer group, 4% in the Strayer group and 24.1% in the isolated procedure. Conclusion: All in all, adding a Strayer to a Haglund's surgery decreased wound healing complications, rupture rates, and reoperation rates. We recommend future randomized controlled studies to compare the use of a Strayer procedure on postoperative complications.

86. Oncologic Outcomes: Intravesical Gemcitabine/Docetaxel is a Feasible Alternative for Management of High-Risk Non-Muscle Invasive Bladder Cancer

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Introduction and Background: There continues to be an international shortage of intravesical Bacillus Calmaette-Guérin (BCG), the first-line therapy for high-risk non-muscle invasive bladder cancer (HR NMIBC). No alternative treatments have yet been approved. In response to this, our institution employed sequential intravesical (IV) chemotherapy of gemcitabine and docetaxel (Gem-Doce). Here, we aim to define oncologic outcomes in patients receiving IV Gem-Doce to evaluate the efficacy in management of HR NMIBC. Methods and Materials: We conducted a retrospective cohort study of patients with HR NMIBC that received IV Gem-Doce as first-line or salvage therapy at our institution. Metrics included prior BCG status, tumor pathology, and recurrence status. BCG-unresponsive was defined as persistent disease after 6 months of BCG or progression at 3 months or relapse within 6 months of treatment. The primary outcome was recurrence-free survival (RFS). Groups compared: BCG-naïve versus BCG-unresponsive patients, patients with CIS present versus no CIS, and patients with multifocal versus non-multifocal disease. We performed a Kaplan-Meier survival analysis to determine RFS at 6, 12, and 18-months. Results: We identified 45 patients for analysis between 2020 and 2022. Pretreatment pathology was high-grade (HG) Ta (71%), CIS (24%) or HG T1(20%). The patients were either BCG-naïve (67%) or BCG-unresponsive (33%) and a majority had multifocal disease (58%). Progression occurred in three patients (6.7%) and one patient died. Overall RFS at 6-, 12-, and 18-month was 81%, 61%, and 55% respectively. The BCG-naïve group had a 12-month RFS of 69% (95% CI 0.52-0.90) compared to BCG-unresponsive group at 54% (95% CI 0.29-1.0, p = 0.97). Patients with CIS had a higher 12-month RFS of 89% (95% CI 0.70 - 1.0) than those without CIS at 53% (95% CI 0.34 - 0.84, p = 0.086). Patients with non-multifocal disease had a 12-month RFS of 74% (95% CI 0.54 - 1.0) and those with multifocal disease were at 37% (95% CI 0.16 - 0.84, p = 0.082). Conclusions: Our data suggested that IV Gem-Doce is a feasible alternative to BCG for patients with HR NMIBC that are BCG-naïve, have CIS, or have non-multifocal disease. Additional studies are needed to evaluate predictors of response to IV Gem-Doce based on clinical and pathologic characteristics.

87. Opiate use is significantly lower in patients with interstitial cystitis/bladder pain syndrome following cystectomy with urinary diversion

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Introduction and Objective: Opiates are prescribed regularly for pain management in interstitial cystitis/bladder pain syndrome (IC/BPS) patients. The IC/BPS patient subgroup with end-stage disease, often characterized by a contracted and fibrotic bladder and significant discomfort, may elect to undergo cystectomy with urinary diversion (CWUD). Removal of the bladder should, theoretically, eliminate the primary source of pain in at least some patients and thus reduce or eliminate the need for narcotic medications. In an earlier study, we compared pre- and postoperative opioid use in IC/BPS patients who underwent CWUD (N=26) and found that, while not statistically significant, a trend towards decreased post-surgery opiate use was evident. In this study, we revisit this question in an expanded cohort. Methods: A retrospective cross-section analysis was completed on an Institutional Review Board (IRB00087367) approved database of IC/BPS patients that underwent CWUD between 2014 to 2022 at our institution. Hunner lesion (HL) status and bladder capacity (BC) were also charted. BC was defined as 'low' if ≤500cc and non-low if >500cc. Opiate use in the form of morphine equivalents (ME) was tracked for each patient by cross-referencing them with the North Carolina Controlled Substances Reporting

System. Pre-CWUD was defined as 1 year before cystectomy up until date of surgery and post-CWUD was defined as 1 year after cystectomy. The first 30 postoperative days were excluded from total ME use to account for management of postoperative pain. Paired t-test was used to compare ΔME for all parameters except age, where a Pearson's correlation analysis was used. Results: A total of 87 patients were included in the study analysis (18 men and 69 female), with a mean age at CWUD of 53.59 (± 16.03) years. Mean bladder capacity was 353.3cc (± 243.05). In the study, 65 patients had low BC, 12 were non-low BC, 29 patients were HL+, and 49 HL-. Two patients were excluded from analysis based on outlier opiate use. 58 ileal conduit diversions were performed, 11 neobladders, and 18 Indiana Pouches. Mean pre-CWUD ME use was 5774.19/year and post-CWUD 2866.86/year with a ΔME of -2907. ($p<0.001$). Change in ME was not significantly different based on gender ($p=0.513$), BC ($p=0.698$), age ($p=0.705$), or HL ($p=0.468$), nor with presence of HL within the low BC group ($p=0.447$). Conclusions: Based on the assumption that IC/BPS patients use opiates primarily for pain relief, the significant decrease in opioid use following CWUD likely represents a corresponding significant reduction in pain and implicates the bladder as the primary source of that pain.

88. Chronic Central Serous Chorioretinopathy: Pathophysiology and a New Treatment Paradigm

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INTRODUCTION: Chronic Central Serous Chorioretinopathy (Chronic CSCR) encompasses an ill-defined cohort of patients with exudative maculopathies characterized by choroidal thickening (pachychoroid), choroidal hyperpermeability, and persistent macular exudation. This cohort shares many of the characteristics of Acute Central Serous Chorioretinopathy (Acute CSCR) which is caused by choroidal hyperpermeability. The natural history of Acute CSCR is favorable due to a high likelihood of spontaneous exudative resolution. However, patients with Chronic CSCR have persistent submacular exudation, retinal pigment epithelial (RPE) deterioration, and on occasions, subretinal neovascularization. The chronic exudation leads to progressive and irreversible photoreceptor damage and subsequent poor vision. We have found that that the presence of choroidal neovascularization is largely responsible for the persistent exudation and that recognition of this angiogenic process in addition to choroidal hyperpermeability is critical for treatment success. METHODS: This study is a single center, retrospective review of 23 patients. Patient records with a referral diagnosis of Chronic CSCR and/or atypical Exudative ARMD during the years 2016 to 2021 were reviewed. Each patient had failed one or multiple monotherapeutic modalities. ICG and OCTA-directed half-fluence PDT Triple Therapy was performed on patients who failed monotherapeutic treatments and had persistent serous detachment of the macula, a thick choroid, ICG hyperflourescence, IVFA leakage, and an OCTA that showed frank neovascularization or a "double layer" sign. The Triple Therapy consisted of an intravitreal injection of an anti-VEGF drug (ranibizumab, 0.5 mg per 0.05mg, Lucentis, Genentech or bevacizumab (Avastin, Genentech), 0.5 mg per 0.05 ml) on Day 0, followed by half-fluence PDT Visudyne (verteporfin, Bausch and Lomb) and Triescence (triamcinolone acetonide, 2 mg per 0.05 ml, Bausch and Lomb) 3-14 days later. The primary outcomes of this study are the proportion of eyes with complete reabsorption of subretinal fluid, change in central subfield thickness (CST), and visual acuity. Secondary outcomes include change in extrafoveal exudation (nCST), and duration of treatment effect. Patients were assessed at baseline and followed up every 8 weeks after combination therapy. RESULTS: 26 eyes from 23 patients with pachychoroid and macular exudation were evaluated. The mean age of this group was 62.3 years ± 11.8 with 14 (60.9%) males and 9 (39.1%) females. 19 (82.6%) were white and 4 (17.4%) were patients of color. 16 (61.5%) had never smoked, 6 (23.1%) had previously smoked and 4 (15.4%) were current smokers. The mean vision at baseline was 0.45 LogMar best corrected visual acuity (BCVA) ± 0.41. The central subfield thickness (CST) was 295.2 ± 133.5 microns. The choroidal thickness as measured by enhanced depth imaging (EDI) was 468.5 ± 146.2 microns. OCTA and ICG-directed Triple Therapy led to complete subretinal exudation resolution in 23/26 (88.5%) eyes. BVCA improved one line (0.11 LogMar +/- 0.20) after treatment and was maintained at one year (0.11 LogMar +/- 0.22). The CST improved by 107.4 ± 105.4 microns and paracentral retinal thickness decreased by 123.2 ± 83.5 microns. The time between treatments was 111.8 weeks ± 70.6 weeks. CONCLUSION: This study confirms the common occurrence of incomplete exudative resolution with monotherapeutic treatments for Chronic CSCR, and validates the efficacy of ICG and OCTA-Directed PDT Therapy. This study also shows the critical need for multimodality imaging and how each modality gives information necessary to correctly diagnose and treat this condition. The results indicate that many Chronic CSCR patients have two pathophysiological processes responsible for the persistent leakage: choroidal hyperpermeability and angiogenesis. The presence of the former necessitates the need for PDT and the latter, anti-VEGF therapy. A randomized study will be necessary to show that patients with simultaneous choroidal hyperpermeability and angiogenesis are treated more efficiently with combination therapy.

