AACA Virtual Regional Meeting
Saturday, November 6, 2021

"Anatomical Competency: A Integral Tool for Informed Clinical Practice"

MAYO CLINIC

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"Anatomical Competency: An Integral Tool for Informed Clinical Practice."

Dear AACA Members, Attendees and Participants

It is a privilege to welcome you to the 2021 AACA Fall Virtual Regional Meeting. Together, with the collective effort of the AACA leadership, AACA management team and organizing committee from the Department of Clinical Anatomy, Mayo Clinic Rochester MN, we are pleased to bring you a program that reflects the diversity of effort and unity in the goal of advancing the practice of clinical anatomy.

While the basic principles of anatomy continue to surreptitiously inform, challenge and inspire the evolving medical practice, its eminence and value over the years have remained largely annexed to its role in conventional instruction. In 1988, Stuart J Salache MD published a masterful account of surgical anatomy for practicing physicians. In his commentary, Dr Salache profoundly stated that *"Of all the most important things one needs to master before being capable of performing competent surgery, an intimate knowledge of anatomy ranks first among equals. It sets the timid free to reach for new horizons and prevents the aggressive from blundering"*. In 1983, upon accepting the presidency of the American Association of Clinical Anatomists, Mayo Clinic physician, Dr Oliver H Beahrs campaigned his vision by declaring that a "*sound knowledge of anatomy was the basis for efficient and successful surgery"*. Like Dr Salache, he too signified that a *"surgeon (especially those in training) whose anatomic knowledge was deficient, was (invariably) responsible for delay in the performance of the operation and a higher rate of mishaps*". While Dr Salache and Bhears viewpoints as surgeons resonate within their practice, the current landscape of health care provision surpasses the surgical suite as procedural care becomes more widely integrated. Practice-based knowledge of anatomy now appeals to a broader cohort, across interprofessional and multidisciplinary practices. With increased accessibility and application of interventional and diagnostic tools risk for iatrogenic injury and impact of user confidence become more apparent. What once sufficed in a basic science curriculum now exceeds its foundational threshold. *Redefined as a practice competency, "anatomical competence" relates to the ability of a surgeon, clinician or health care provider to assess, interpret and navigate the patient's anatomical terrain to enhance patient outcome and avoid procedural pitfalls.*

The theme for this year's meeting draws attention to the concept of "anatomical competency", the underlying element of the strategic vision of Mayo Clinic's Department of Clinical Anatomy. In addition to the platform and poster presentations submitted by AACA faculty and student members, we are honored to have 7 invited clinicians and surgeons who will share with us the ways in which they actively utilize anatomy to inform and advance their practice while engaging with traditional hands-on methods and current advancing technologies. In keeping with Mayo Clinic's three shield construct, this meeting integrates Education, Research and Practice initiatives which we hope will cater to the diverse interests of our participants.

In planning this virtual meeting, we remained acutely aware of how much personal interaction means to participants and built in opportunity to interact via chat rooms throughout the day. For those of you who are interested in learning more about the Department of Clinical Anatomy please connect to www.linkedin.com/in/Nirusha-Lachman Mayo Clinic, please visit https://www.mayoclinic.org/. We hope that you will be inspired to visit us in person when the opportunity arises!!

With Warm Regards and Gratitude for this opportunity to host the 2021 AACA Fall Virtual Regional Meeting

Nirusha Lachman, Ph. D.,
Chair of Department of Clinical Anatomy,
Professor of Anatomy,
Professor of Medical Education

Sebastian Cotofana, M.D., Ph.D., Ph.D.,
Medical Director of Clinical Anatomy Laboratory
and Mayo Clinic Body Donation Program,
Associate Professor of Anatomy

Aine Jadran, BSc
Administrative Assistant for
Department of Clinical Anatomy

2021 AACA Fall Regional Meeting Theme:

"Anatomical Competency: An Integral Tool for Informed Clinical Practice"

Held virtually via various Zoom Rooms

TIME (Central Time)	EVENT
8:00 - 8:45 AM	**Welcome and Panel Discussion** What does anatomy look like in practice? Presenters: Thomas Gest, Ph.D, AACA President, Nirusha Lachman, Ph.D, Meeting Host, and R. Shane Tubbs, Ph.D., AACA President-Elect
9:00 - 9:25 AM	**International Speaker** **Facial Clefts – Embryology Gone AWOL** Presenter: Anil Madaree (South Africa/Operation Smile)
9:00 – 9:25 AM	**Concurrent Networking Room – Open Discussion**
9:25 - 9:35 AM	**Break**
9:35 - 9:45 AM **9:48 - 9:58 AM** **10:01 - 10:11 AM**	**Platform: Surgical Anatomy and Intrapelvic Course of Obturator Nerve.** Presenter: Merve Didem Eskin Tannverdi **Platform: Building 3D interactive e-learning content using anatomical photogrammetry.** Presenter: Dillon Haughton **Vendor Presentation: 3D Organon**
10:15 - 10:17 AM **10:17 - 10:19 AM** **10:19 - 10:21 AM** **10:21 - 10:23 AM** **10:23 - 10:25 AM**	**Poster: Applied Cranial Morphology.** Presenter: Maryna Al-Fauri **Poster: Learning heart anatomy using an online radiographic and cadaveric anatomy (ORCA) module.** Presenter: Joshua Alger **Poster: Juvenile Scoliosis and Associated Arnold-Chiari Malformation.** Presenter: Ashton Amos

	Poster: Human brain lipidomics: Assessing the influence of embalming on the basal ganglia lipidome. Presenter: Aaron Berger **Poster: Osteopathic-oriented dissection guide to the superficial back.** Presenter: Michael Cox
9:35 – 10:25 AM	**Concurrent Networking Room – Curriculum Development: National and International trends discussion facilitated by Dr. Wojciech Pawlina, Editor-in-chief Anatomical Sciences Education**
10:25 - 10:35 AM	**Break**
10:35 - 11:15 AM	**Perspectives on facial anatomy relevant to invasive and minimally invasive procedures -core anatomical knowledge competencies** Presenter: Sebastian Cotofana, MD, PhD
11:20 - 11:22 AM **11:23 - 11:25 AM** **11:26 - 11:28 AM**	**Poster: Transitioning a medicine-based cadaveric research program in osteoarthritis to dentistry.** Presenter: Jessica Immonen **Poster: Syringomyelia-Associated Juvenile Scoliosis: A Review.** Presenter: Emily Kelly **Poster: Unilateral agenesis of the ascending part of trapezius: A case study and review of the literature.** Presenter: Kathryn Lazarchick
10:35 – 11:28 AM	**Concurrent Networking Room – Open Discussion**
11:30 AM - 12:30 PM	**Lunch**
12:30 - 12:55 PM	**National Speaker:** **Development of novel minimally invasive ultrasound guided surgical techniques- a multidisciplinary approach** Presenters: Brennan Boettcher, D.O.
1:00 - 1:25 PM	**International Speaker:** **Ultrasound and Anatomy: the more You know, the more You'll see.** Presenter:

	Bernhard Moriggl, MD, FIACA
12:30 – 1:25 PM	**Concurrent Networking Room – Cadaveric / Lab-Based**
1:25 - 1:35 PM	**BREAK**
1:35 - 2:00 PM	**National Speaker** **Anatomic basis of Mohs surgery** Presenter: Christopher J. Miller, MD
2:00 - 2:30 PM	**National Speaker** **Ventricular Anatomy for Arrhythmias.** Presenter: Dr. Samuel J. Asirvatham
2:35 - 2:45 PM **2:48 - 2:58 PM** **3:00 - 3:10 PM**	**Platform: Methods of anatomical preservation, and ideal applications of each methodology.** Presenter: Shawna Rodabaugh **Platform: Variations of the branching pattern of the axillary artery and its related branches: a cadaver study.** Presenter: Nkhensani Mogale **Vendor Presentation: BodyViz**
3:13 - 3:15 PM **3:16 - 3:18 PM** **3:19 - 3:21 PM** **3:22 - 3:24 PM**	**Poster: Assessing the Ethical Concerns of Medical Students in the Gross Anatomy Lab.** Presenter: Mohamad Nawras **Poster: Learning anatomy using online radiographic and cadaveric anatomy modules.** Presenter: Aaron Murillo-Ruiz **Poster: An anatomical study of the extracranial course of the facial nerve.** Presenter: Livashin Naidu **Poster: An uncommon, unilateral motor variation of the intercostobrachial nerve.** Presenter: Daniel van Tonder

3:25 - 3:27 PM	P**oster: A novel and easy way to dissect hippocampus.** Presenter: Sailabala Vanguri
3:27 - 3:29 PM	**Poster: Efficacy of a novel pulmonary online radiographic and cadaveric anatomy module for medical students.** Presenter: Dennis Wang
3:29 - 3:31 PM	**Poster: The relationship of the types of accessory naviculars to the development of the flat foot.** Presenter: Andrew Zhao
3:31 - 3:33 PM	**Poster: Reviewing the impact of anatomy teaching modalities in physician training.** Presenter: Alexsaundra Zywicki
3:33 - 3:35 PM	**Poster: The role of audition in anatomy: a medical student's perspective on podcasts.** Presenter: Alexsaundra Zywicki
1:35 – 3:35 PM	**Concurrent Networking Room – Virtual Anatomy**
3:35 - 3:45 PM	**BREAK**
3:45 - 4:10	**Experiential Learning** How Anatomy interacts in the platform of experiential learning Presenters: Robert Morreale, Dr. Jonathan Morris
4:15 - 4:35	**Speaker** TBD <u>Presenter:</u> Maria Peris Celda, MD, Ph.D
3:45 – 4:35 PM	**Concurrent Networking Room – Open Discussion**
4:40 - 5:00	**Closing Remarks** Robert J. Spinner, MD, AACA Past President

2021 AACA Fall Virtual Regional Meeting

Exhibitors

Demonstration time: 10:01 – 10:11 AM Central Time

Demonstration time: 3:00 – 3:10 PM Central Time

Please take a moment today to visit with and thank the exhibitors who are participating in this meeting.