89. REFRAMING THE MANAGEMENT OF CHOLEDOCHOLITHIASIS: JUSTIFICATION FOR A SURGERY FIRST MINDSET

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Introduction: The endoscopic retrograde cholangiopancreatography (ERCP) first pathway for choledocholithiasis management is a two-procedure process consisting of ERCP followed by laparoscopic cholecystectomy (LC). In contrast, a single-stage approach consisting of LC with laparoscopic common bile duct exploration (LCBDE) has a shorter length of stay with an equivalent safety profile. Despite this, nationwide referral patterns heavily favor ERCP first. LCBDE as an initial approach in the management of choledocholithiasis may decrease the instances in which patients are unnecessarily exposed to two separate anesthetic events. Therefore, we reviewed the endoscopy reports of preoperative ERCPs in patients with a non-complicated presentation of choledocholithiasis at a large tertiary referral center to determine what proportion of patients may benefit from a surgery first approach. Methods: We retrospectively reviewed 71 patients over the age of 18 who underwent ERCP first at a single center over a 6 year study period. Demographic and endoscopic data were analyzed. Thirteen patients were excluded because of missing endoscopy data, a diagnosis of cholangitis, or due to poor surgical candidacy. Endoscopic information collected included ERCP indications, presence of stones and/or sludge, stent placement, stone size and number, and common bile duct diameter. Based on accepted criteria, stone size was categorized as small (0-4 mm), medium (5-7 mm), and large (≥8 mm). Results: Eleven (19%) patients who underwent ERCP prior to laparoscopic cholecystectomy had sludge only, 15 patients (26%) had sludge and stones, while 32 (55%) had stones only. Of those 47 patients with stones, 17 (36%) were small, 16 (34%) were medium, and 14 (30%) were large. Twenty-six patients (46%) had isolated choledocholithiasis, making it the most common primary indication for ERCP. This was followed by 22 (25%) with concomitant cholelithiasis and/or cholecystitis, gallstone pancreatitis 7 (12%), and isolated cholelithiasis or cholelithiasis 3 (5%). The diagnosis was made with ultrasound in 38 patients (65%), CT scan in 36 patients (63%), and via MRCP in 23 patients (40%). Twenty-one patients (36%) had multiple imaging modalities that included an MRCP. Stent placement was performed in 27 (39%) with the majority of these patients being biliary stents (85%). Of all patients who underwent ERCP, 76% of patients had findings of sludge and/or stones that might have been amenable to basic LCBDE maneuvers and would have benefited from a surgery first approach. Conclusion: Our findings suggest that the majority of patients who underwent preoperative ERCP for suspected choledocholithiasis had obstructions that are amenable to LCBDE. Implementing surgery first management for suspected choledocholithiasis can offer an efficient alternative to the more common pathway of ERCP followed by LC. Renewed efforts are needed to promote LCBDE implementation during LC and disseminate effective training to general surgeons.

90. Inpatients with Chronic Lower Extremity Wounds Often Present with Advanced Disease and Carry a High Risk of Lower Extremity Amputation

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Objectives Chronic lower extremity wounds are a significant cause for hospitalization and readmissions. With increasing prevalence of risk factors for peripheral arterial occlusive disease, the burden of lower extremity wounds continues to grow. Patients are often presenting to inpatient settings with advanced disease. In this study we evaluate outcomes of patients admitted to a large tertiary center who are managed by our limb preservation service (FLEX). Methods Patients referred to the inpatient FLEX service were included in the study. Admission data including WiFi stage, etiology of disease, ankle brachial index (ABI), and anthropometric data were collected. Limb-Specific outcomes were evaluated using multivariate regression models. Results 577 patients were included in FLEX. Mean age was 64 years, 37% were female, and 30% were of black race. 64% of patients were diabetic and 66% were current or former smokers. XX% of patients underwent a major or minor amputation. Mean ankle brachial index (ABI) of the cohort was 0.91 and mean toe pressure was 80.1 mmhg. 63% of patients presented with WiFi clinical stage 3 or 4 disease. 63% of patients presented with WiFi stage 3

disease at the time of evaluation by the FLEX service. 32% of patients underwent minor or major amputation during follow up. Increasing WiFi stage (p<0.0001), hyperlipidemia (OR 3.1; 95% CI 1.55-6.22), Diabetes (OR 1.87; 95% CI 1.27-2.74), end stage renal disease (OR 2.26; 95% CI 1.28-3.99), hypertension (OR 1.69; 95% CI 1.17-2.43) and Hemoglobin A1c (OR 1.23; 95% CI 1.02-1.49) were associated with increased risk of lower extremity amputation. In multivariate models, WiFi stages 3 (infection, ischemia, and wound) were all significant predictors of limb loss. Conclusions Inpatients who are admitted with chronic lower extremity wounds often present with advanced peripheral arterial disease. Our study suggests that early consultation and multimodality therapy is needed to improve lib salvage rates.

91. ADAPTIVE BALLOON WEANING ALGORITHM WITH AUTOMATED REBOA FACILITATES PROXIMAL HOMEOSTASIS DURING REPERFUSION IN A SWINE HEMORRHAGIC SHOCK MODEL

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Introduction and Objectives: Restoration of distal blood flow is critical to successfully salvage patients with resuscitative endovascular balloon occlusion of the aorta (REBOA). Yet, ideal methods for REBOA deflation to restore flow and simultaneously avoid proximal hypotension, remain undefined. Adaptive balloon titration algorithms to guide deflation may prevent large hemodynamic fluctuations during weaning. We hypothesize that automated REBOA weaning can both augment proximal hemodynamics and avoid hypotension during resuscitation in a swine model of hemorrhagic shock. Methods Fifteen swine underwent 30% controlled hemorrhage followed by 30 minutes of zone 1 REBOA. Next, the REBOA was deflated with an automated syringe running an adaptive algorithm that prioritized proximal mean arterial blood pressure (pMAP) >62.5 mmHg during transfusion of shed blood. Upon post-hoc analysis, animal pMAP responses (Hypertensive-HTN vs Normotensive-NORM) and the discovery of low volume distal flow during the intended complete REBOA allowed us to identify two distinct cohorts. The performance of the adaptive weaning algorithm was compared between the groups. Results The 2 cohorts (HTN, n=5 and NORM, n=10) differed in pMAP (p=0.001) and distal flow (p = 0.001) during REBOA. During the wean phase, cohorts were similar in pMAP, time with carotid flow within 90% of baseline, and time above the pMAP threshold of 62.5 mmHg (p=0.20, p=0.59, p=0.95, respectively) despite the weaning algorithm permitting 14.5 mL/kg more distal aortic flow for the HTN cohort (p=0.001). Conclusion Automated REBOA weaning is feasible and maintains consistent hemodynamics across various physiologic profiles. Automated endovascular devices that can interpret and adapt to a range of hemodynamic physiology will soon facilitate precision resuscitation for patients requiring endovascular aortic occlusion. These findings highlight the need for adaptive control to overcome variability in hemodynamics and differences in resuscitation intensity across clinical contexts.

92. ERCP FINDINGS PROVIDE FURTHER JUSTIFICATION FOR A SURGERY FIRST MINDSET IN PEDIATRIC CHOLEDOCHOLITHIASIS

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Introduction: Endoscopic retrograde cholangiopancreatography (ERCP) first pathway is heavily favored in the management of choledocholithiasis for pediatric patients, despite often requiring two separate general anesthetics. In contrast, a single-stage, “surgery first”, approach consisting of LC with cholangiogram and possible laparoscopic common bile duct exploration (LCBDE) has a shorter length of stay with an equivalent safety profile. However, it is unclear what proportion of pediatric patients undergoing initial ERCP have endoscopic evidence of obstructions that would be amenable to clearance with LCBDE. We hypothesized the majority of patients who obtained an ERCP before LC would have been candidates for and benefited from initial LCBDE for choledocholithiasis during LC. Methods: A retrospective review of all patients under the age of 18 at a single children’s hospital who underwent ERCP before LC over a 10 year period was conducted. Twenty-six patients underwent ERCP before LC, with 1 patient excluded due to a failed ERCP attempt. Demographic and endoscopic data were analyzed, including ERCP indications, presence of stones or sludge, stone size and number, and

stent placement. Based on accepted criteria, stone size was categorized as small (0-4 mm), medium (5-7 mm), or large (≥8 mm). Findings considered amenable to LCBDE included the presence of no return, sludge, or stones less than 8 mm on ERCP. Results: Of the twenty-five ERCPs analyzed, 10 (40%) had sludge only, 3 (12%) had sludge and stones removed, 9 (36%) had only stones removed, and 3 (12%) had no evidence of stones or sludge. In the 12 patients with stones removed, 3 (25%) had small stones, 4 (33%) had medium stones, and 3 (25%) had large stones; stone size was not specified in 2 patients. Twelve patients had choledocholithiasis with cholelithiasis (48%), making it the most common primary indication for ERCP, followed by primary choledocholithiasis (24%), gallstone pancreatitis (16%), cholecystitis (8%), and concomitant choledocholithiasis with cholecystitis (4%). Of all patients who underwent ERCP, 80% had either findings of sludge, stones amenable to LCBDE maneuvers, or no return of material after balloon sweeps. Conclusion: Our findings suggest that a large majority (80%) of pediatric patients who underwent preoperative ERCP had obstructions that are amenable to LCBDE. Implementing surgery first management for suspected choledocholithiasis can offer an efficient pathway to the more established ERCP first strategy. Renewed efforts are needed to promote LCBDE implementation during LC and disseminate practical training to pediatric surgeons.

93. Single-cell multiomic analysis in renal transplantation

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Background: The challenge with single cell assays and tissue biopsies is the difficulty of getting a sample large enough to generate the required number of cells. This is because cells are more vulnerable when exposed to the cell lysis buffer due to the small size and will lead to reduced data quality. To solve this issue, we developed a single-nucleus isolation protocol that can work for very small samples such as human kidney biopsies. Hypothesis: It is hypothesized that single-cell transposase accessible chromatin using sequencing (scATAC-seq) assay and scRNA-seq conducted on biopsy samples will identify molecular fingerprints specific to DGF versus non-DGF allografts. Methods: In the context of the Double R Study (IRB00027118) - whereby multiomics data relative to recipients of DCD renal allograft are compared with living donor recipients to address critical pathophysiological, diagnostic and prognostic questions -, renal biopsy samples are collected at the time of admission for the transplant (baseline), one month after transplantation, and 12 months after transplantation. To determine feasibility, single-cell sequencing assay for transposase-accessible chromatin (scATAC-seq) was applied on the renal allograft specimen of a living donor recipient. Results: We were able to obtain a total of 300k-500k high quality nuclei from the tissue sample. After several washes and filtration, the number of nuclei appeared suitable for our scRNA/ATAC-seq co-profiling assay. Pilot results indicated that scRNA-seq library had an average insertion of 400-500 bp and scATAC-seq library exhibited chromatin structure periodicity as expected. Conclusions: Single-cell sequencing assay for transposase-accessible chromatin (scATAC-seq) can be successfully applied to small (<5mm) renal biopsy samples to generate precious data on the regulatory landscapes of single cells. In the future, we will apply it on all biopsy samples of the Double RR study and the generated data will be matched with urine Raman spectroscopy data, peripheral blood bulk RNAseq data, and clinical outcome data.

94. Personalized Immunocompetent Tumor-on-a-Chip Platform Produces Tumor-Reactive Cytotoxic Lymphocytes

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Introduction: Adoptive cellular therapy (ACT) is a promising anti-tumor immunotherapy whereby a patient's T-cells are isolated ex vivo, expanded and modified to improve tumor cytotoxicity, then reinfused into the patient. While the current ACT modalities [chimeric antigen receptor (CAR) T cells, genetically engineered T-cell receptors, and tumor-infiltrating lymphocytes (TILs)] show remarkable success in select tumor clinical trials and patients, major challenges limit ACT application to all tumor types. These limitations include the lack of sufficient cell numbers for therapeutic efficacy and failure of engineered T-cells to effectively target heterogeneous tumors. To overcome these limitations, we developed a biomimetic device where patient-derived tumor organoids (PTOs), also enriched with antigen presenting cells, are co-cultured

with patient-matched peripheral blood mononuclear cells (PBMCs) in a microfluidic tumor-on-a-chip system (TOC). As PBMCs circulate through this on-demand system, they are exposed to the tumor's polyclonal neoantigen composition in a dispersed system. This system both eliminates the infiltration-inhibitory in vivo tumor microenvironment and leads to the formation of patient- and tumor-specific organoid infiltrating lymphocytes (OILs). The goal of this project is to demonstrate anti-tumor reactivity of TOC-generated OILs. Methods: Patient-matched antigen presenting cells (normal lymph node or spleen) were combined with tumor biopsy-derived PTOs (3 metastatic appendiceal and 1 melanoma) in the TOC platform. Patient-matched PBMCs were circulated through the system for 7 days. The resultant OILs were collected and expanded for an additional 7 days. As control, uncirculated PBMCs and TILs were also expanded from the same patient. Following expansion, PBMCs, TILs, and OILs were separately co-cultured with matched PTOs in a plate for 7 days. Thereafter, culture media was collected and assayed for multiplex secreted cytokine analysis, immune cells collected and stimulated for flow cytometric intracellular cytokine analysis, and PTOs collected for immunohistochemistry analysis of immune cell infiltrate and tumor cell apoptosis. Results: Secreted cytokine analysis revealed increased signal intensity of the cytotoxic-associated cytokines perforin, IP-10, and IFNγ in OIL/PTO co-culture media compared to TILs and control uncirculated PBMCs (n=1). Furthermore, TIL/PTO co-culture media had increased IL-10 signal intensity, suggesting TIL immunosuppression. Flow cytometric analysis of PBMCs, OILs, and TILs showed no significant difference between the percent of TNFα, granzyme B, or IFNγ positive T-cells (CD3+CD8+) (n=3, $p>0.05$). Immunohistochemistry analysis of PTOs after co-culture revealed infiltration of CD3+ and CD3+Granzyme B+ cells into co-cultured PTOs (n=1). Additionally, compared to PBMC control and TILs, the OIL co-cultured PTOs showed increased apoptosis via cleaved caspase 3 expression (n=2). Conclusion: These preliminary results suggest that patient immune cells co-cultured with PTOs (OILs) show higher cytotoxicity associated cytokines as well as induce tumor cell apoptosis, compared to TILs and control PBMCs. With further validation of the OILs' increased tumor-targeting efficacy, we propose a new potential source of therapeutic lymphocytes for ACT in a broad array of tumor types previously untreatable by current ACT modalities.

95. Cerebrospinal Fluid Volume Assessed from Clinical T1w-MRI Predicts Functional Outcomes Post-Thrombectomy

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Introduction: Endovascular treatment (EVT) is recognized as the standard of care for patients with acute ischemic stroke caused by large vessel occlusion (LVO). However, many patients do not achieve functional independence after successful EVT, which may be due to the pre-existing brain atrophy and higher total cerebrospinal fluid volume (CSFV). Prediction of patients who will highly benefit from EVT may be possible using baseline total CSFV as a marker of brain health and reserve. Objective: Quantify total cranial CSFV from clinical T1w-MRI to determine brain health and examine its influence on functional outcomes post successful EVT. Methods: We performed a retrospective analysis of Wake Forest Baptist Health's Stroke Thrombectomy and Aneurysm Registry (n=602), collected between 2015 - 2021. We selected 213 patients (mean age 67.5 ± 14.6, 49.3% female) who had adequate MRI within 14 days of EVT and a record of the modified Rankin scale (mRS) at 90 days post EVT. Clinical T1w images were transformed into high-resolution images using the convolutional neural network SynthSR. Then, FreeSurfer was used to estimate total cranial CSFV including the ventricles and choroid plexus. To correct for head size, total CSFV was adjusted to the estimated total intracranial volume. Results: Baseline total CSFV significantly predicted 90-day mRS in an ordinal regression model adjusted for baseline mRS ($p<0.001$). After further adjustment for age, sex, smoking history, prior stroke, hypertension, congestive heart failure, hemoglobin A1c, atrial fibrillation, ASPECT score, and other confounders, total CSFV remained an independent predictor of 90-day mRS ($p=0.007$). Conclusions: This study elucidates the clinical implications of pre-existing brain health and reserve in the setting of acute ischemic strokes to aid clinicians in treatment decisions impacting prognosis. Increased total CSFV correlates with increased brain frailty and poorer functional outcomes after mechanical thrombectomy, which may ultimately attenuate its benefit.

96. Utility of Deep Inferior Epigastric Perforator Free Flap for Non-Breast Reconstruction: A Single-Center Series and Review of the Literature

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Background: The deep inferior epigastric artery perforator (DIEP) flap has become the gold standard for autologous breast reconstruction; however, it is less commonly used for reconstruction of non-breast defects. In this study we sought to highlight the DIEP flap's versatility in coverage across anatomic locations to better define its role in non-breast reconstruction. Methods: We performed a retrospective review of free tissue transfer using DIEP flaps at our institution outside of breast reconstruction from January 2013 to September 2020. Various patient demographics and overall outcomes were collected and analyzed. Results: Twenty-six DIEP free flap reconstructions were identified. Recipient sites included seventeen on the head and neck, one on the chest wall, three on the upper extremity, and five on the lower extremity. Twenty-five patients (96%) achieved reconstruction completion. There were no cases of complete flap loss. The one reconstruction failure was secondary to persistent and destructive osteomyelitis of the knee joint, thus requiring lower extremity amputation despite soft tissue coverage with a viable DEIP flap. Furthermore, post-operative complications occurred in nine patients (35.0%) who had successful final reconstructions. Complications included three recipient site infections, two partial flap losses requiring debridement (but not compromising final reconstruction), one donor site wound, and two post-operative hematomas. Ultimately six patients required return to the operating room for an acute or subacute flap-related complication during the same hospital admission. Fourteen patients required operative revisions (54%) for flap thinning or contouring (mean of 1.0±1.1). Four patients (15%) received radiation following DIEP flap reconstruction, one of which resulted in partial flap necrosis requiring minor debridement. Conclusion: The DIEP flap is a versatile option for a variety of applications beyond breast reconstruction.

97. Distance Traveled and Disparities in Patients Undergoing Cytoreductive Surgery and Hyperthermic Intraperitoneal Chemotherapy

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BACKGROUND: The impact of distance traveled on cytoreductive surgery and hyperthermic intraperitoneal chemotherapy (CRS/HIPEC) outcomes needs further investigation. METHODS: This is a retrospective review of a prospectively managed single-center CRS/HIPEC database 1992-2022. Zip codes were used to calculate distance traveled to treating facility and to obtain data on median household income and educational attainment from the American Community Survey 2020. Insurance data was collected on a subset of patients (2011-2020) via chart review or patient report. For analysis, patients were separated into 3 groups based on distance traveled in miles (local: <=50, regional: 51-99, distant: >=100). Descriptive statistics, Kaplan-Meier method, and Cox regression were performed. RESULTS: Of 1614 patients, median distance traveled was 109.5 miles (IQR: 53.36-202.29). 23% traveled locally, 23.9% regionally, and 53% distantly. Those traveling distantly or regionally tended to be more white (distant: 87.8%, regional: 87.2%, local: 83.2%), affluent (distant: $60944, regional: $65014, local: $54390), educated (% without high school diploma distant: 10.6%, regional: 11.5%, local: 13.0%), less often uninsured (distant: 2.3%, regional: 4.6%, local: 5.2%) or with Medicaid (distant: 3.3%, regional: 1.3%, local: 9.7%). They more often had higher PCI scores (distant: 15.4, regional 15.8, local: 12.7), and R2 resections (distant: 50.3%, regional: 52.2%, local: 40.5%) (Table 1). Median survival (months) was not different between groups (distant: 34.2, regional: 30.4, local: 30.8; p=0.34). Distance traveled was not a predictor of survival on Cox regression. CONCLUSION: Over 50% of patients traveled over 100 miles for treatment. While regionalization of CRS/HIPEC may be appropriate given the lack of survival difference based on distance traveled, those who traveled further were more often white, affluent, educated, and insured, which raises concerns about disparities and access to care. The higher percentage of R2 resections and higher PCI scores in the distant group also raises questions about time to treatment, delayed referral and surgical quality.

98. Management of Tibial and Femoral Non-Unions and Stress Fractures with Severe Ipsilateral Knee Arthritis with Long Stemmed Modular Total Knee Arthroplasty

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Management of patients with non-unions or stress fractures of the tibia or distal femur with debilitating ipsilateral knee ar-

thritis can be difficult to manage. In these examples of care, we present three illustrations of using long-stemmed modular total knee components to successfully manage both tibial and femoral non-unions and stress fractures as well as ipsilateral arthritis with resultant deformity. The average improvement in our knee outcome scores for these three patients via pre-operative Knee Injury and Osteoarthritis Outcome Score for Joint Replacement (KOOS, JR.) and one-year post-operative KOOS, JR. is 44.37. After treatment with a long-stemmed modular total knee prosthesis, all three examples of care went on to union, and the arthritic deformity was corrected.

99. Crowdsourced Comparison of Aesthetic Outcomes of Implant-based Breast Reconstruction with Traditional Transverse versus Skin Reducing Mastectomy Incision Patterns

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PURPOSE: Advancements in reconstructive breast surgery have made postoperative cosmesis and patient satisfaction critical outcome measures. Skin-sparing mastectomy (SSM) incision patterns may be classified into the traditional transverse incision or skin reducing patterns. We aim to identify if there is preference among the public regarding aesthetic outcomes between incision patterns following implant-based breast reconstruction (IBBR). METHODS: Twelve patients who underwent IBBR following SSM were included, 6 with a transverse incision pattern and 6 with skin reducing mastectomy (SRM) patterns. Patients were matched regarding age, BMI, ASA, comorbidities, and chemotherapy/radiation status. A survey was created via RedCap to assess outcomes in seven categories: Symmetry, Volume, Projection, Shape, Skin Quality, Scar Pattern, and Overall Aesthetic Rating. The survey was distributed via social media and the Amazon MTurk crowdsourcing platform. RESULTS: 1,192 survey responses were recorded and analyzed. Respondents tended to be female, less than 40 years of age, and similarly distributed in terms of healthcare experience. Respondents with or without healthcare experience could accurately identify the difference between scar patterns. In every category, the SRM was rated higher compared to the transverse pattern. CONCLUSION: This study represents a crowd-sourced survey of aesthetic results of patients with IBBR following SSM with traditional transverse incision versus SRM patterns. The SRM was found to be more aesthetically pleasing to the general public regardless of age, gender, or healthcare experience.

100. Matthews Cranial Vault Remodeling Procedure

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Non-syndromic sagittal synostosis is the most common of all craniosynostosis cases. Controversy exists regarding the optimal surgical treatment in infancy. Primary treatment with strip craniectomy, spring-assisted cranioplasty, or cranial vault remodeling (CVR) shows improvement in long-term behavioral, social, and executive function also corrects cranial cosmetic deformities. We describe a novel CVR technique, performed with the patient entirely in the prone position. This position offers improved operative access, allowing neurosurgeons to efficiently perform osteotomies and control bleeding. Further, the initial cuts in the skull are positioned adjacent to, but not directly over, the sagittal sinus, reducing the risk of injury/bleeding. This technique involves the creation and elevation of two, single piece bifrontal, biparietal and bioccipital craniotomy bone flaps, allowing a retained medial bone strip to include the fused sagittal suture. These flaps are contoured with Hendel oststeotomies on the back table and later fixed on the calvarium with absorbable plates. The central strip is shortened as needed. We present six children who underwent this procedure for the treatment of isolated, non-syndromic, sagittal synostosis with preoperative and long-term postoperative (> 6 months) CT scans. The average cephalic index (CI) improved significantly when preoperative measurements (72.83 +/- 0.033) were compared to long-term postoperative CIs (80.83 +/- 0.039), demonstrating this technique's ability to improve the dolichocephalic deformity associated with sagittal synostosis.

101. Optimization of a live/dead assay for potential application to coaxial bioprinting constructs, using Hep G2 spheroids

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Hep G2 is an immortalized hepatocyte cell line with epithelial morphology, suitable for the generation of three-dimensional (3D) cell aggregates or spheroids that can be used for coaxial bioprinting, an innovative strategy to produce functional cell complexes for tissue engineering applications in regenerative medicine. Many assays and molecule dyes are available to test the viability of the cells in a monolayer; more challenging is to detect live and dead cells in 3D cell culture systems and in 3D bioprinted constructs. In this study we optimized the application of a commercial fluorescent live/dead assay (Multitox), using Hep G2 spheroids (Hep G2s) and Hep G2s casted in a disk of ultra-pure low viscosity sodium alginate (LVM), as a test experiment prior to the coaxial bioprinting trial. Hep G2 cells were cultured in EMEM medium completed with fetal bovine serum and Penicillin-Streptomycin and used at passage not higher than 8. Hep G2s were generated using microwells culture plates, coated with an anti-adherence solution by serial centrifugation steps, to have 1,200 spheroids per well, 500 cells per spheroid. Hep G2s were fully formed after two days of culture, having an average diameter of 150 µm. After, they were transferred to a poly-HEMA coated 6-well plate with a 1:3 distribution ratio and let recover for additional 2 days. Hep G2s were harvest and divided in 2 batches: free Hep G2s and Hep G2s casted in a LVM disk (diameter 60 mm, height 1.5 mm). Multitox assay was performed using 6 replicates of each batch, 50 spheroids equivalent (sEQ) per replicate. Spheroids in lysis solution were also used as control. Incubation settings included multiple time points, 30 min, 1h, 2h and 3h at 37°C; fluorescence at 400EX/505EM for live cells and 485EX/520EM for dead cells was then measured. Live/dead ratio was considered as expression of viability. Live/dead staining, using calcein AM and Ethidium homodimer-1 dyes, was also performed. Hep G2s live/dead ratio was 5.12±0.22 (mean±STD) after 30 min and significantly decreased ($p<0.0001$ by one-way ANOVA) to 2.88±0.29, 1.51±0.13 and 0.95±0.05 after 1h, 2h and 3h incubation respectively, with a fold change of 5 between 30 min and 3h. The live/dead ratio of free spheroids was significantly higher than the respective control at each time point ($p<0.0001$ vs control). A similar trend was also observed for spheroids casted in a LVM disk. Live/dead staining after 1h incubation at 37°C confirmed the presence of a larger proportion of viable cells. Multitox proves to be a feasible assay to measure cell viability and cytotoxicity of free or casted 3D cell aggregates. Additional tests need to be performed on different types of 3D cell aggregate either free or used in the preparation of bioinks for coaxial bioprinting.
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102. Repurposing of FDA-Approved Farnesol to Combat Tough Bacterial Biofilms

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Purpose: Biofilm-associated infections caused by drug-resistant and persistent bacteria remain a significant clinical challenge. Farnesol is an FDA-approved agent that is commercially available as a flavor enhancer, while also having versatile antibacterial, antifungal, and antitumor activities. The purpose of this study was to determine whether farnesol is capable of combating biofilms of drug-resistant and persistent bacteria in vitro, and in ex vivo burn wounds. Methods: Bacteria was cultured in media containing farnesol for 24 hours to evaluate its effect on biofilm formation, while 24-hour-old bacterial biofilms were exposed to farnesol overnight to examine its efficacy on disruption of established biofilms, using serial dilution assays to determine surviving colony forming units (CFUs). The effect of farnesol on biofilms was visualized by Live/Dead viability assay, followed by quantitative analyses of images of the three-dimensional biofilm structure. Efficacy of farnesol against biofilm-associated skin infections was assessed using ex vivo healthy, or thermally burned human skin. Results: Farnesol, dissolved in ethanol, is effective at preventing biofilm formation, and also disrupts established biofilms of Gram-positive Staphylococcus aureus and/or Gram-negative Pseudomonas aeruginosa, with clinically significant reductions, or complete eradication of the bacteria. Moreover, farnesol is capable of killing S. aureus persister cells without inducing resistance, even after prolonged culture in the presence of sub-inhibitory farnesol doses. Farnesol is bactericidal by cell

membrane permeabilization and can also detach biofilm from surfaces. Furthermore, farnesol was shown to be safe, and highly effective, for both preventing and treating biofilm-associated infections of S. aureus or P. aeruginosa in an ex vivo burned human skin model. Conclusions: These results demonstrate that farnesol is an effective broad-spectrum antibiofilm agent with promising clinical potential. Due to its established safety, low-cost, versatility, topical delivery, and excellent efficacy - including the ability to eliminate both persistent and resistant microbial populations - farnesol offers a translational platform for addressing many of today's unsolved clinical challenges due to biofilms.

103. Post-Operative Day #1 (POD1) Discharge in Deep Inferior Epigastric Perforator (DIEP) Flap Breast Reconstruction

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Introduction: Autologous breast reconstruction is the gold standard for reconstruction of the irradiated mastectomy patient. One major drawback is the prolonged hospital stay. Studies have started to question the necessity of longer admissions for these patients, yet only one group has published their experience with post-operative day #1 (POD1) discharge (1-3). Over the last three years, our institution has progressively shortened the length of stay following DIEP flap reconstruction and begun discharging patients on POD1. The purpose of this study is to document our experience with POD1 discharges while also identifying pre-operative and intra-operative factors that may identify patients as candidates for earlier discharge. Methods: An IRB-approved, retrospective review of patients undergoing DIEP flap breast reconstruction from January 2019-March 2022 at Atrium Health was completed consisting of 510 patients and 846 DIEP flaps. Patient demographics, medical history, operative course and postoperative complications were collected. R statistical software was used for statistical analysis, including summary statistics and Welch's two-sample T-tests. Results: 23 Patients totaling 33 DIEP flaps were discharged on POD1 following reconstruction. Standard protocol through all phases of surgery was outlined. Factors associated with POD 1 discharge include BMI less than 30 and shorter operative time. No complications occurred in the POD1 group. Conclusion: POD1 discharge following DIEP flap breast reconstruction is safe for select patients. Lower BMI and shorter operative times may be predictive in identifying patients as candidates for earlier discharge.

104. The Microenvironment Modulates Chondrogenic Differentiation in Progenitor Cells

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Background: Osteoarthritis (OA) is the most prevalent musculoskeletal degenerative disease(1). Treatment currently consists of pain management, lifestyle modification and in some cases arthroplasty. These disease management options address patient pain but do not fundamentally treat or slow OA progression(2). New studies have demonstrated that it may be possible to regenerate isolated tissues when progenitor cells are cultured in the presence of mononuclear cells activated towards specific tissue antigen(3). For the purpose of regenerating articular cartilage, the microenvironment factors that steer progenitor cell differentiation towards chondrogenesis and away from osteogenesis are not fully understood. Aim: The aim of the project was to evaluate the impact of the microenvironment on chondrogenic differentiation of clinically relevant progenitor cell populations for the potential treatment of OA. Methods: The experiment involved coculturing both Adipose Derived Mesenchymal Stromal Cells (aMSCs) and Placenta Derived Progenitor Cells (PLCs) with human derived mononuclear cells activated to promote regeneration of articular cartilage. The cocultures were carried out in 2D and 3D environments and in normoxia and hypoxia. Cells were collected at 24,48,72 and 96 hr time points. Cell lysates were collected in order to perform qPCR for analysis of SRY Transcription Box 9 (SOX9), Indian Hedge Hog (IHH), and RUNX Family Transcription Factor 2 (RUNX2) gene expression. Using two sided T-Tests we compared relative gene expression between time points, progenitor type, plating environment and oxygen environment. Immunohistology of organoids formed in 3D plating conditions was performed to allow for phenotypic characterization. Results: Expression of IHH increased significantly ($p<0.05$) in all but one of the coculture groups. The greatest increase in IHH expression was observed between

72 and 96h time points with peak expression at 96h in all groups. No significant difference in IHH expression was observed between respective normoxic and hypoxic or 2D and 3D coculture environments. Analysis of the chondrogenic transcription factor SOX9 confirmed the onset of the chondrogenic program as seen by temporal increase of gene expression in 2D plated cocultures after 48h and significantly increased expression in the 2D normoxic aMSC coculture at 96h ($p = 0.048$). These findings were further supported by the expression profiles of the osteogenic transcription factor RUNX2, which showed a decreased expression at 96h ($p<0.05$), confirming that the progenitor cells did not enter the osteogenic lineage. Interestingly normoxic conditions resulted in greater expression of RUNX2 at 96h compared to hypoxic conditions (significant only for 3D plated PLC's, $p<0.001$). H&E staining of 3D plated organoids demonstrated cellular hypertrophy and production of extracellular matrix in all conditions over time. Alcian Blue staining for identification of glycosaminoglycans (GAG's), a component of articular cartilage, showed robust GAG accumulation over time. Conclusions: IHH, SOX9 and RUNX2 were chosen as genes of interest due to their role in progenitor cell differentiation. Upregulation of IHH and SOX9 steers chondrogenic differentiation while upregulation of RUNX2 induces osteogenic differentiation. Increased upregulation of IHH and corresponding downregulation of RUNX2 confirms that, in the presence of cartilage activated mononuclear cells, progenitor cells undergo chondrogenic differentiation. This is further supported by the temporal increases seen in SOX9 expression. Immunohistology allowed for observation of phenotypic changes that paralleled gene expression. In the future, increased coculture time may provide better understanding of the environment most suitable for chondrogenesis and production of cartilage producing chondrocytes.

105. Is There an Age-Related Difference in Reverse Total Shoulder Arthroplasty Outcomes?

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Background: The number of shoulder arthroplasties, especially reverse total shoulder arthroplasties (RTSA), have increased since the early 2000s. This is due, in part, to expanding indications which have included a broader and younger cohort of patients. The literature remains conflicted regarding the impact of age on subjective and objective outcomes after RTSA. While some existing research suggests that outcomes may be worse for patients under 60 years of age, other studies have found that RTSA is a viable and reproducible option for this cohort. The purpose of this study is to compare RTSA outcomes in patients younger than (or equal to) 65 years of age to those older than 65 years of age. Hypothesis: We hypothesize that there would be no difference between groups with regards to revision rate or patient reported outcomes (PROs) at 1 year after RTSA. Methods: A retrospective case series was performed, analyzing the outcomes and complications of postoperative shoulder arthroplasties for patients, stratified by age; group 1, aged 51-65 and group 2, aged 66-80. Primary outcomes were postoperative instability and/or surgical revision. Secondary endpoints included PROs for pain and function. All data analysis was completed via a non-parametric Mann-Whitney-U test; significance was defined as an alpha level of < 0.05. Results: A total of 47 patients who were consecutively enrolled in a PROs collection system were included in this study (n=12 group 1, n=35 group 2). The average age of group 1 was 60 years, and the average age of group 2 was 72 years. No patients in group 1 underwent revisions, while three patients in group 2 required revisions within two years of initial arthroplasty ($p=0.56$). There was no difference in VAS pain score at one-year follow-up between group 1 and group 2 (2.40 ± 2.57 vs 2.01 ± 2.52, $p=0.77$). There were also no significant differences between group 1 and group 2 for SANE (75 ± 23 vs 73 ± 27 respectively, $p=0.57$) or ASES (67 ± 32 vs 75 ± 22, $p=0.66$) at 1-year follow-up. However, at one-year post-operation the PROMIS-10 physical score showed significantly reduced function for group 1 when compared to group 2 (38.2 ± 3.76, 57.77 ± 16.75 respectively, $p=0.009$). Conclusions: In this single-center cohort of patients, there was no significant difference in 1-year VAS, SANE, or ASES score between patients younger than 65 and those older than 65. Younger patients did report significantly lower PROMIS-10 physical scores. Overall, these data challenge previous research reporting that younger patients under 60 have worse outcomes than those older than 65 years of age. Source of mentor's funding or other support that funded this research: none

106. Demographic Analysis of Patients Undergoing Facial Cosmetic Surgery in an Academic Practice

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Background: Facial cosmetic surgery is largely performed in the private practice setting. The demographics of patients undergoing cosmetic surgery in the academic setting has not been well characterized. Objectives: Characterize the demographics of patients undergoing cosmetic facial plastic surgery in an academic surgery practice. Methods: A retrospective chart review was performed of patients undergoing facial cosmetic surgery in the operating room by fellowship-trained facial plastic surgeons at a single academic institution from 2015 to 2020. Combination cases with functional components covered by insurance were included. Results: 186 cosmetic surgical procedures were performed on 137 patients by 3 surgeons over the course of the 6-year period. Cosmetic patients represented 8% of all operative patients for the group. 77% of patients were female. Of the 137 patients, 52% underwent cosmetic procedures in combination with other functional procedures covered by insurance. 90% of patients undergoing cosmetic procedures were white, 5% other, 2% Asian, and 1% Black, and 1% American Indian or Alaska Native. 1% of patients did not have a gender listed. Conclusion: Facial cosmetic surgery patients at a single academic institution are composed of disproportionately more white individuals than the surrounding area. Compared to national trends, male and white patients made up a larger portion of patients undergoing surgery. Combination procedures with insurance-based cases constitute approximately half of cosmetic surgeries in this group.

107. CD47 blockade limits immunosuppressive checkpoint molecules in the tumor microenvironment to sensitize triple-negative breast cancer tumors to immune checkpoint blockade therapy.

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Triple-negative breast cancer (TNBC) lacks druggable targets and has high metastatic incidence. Immune checkpoint blockade (ICB) antibodies are FDA approved for TNBC treatment, but therapeutic response and biomarkers are limited. Therefore, additional therapeutic targets and biomarkers are needed to sensitize TNBC tumors to immune checkpoint blockade therapies and improve patient response. CD47 is an integral membrane protein overexpressed on cancer cells that alters anti-tumor immunosurveillance, resulting in tumor progression. CD47 is involved in metabolic reprogramming but whether CD47 is a marker of progression and its role in ICB response for TNBC remains unknown. Human TNBC biopsies were subjected to immunohistochemical analysis to determine CD47 role in TNBC progression. Human matched primary, and metastatic TNBC biopsies increased immunoreactivity to CD47, signifying a potential therapeutic target. To determine CD47 impact on tumor burden, a carcinogen-induced TNBC model was performed in female wild type (WT) and cd47 null(cd47-/-) C57Bl/6 mice. CD47 deficiency in the carcinogen-induced model decreased tumor incidence, multiplicity, weight, and area compared to WT. Since CD47 can regulate metabolism, tumors underwent metabolomic analysis. Principal component analysis displayed differentially regulated metabolites between WT and cd47-/- tumors. Decreased carnitine conjugated fatty acids and ketone bodies were observed in cd47-/- tumors compared to WT, suggesting decreased fatty acid availability and/or metabolism. TNBC cell respiratory measurements validated that targeting CD47 blocked the metabolic dependency of fatty acid oxidation in a fatty acid-enriched environment. Kynurenine/tryptophan pathway metabolites, which catabolize Indoleamine-2,3-dioxygenase (IDO1) and are involved in anti-PD-1/PD-L1 resistance, were decreased in cd47-/- tumors compared to WT. To evaluate immune infiltrate signaling, tumors underwent spatial tissue proteomics by multiplexing photo-cleavable antibodies in Formalin-Fixed Paraffin-Embedded samples. Spatial proteomic analysis determined that cd47-/- tumors had elevated immune cell infiltration (CD45+, CD3+), suggesting CD47 absence enhances tumor immunogenicity and immune-mediated tumor ablation. Multiplexing of photo-cleavable antibodies increased protein expression of immune checkpoint molecules (PD-L1, VISTA, B7-H3, BatF3) and immunosuppressive cell types (CD11b+, Ly6c+) in WT tumors compared to cd47-/-, suggesting CD47 absence limits immunosuppressive signaling. Since anti-PD-L1 therapies are approved to treat TNBC and WT tumors from our DMBA model show PD-L1 upregulation, we examined how targeting CD47 would impact tumor burden of mice receiving anti-PD-L1 therapy through an orthotopic EMT-6 murine TNBC model. Targeting CD47 or PD-L1 as monotherapy decreased tumor burden; however, in combination it further reduced tumor burden compared to anti-PD-L1 treatment due to increased intratumoral granzyme B secreting cytotoxic T cells. Our data indicate that CD47 may serve as a marker of anti-PD-L1 response, and targeting CD47 enhances immunogenicity and decreases immunosuppressive molecules, sensitizing TNBC tumors to anti-PD-L1 therapy to reduce tumor burden.

108. Patient Perspective of Podiatrist Attire

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Background: Creating a respectful relationship between health-care providers and patients is important to provide patient care. A provider's attire is the first impression a patient has of their physician. Previous studies have demonstrated different preferences on attire based on the type of physician. However, podiatrists provide a wide variety of services for each patient. Our goal is to analyze the perspective of patients on podiatric physician attire. Methods: An anonymous survey was provided to patients at two academic hospital associated clinics. Questions were asked regarding patient preference on podiatric attire based on encounter type: evaluation, office procedure, and surgical consultation. Additional questions were asked regarding tie preference, their preference on primary care provider attire and nursing staff attire. Results: Our study included 208 participants with the average age was 56.7 +/- 16.3 years old. The majority of respondents reported no preference on podiatrist attire. Following this response, respondents prefer white coats and scrubs for office procedures and surgical consultations and professional attire with white coats for evaluations. For nursing and medical assistants, the majority (75.3%) prefer scrubs. Almost 75% of participants reported it does not matter if a podiatrist wears a tie and less than 5% prefer a tie. Conclusions: We recommend wearing a white coat with scrubs or professional attire. Based on our findings, few participants prefer fleece jackets or ties. We recommend primary care providers wear professional attire with white coats.

109. Handling of Sharps in the Operating Room: A Single Institution Review

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Background: Operating room (OR) personnel are at a high risk for sharp injuries which can cause serious side effects. Previous studies have shown the high rate of under reporting and multiple severe pathogens that can be transmitted by needlestick injuries. Our goals of this study are to analyze OR nurses and surgical technologists' experience with sharps and evaluate their current level of sharps prevention education. Methods: An anonymous survey was sent to OR nurses and surgical technologists at a single institution. The survey included questions regarding whether the participants have been stuck by a sharp, when they were stuck, and their perspective on sharp handling safety and education. Results: Forty-two participants responded to the survey. We found 69% had sustained a sharp injury with 58.6% being stuck while handling sharps alone. The vast majority (90.5%) believed handing back sharps protected was the safest. Forty-five percent reported never having attended Continuing Medication Education (CME) regarding handling sharps. Only 59.4% of those who had CME found it helpful. Conclusions: This is the first study we are aware of that looked at OR personnel's perspectives on sharps handling and current CME. We recommend reevaluation of current CME regarding handling sharps and increased access. Our study found most injuries occurred when handling sharps alone. We recommend using our study to guide future research to improve sharps handling safety in the OR.

110. Change in Height Following Tibiotalocalcaneal Arthrodesis: Retrospective Radiographic Analysis

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Tibiotalocalcaneal arthrodesis (TTCA) with an intramedullary rod is a viable treatment option for a myriad of pathologies

involving the foot and ankle. The primary surgical goals are decreased pain, improved hindfoot alignment, and increased function. While the current literature has focused on fixation techniques, deformity correction, and clinical outcomes, we are unaware of any studies specifically examining change in height following a TTCA. In the present study, we retrospectively analyzed radiographs with novel radiographic techniques to determine the change in height from preoperative to postoperative radiographs following TTCA. Patients were divided into three categories: Charcot, arthritis, and pes planus as the indication for surgical intervention. We found that Charcot and arthritis had an average decrease in height on anterior and posterior measurements of the height from the distal tibia to the calcaneus, while pes planus had an increase in height. The average Charcot change in height was -12.0 ± 24.4mm anteriorly and -7.6 ± 15.5mm posteriorly. The average change in height for the arthritis group was -6.9 ± 6.7mm anteriorly and -3.8 ± 5.8mm posteriorly. The pes planus group was found to have an average increase in height 0.5 ± 8.0mm anteriorly and 2.9 ± 5.8mm posteriorly. Overall, we found a statistically significant difference in height change between the three groups in anterior measurements (p- value= 0.012) and posterior measurement (p-value= 0.006). We recommend surgeons who perform this procedure to be aware of the potential change in height to better tailor surgical and postoperative care.

111. Clinical Outcomes in Shoulder Stabilization via Knotted versus Knotless Fixation

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Introduction: Glenohumeral instability results in disruption or tearing of the glenoid labrum. Surgical treatment using an arthroscopic technique has been successful in restoring stability and athletic function in the absence of glenoid bone loss. Advances in anchor design have allowed for knotless fixation of the labrum. The current literature suggests that there are no significant differences in the clinical outcomes or return to play (RTP) of knotted versus knotless anchoring for any location of labrum repair. The purpose of this study is to further compare rates and timeline for RTP, abduction and external range of motion (ROM), and the surgical failure rates, between knotted and knotless labral repair. Methods: After institutional review board approval, a single-centered retrospective chart review analyzing the outcomes and complications of labral repairs for adult and adolescent patients between 2017 and 2022 was performed. Patients were excluded if they did not undergo an isolated knotted or knotless labral repair. Demographic and surgical data were collected including age, sex, race, laterality, characterization of the labral tear, number of anchors and anchor location. Patient participation in sport, if any, level of competition, ability to RTP, and RTP times were also collected. Data analysis was completed using the Prism GraphPad Version 9.3.1 (Dotmatics, Boston, MA) software via a non-parametric Mann-Whitney-U test and a Chi-Squared test with an alpha level of <0.05 set prior to the study. Results: Patients were divided into two cohorts of knotted (n=31) or knotless (n=30) labral repair with the average ages of 26 ± 14 and 22 ± 6, respectively. There was no significant difference at any time interval for abduction or external rotation ROM. There was no difference in remplissage rate between groups. Also, no significant difference in the presence of perioperative complications or revision was identified. Of those who participated in sports, no significant difference was identified in the ability to return to play between the two groups. However, there was a statistically significant increase in RTP time for patients receiving knotted fixation, when compared to those receiving knotless fixation (194 ± 29 vs 173 ± 49 days, respectively, p=0.020). Conclusion: Patients who identified as athletes and underwent a knotless labral repair were found to return to their sport at a shorter duration than those who underwent a knotted fixation at all levels of competition. These findings add to the current literature comparing knotted and knotless anchoring during labral repair surgery and help guide patient and physician expectations in the post-operative period.

112. Development of a Living Biobank of Breast Cancer Organoids

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Introduction: Breast cancer is one of the most frequently diagnosed cancers among women, with a high mortality rate. More than 20 different subtypes of breast cancer are identified. Advancement in patient-derived organoid technology makes it possible to preserve cellular, structural, and tissue microenvironment, which mimics the tissue in vivo. The present study

aims to develop a cryopreserved (living) tumor biobank from patient-derived tumor breast tissues. Eventually, biobank organoids will be used to test treatment options outside of patients, in a dish, and provide information on what treatments the patient responds to. Method: Breast biopsies were mechanically and enzymatically digested to yield a single-cell suspension. Patient-derived organoids (PDOs) were bio-fabricated using an unsorted tumor and normal cell suspension in a collagen-based hydrogel. Immune-enhanced tumor organoids (iTOs) were also bio-fabricated using patient-matched PMBCs and tumor cells as described above. Breast cancer living biobanks were developed by freezing organoids in cryopreservation solutions and reestablishing them in growth media compatible with breast organoids. Histological staining for hormone receptors and Her2 receptor markers was performed on organoid sections. Organoids were cultured for seven days, followed by treatment with chemotherapy (Paclitaxel, Doxorubicin, and Sulphonamide) and immunotherapy (Nivolumab, Pembrolizumab, and Atezolizumab), and assessed for cell viability using CellTiter GLO assay. Results: H&E staining showed the characteristics of the breast tissue with well-defined acini. In tumor organoids, acini were somewhat perturbed compared to normal breast organoids. Immunofluorescence staining showed the expression of breast biomarkers, including EGF receptor 2 (HER2), Progesterone receptor (PR), and Estrogen receptor (ER). Zona occludin 2 and keratin 19 expression in luminal cells and expression of Keratin 14 and P63 in basal cells, suggesting correct polarization in the organoids. Immunofluorescence staining of iTOs, with T cell markers including CD3, CD4, and CD8, indicated that immune cells remained viable in the iTOs. Drug responses to Doxorubicin, Paclitaxel, Sulphonamide and a combination of Doxorubicin-Paclitaxel showed significant inhibition of cell growth in normal and tumor organoids ($p< 0.04$). Treatment of breast iTOs showed moderate responses to nivolumab (n=11) and pembrolizumab (n=4), with a 63%-100% efficacy ($P < 0.05$) respectively. No responses were observed for Atezolizumab (n=4). Drug responses of biobank organoids showed comparable drug sensitivities to their fresh, non-frozen counterparts, suggesting that biobank organoids retain physiological relevant information and can be used for testing new drug therapies. Conclusion: Breast cancer organoids recapitulate the histological features of breast tissue in culture and respond to chemotherapy and immunotherapy. In the future, patient-derived breast tumor organoids can be cryopreserved and serve as living biobanks to provide a platform for personalized medicine.

113. Assessing Bromelain Mucolytic and Cytotoxic Activity in Appendiceal Cancer Organoids

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Introduction: Mucin production in appendiceal cancer (AC) has been hypothesized to serve as a barrier to HIPEC drug delivery and treatment resistance. There is no currently approved mucolytic agent for AC. Bromelain is a pineapple extract with mucolytic properties that have generated research interest. We explored bromelain's cytotoxic and mucolytic effects against mucinous AC in a patient-derived tumor organoid (PTO) model. Methods: After IRB approval, tumor specimens were obtained from patients with AC undergoing cytoreductive surgery with HIPEC. PTOs were bio-fabricated using an unsorted tumor cell suspension in a collagen-based hydrogel. PTOs underwent HIPEC mimicry treatment with bromelain, cisplatin, and mitomycin C (MMC) under 37°C and 42°C conditions. Bromelain was also assessed as a pre-treatment agent prior to HIPEC treatment with MMC and cisplatin. Results: From October 2020 - March 2022, 11 specimens were collected from 11 patients with low grade appendiceal (7/11, 63.6%) and high grade appendiceal cancer (4/11, 36.4%). Testing was successful in all 11 specimens. Mucin-depleting effects of Bromelain (600 ug/ml) were most significant in the presence of N-acetylcysteine (NAC, 3% w/v) compared to Bromelain alone (50% residual mucin vs. 85%, $p=0.002$) and NAC alone (85% residual mucin, $p=0.003$). The cytotoxicity of Bromelain increased with time and reached statistical significance at 60 minutes of treatment (>50% post-treatment viability reduction, $p<0.01$). The cytotoxicity of cisplatin and MMC increased with the addition of Bromelain under 42°C HIPEC conditions compared to cisplatin (70% greater reduction in post-treatment cell viability, $p=0.03$) and MMC (60% greater reduction in viability, $p=0.002$) alone. Immunohistochemistry studies demonstrated reduced Ki67, CK20, and MUC2 expression after treatment with Bromelain. We also found increased expression of annexin V and caspase 3/7 activity in bromelain-treated PTOs compared to untreated controls, suggesting Bromelain's anti-tumor activity induces apoptosis pathways. Antiapoptotic-prosurvival proteins Bcl-2 and Bcl-xL and serine 473 phospho-Akt were significantly reduced after treatment with Bromelain compared to untreated controls ($p=0.009$ and $p=0.01$, respectively). Furthermore, the inhibition of cyclin D1 and the decreased expression of cyclin A, cyclin E, and cyclin H, in bromelain-treated organoids suggest that bromelain-induced cytotoxicity is due to its ability to interfere with cell cycle progression and arrest cell cycle. Moreover, autophagosome initiation protein LC3-A/B I and II expression increases ($p< 0.01$, $p< 0.03$) in bromelain-treated PTOs along with the inhibition of ATG7 $p<0.01$, ATG 12 $p<0.04$,

and Becline p< 0.03 suggesting that autophagy system is also involved in Bromelain mediated anti-tumor activity. Our data strongly suggest that apoptosis, cell cycle growth arrest, and autophagy are likely mechanisms underlying the anti-tumor activity of Bromelain. Conclusions: Bromelain demonstrates mucolytic and cytotoxic activity against appendiceal cancer PTOs both as a single agent and in combination with traditional perfusates. Our preliminary results support further investigation of Bromelain as a drug for inoperable mucinous cancers.

114. Does Severity of Acute Kidney Injury Influence Outcomes Following Deceased Donor Kidney Transplantation?

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Background: Kidney allografts from deceased donors having suffered extreme injury are often discarded for fear of worse long-term outcomes compared to kidneys with mild acute kidney injury. The use of these organs with extreme kidney injuries has been less well established. Methods: A single center retrospective review was performed of deceased donor kidney transplants (DDKT) from donors with acute kidney injury (AKI). The degree of AKI was categorized based on the terminal serum creatinine (tSCr). AKI kidneys were defined by both doubling of the donor's admission SCr level and tSCr ≥2.0 mg/dl. Results: Between January 2007 - August 2021, 236 DDKTs were performed using AKI kidneys. Of these, 136 donors had terminal SCr between 2-3 mg/dL (low group), 51 had SCr of 3-4 mg/dL (moderate), and 49 with SCr ≥ 4 mg/dL (extreme). In the entire cohort, 3 grafts had primary non-function and 3 were lost to thrombosis. In the low tSCr group, the rate of delayed graft function was 45.6% (n = 62) vs. 57.1% (n = 28) in the extreme group (p = 0.222). Excluding patients who died with a functional graft (n = 30) and primary non-function, overall graft loss occurred at rates of 43.4% in the low group, versus 32.6% in grafts with tSCr ≥ 3 mg/dL (p = 0.157). Conclusions: Although very high serum creatinine in the donor has traditionally been viewed as a contraindication for organ use, outcomes appear similar to those in mild AKI cases. Even despite slightly higher rates of delayed graft function, use of these organs may safely increase the donor pool for patients awaiting kidney transplantation.

115. Accidental Thermal Injury From Ignition of Home Oxygen: Is Burn Center Admission a Mandate?

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Introduction: Home oxygen therapy is available for the supportive treatment of patients with chronic lung disease. Nevertheless, complications associated with home oxygen use have been well described. The typical injury pattern associated with the accidental ignition of home oxygen does not mandate emergent intubation. However, due to the thermal component of the injury, patients are initially directed towards admission to burn units. The recent stress applied to the healthcare system by COVID-19 has highlighted the potential benefit of flexibility in the disposition of injured patients. In particular, we wanted to determine if there is a demonstrable benefit from admission to an American Burn Association (ABA) verified burn center for patients presenting with home oxygen ignition injuries. Methods: After obtaining approval from our local Institutional Review Board, we conducted a retrospective review of our institution's ABA-verified burn center database from January 2016 through May 2022. Individual charts were inspected for discrete data points related to the general descriptor of the patient's injuries, comorbidities, and hospital course. Using independent samples t-tests, we compared patients admitted to the burn service with those primarily cared for by non-burn service teams. Results: We identified 49 adult patients admitted with burn injuries associated with home oxygen use during the study period. These patients were divided into those intubated at or near the time of admission and those managed without intubation. Of the 29 patients intubated on admission, the burn service managed 19 of these patients, and non-burn services managed 10. There were no identified differences in the outcomes of ventilator days, days in the ICU, total length of stay, or mortality between the two groups. Similarly, we examined the 20 patients admitted without intubation. The burn service managed 7 of these patients, and non-burn services managed 13. Again, the two groups had no identified differences in the outcomes of days in the ICU, total length of stay, or mortality. Conclusions: This single-center review revealed no difference in outcomes between patients cared for in an ABA-verified burn center versus non-burn services for home oxygen ignition injury. From a care

perspective and resource utilization, the outcomes appear similar. Further, we note that patients required only brief periods of mechanical ventilation - supportive of the opportunity to avoid intubation in these patients. Prevention efforts, like those in the burn center, need to continue, and further studies must be done to confirm these preliminary findings.

116. Single dose antibiotics at the time of transperineal prostate biopsy are equivalent to outpatient antibiotic prophylaxis in preventing infection

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Background: Prostate biopsy is one of the most frequently performed procedures in urology. There are 2 primary ways to biopsy, namely the transrectal (TR) and transperineal (TP) approaches. TR biopsies have been the mainstay method in practice due to their low learning curve, ability to be performed in office, and short procedure time. However, a major critique of the TR approach is the burden of post-procedure infection, which impacts patient health and increases cost to the healthcare system. In response, there has been a nationwide shift to offering TP biopsies due to an allegedly reduced rate of infectious complications. While various studies have attempted to establish the infection rate after TP biopsy, the literature remains inconsistent. Further, there is an ongoing debate regarding the need for antibiotic prophylaxis with TP biopsy. Here, we report the rate of infection following TP biopsy at a single high-volume academic institution and reassess the need for outpatient antibiotics in addition to single-dose antibiotics at the time of biopsy. Methods: This was a retrospective case-control study at a single institution. All biopsies were performed using TP technique under TR ultrasound guidance with general anesthesia in dorsal lithotomy using a grid template. Charts of men undergoing TP biopsy from 2012 to present were reviewed. Infection was defined as at least one of the following: clinically documented prostatitis, fever (≥38.3 °C), and/or presence of urgency, frequency, and dysuria with pyuria, leukocytosis, and positive urine culture (>105 CFU) within 14 days post-biopsy. Patients were divided into 2 groups, those who received antibiotics at the time of biopsy in addition to outpatient antibiotics before/after biopsy and those who only received antibiotics at the time of biopsy. Pearson's Chi Squared was performed to evaluate the difference in infection rate between the 2 groups. Results: A total of 760 biopsies were included in the study. The overall infection rate post-TP biopsy was 1.97% (N=15). The infection rate for patients that received both forms of antibiotics was 1.85% (N=6) and 2.06% (N=9) for patients with only peri-operative antibiotics at time of biopsy. Pearson's Chi Squared test showed no significant difference in infection rates between single dose antibiotics at time of biopsy with/without outpatient antibiotic augmentation (p=0.835). Conclusions: There is a growing body of evidence that the rate of infection after TP biopsy is lower than TR, which our data supported. Outpatient antibiotics are not needed as infection prophylaxis to supplement antibiotics at the time of biopsy. Given the low rate of infection in both groups, we question if antibiotic prophylaxis is needed at all. A large-scale randomized control trial is needed to better assess both of these claims. Funding Acknowledgements: None Conflict of Interest Disclosure Statement: The authors do not have any conflicts of interest to disclose as it pertains to this abstract.

117. Atrial Cannulation During Resuscitative Clamshell Thoracotomy

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Abstract Background: Resuscitative thoracotomy and clamshell thoracotomy are performed in the setting of traumatic arrest with the intent of controlling hemorrhage, relieving tamponade, and providing open chest cardiopulmonary resuscitation. Historically, return of spontaneous circulation rates for penetrating traumatic arrest as well as out of hospital survival have been reported as low as 40% and 10%. Vascular access can be challenging in patients who have undergone a traumatic arrest and can be a limiting step to effective resuscitation. Atrial cannulation is a well-established surgical technique in cardiac surgery. Herein, we present a case series detailing our application of this technique in the context of acute trauma resuscitation during clamshell thoracotomy for traumatic arrest in the emergency department. Methods: A

retrospective case series of atrial cannulation during traumatic arrest was conducted in Charlotte, NC at Carolinas Medical Center an urban level 1 trauma center. Results: The mean rate of return of spontaneous circulation in our series, 60%, was greater than previously published upper limit of return of spontaneous circulation for penetrating causes of traumatic arrest. Discussion: Intravenous access can be difficult to establish in the hypovolemic and exsanguinating patient. Traditional methods of vascular access may be insufficient in the setting of central vascular injury. Atrial appendage cannulation during atrial cannulation is a quick and reliable technique to achieve vascular access that employs common methods from cardiac surgery to improve resuscitation of traumatic arrest.

118. 3D Human Renal Tubular Organoids Generated from Urine-Derived Stem Cells for Nephrotoxicity Screening

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Introduction: Acute tubular necrosis (ATN) is one of the most common causes of acute kidney injury. ATN is most frequently the result of the use of pharmaceutical compounds. It is extremely important to screen nephrotoxicity during drug development to accurately predict injury to the kidneys. Current preclinical methods of determining nephrotoxicity include 2D cultures of cell lines and rodent models, both of which are incapable of fully recapitulating the in vivo human response to drugs, contributing to the high failure rate upon clinical trials. The development of 3D human primary cell-based systems to replace the use of animals or the 2D culture for studying nephrotoxicity is urgently needed. Our previous studies demonstrated that human urine-derived stem cells (USC) originate from the renal glomerular parietal stem cell population, which can be obtained via noninvasive approaches[1, 2]. The goal of this study was to determine whether porcine-derived kidney- extracellular matrixes (ECM) could induce USC to differentiate into renal tubule epithelial cells to form 3D organoids as a biological tool to test nephrotoxicity. Methods: The renal cell phenotypic characteristics of 3D USC organoids were identified after induction with kidney ECM. Nephrotoxicity tests were performed in USC organoids three days after acetone (1%) and cisplatin (0.2 mM). Results: Human USC were differentiated into renal tubular epithelial cells in 3D organoids after being induced by kidney ECM. Levels of CYP2E1 and KIM-1 in 3D organoids were significantly increased in response to acetone and cisplatin. Conclusion: This 3-D culture system provides an alternative tool for nephrotoxicity screening and research.

119. 3D Printing of Orbital Floor Stamps: Feasibility and Efficacy in Reconstruction of Orbital Floor Fractures

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Introduction: Three-dimensional (3D) printing is widely used in craniofacial surgery to enhance pre-operative planning, surgical precision, and patient outcomes. However, this technology comes with high costs and lengthy turnaround times that hinder its broad application in acute craniofacial trauma cases. Industry-printed orbital floor implants cost $8,000 on average and require several days of production time. We previously innovated a novel approach using in-house 3D printers to create contour models to generate patient-specific orbital floor implants. This method enables trauma centers to create patient-specific anatomical implants in a few hours and we hypothesized that this could be done a fraction of the cost of industry-produced implants. Methods: A retrospective cohort study was performed for 14 patients who have undergone orbital floor reconstruction using either in-house or industry-printed 3D models at our institution from 2019 to 2022. Demographic information (age, sex, comorbidities, type of trauma, and BMI), perioperative data (operative length, blood loss, and length of hospital stay), and postoperative results (complications, functional outcomes, and subjective aesthetic outcomes) were collected. In-house orbital floor 3D stamps were designed using mirrored patient CT scans and printing costs were retrieved from our in-house 3D printing lab. Results: In-house 3D-printed stamps were used as contour models to press absorbable plates (Sonicweld®, KLS Martin) into patient-specific implants, and associated costs were compared

to those for industry-created custom implants. Implants created with the help of in-house 3D printing costed 85% less than industry 3D printing ($998 and $6,701, respectively). In-house 3D printing averaged a turnaround time of 3.5 hours and was quicker than the industry average of several days. There were no significant differences found in complication rates and no patients in either group required re-operation. Conclusions: This new method of in-house 3D printing to treat orbital floor fractures is rapid, low-cost, and as clinically effective as industry 3D-printed implants. Due to its quick turnaround time, this approach contributes unique value in acute trauma settings where patients may require urgent operation. With greater adoption of this technology, we hope that trauma centers can offer more patients access to custom orbital floor implants, shaped to their own individual anatomy.

120. CT-based 3D-Printed Occlusal Splints for Repair of Acute Occlusal Trauma: A Feasibility Study

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Introduction: Mandible fractures account for a large percentage of craniofacial trauma. In complex orthognathic and mandibular cases, virtual surgical planning (VSP) and patient-specific models are frequently used to reduce operative times and improve accuracy of reconstruction. These models often include occlusal splints, which can stabilize the occlusion and aid with osteotomies. However, occlusal splints often require supplemental intraoral scans and several days of production time. This study explores the feasibility of rapid in-house design of occlusal splints using only CT imaging, without the supplementation of high-resolution intraoral scanners. Methods: For two patients with acute occlusal trauma, DICOM files were obtained from CT scans and imported into Materialise Mimics for bone thresholding. The maxilla, mandible, and damaged fragments were individually segmented and subsequently exported to Geomagic for virtual surgical reduction. If occlusal interference was present, fine adjustments were made with the aim of optimizing molar occlusion and incisal relationship. 3D occlusal splints were created and printed in UMA 90 resin using a Carbon M1 printer at our in-house 3D printing lab. Intraoperatively, the 3D printed occlusal splint was soaked in betadine and placed intraorally prior to wiring. Results: The average material cost for printing a resin occlusal splint was $20.43, with a total printing cost of $329.10 including labor. Turnaround time averaged 6.5 hours (3 hours of design and 3.5 hours of printing). Intraoperatively, the 3D printed occlusal splint set flawlessly in the patient's teeth, aligning the mandibular fragments and allowing for plating of the mandible fractures with ease. Conclusions: With the seamless intraoperative application of a 3D printed occlusal splint, this study suggests that designing occlusal splints from solely CT imaging may be viable. This method would contribute unique value in an acute trauma setting where time is limited and only CT imaging is available. Additionally, in traumatic cases with multiple mandible fractures, creating an occlusal splint would aid in stabilizing mandible fragments and allow for accurate plating. Further application of this technique will allow for refinement and outcomes analyses.