Plenary Speakers

Times listed are in Central Time Zone

9:00 – 9:25 AM

Facial Clefts – Embryology Gone AWOL

Facial clefts are relatively uncommon facial deformities. They account for 2-5% of all clefts. There are 2 basic classifications of facial clefts. The most popular one is that described by Tessier, and this is one that is favoured by craniofacial surgeons as it is clinically based. These have been numbered from 0 to 14 using the midline and orbit as the reference points. An embryological classification has been described by van der Meulen. These clefts can affect skin and soft tissue only, bone only or both. The extent and severity of these clefts can vary from mild to grotesque. They can occur as isolated clefts or in combination with others. Although termed facial clefts, they can have cranial components and may be associated with cranial defects and even encephalocoeles.

Understanding the embryology of the craniofacial region helps us better appreciate the pathways and pathology of these facial clefts.The surgical correction of these clefts are individualized and are often staged procedures.A variety of these facial clefts will be presented including the clinical appearance and deformities, CT imaging, the surgical strategies employed and the post operative outcomes.

Anil Madaree

Chief Specialist/Professor
Head of Department
Plastic & Reconstructive Surgery
Inkosi Albert Luthuli Hospital
Nelson R. Mandela School of Medicine
University of Kwa Zulu Natal, Durban

Professor Anil Madaree Heads the Department of Plastic and Reconstructive Surgery at Nelson R Mandela School of Medicine, UKZN. He is the President of the Colleges of Medicine of South Africa since 2010. He was

the President of the International Society of Craniofacial Surgery from 2009 – 2011. He is the former President of the Association of Plastic and Reconstructive Surgeons of South Africa and South African Society of Burns. He is the National Representative of International Society of Plastic, Reconstructive and Aesthetic Surgery (IPRAS). He was Exco of Association of Plastic and Reconstructive Surgeons of Southern Africa (APRSSA) from 1997 to 2012. He is currently the Executive Member of Colleges of Medicine of South Africa and the Medical Director of Operation Smiles, South Africa.

Throughout his career he has received a number of accolades including; Rhodes scholarship to study Medicine in 1976. This award was successfully renewed every year until completion of studies in 1980. In 1989 he received The Smith & Nephew Travelling Fellowship by the Association of Plastic and Reconstructive Surgeons of South Africa. In the same year he was Invited by the Plastic Surgery Education Foundation of America as one of four International young Academics to attend the Annual American Society of Plastic and Reconstructive Surgeons meeting in San Francisco U.S.A.

In 1990 he was awarded The Visiting Scholar Programme by the Plastic Surgery Education Foundation of America to study in any institution in the United States of America. Completed a clinical fellowship in Plastic Surgery at the University of Pennsylvania, Philadelphia under the chairmanship of Dr Linton A Whitaker from August 1990 – December 1990. In 1997 he was chosen as one of the Ten Outstanding Young Persons (TOYP) in the World in the Medical category and presented at the JCI World Congress in Honolulu, Hawaii. In July 2012 he was elected Honorary Fellow of Academy of Medicine of Malaysia, July 2012 and in the same year he was also elected Fellow of Royal College of Physicians of Ireland. He is also the Honorary Fellow of the College of Physicians and Surgeons of Pakistan.

10:35 – 11:15 AM

Advanced facial anatomy as revealed through layer-by-layer dissection

Description: In this session the audience will learn about forehead, temple, and mid-face anatomy as it relates to the layers of the face and the respective arteries and nerves that can be found in each of the regions.

Sebastian Cotofana, MD, PhD

Associate Professor of Anatomy
Department of Clinical Anatomy
Mayo Clinic

Sebastian Cotofana, MD, PhD, PhD, is an Associate Professor of Anatomy in the Department of Clinical Anatomy at the Mayo Clinic College of Medicine and Science in Rochester, Minnesota.

Dr. Cotofana received his medical degree at Ludwig-Maximilians University in Munich, Germany, where he also earned a PhD in medical science. He went on to serve his residency at the department of trauma surgery at Kreisklinik Altötting, in Altötting, Germany, and received his PhD in anatomy at Paracelsus Medical University, in Salzburg, Austria.

Dr. Cotofana has published extensively in peer-reviewed journals, including in the *Plastic and Reconstructive Surgery, Aesthetic Surgery Journal,* and the *Journal of Drugs in Dermatology*, among others. He has also been invited to multiple conferences as keynote speaker and Live Dissector throughout the world.

Dr. Cotofana has been recognized for his writing and reviewing of scientific work and has been recognized as Teacher of the Year repeatedly by Paracelsus Medical University. Additionally, he is a member of multiple societies and has published more than 100 scientific article and book chapters.

12:30 – 12:55 PM

Development of novel minimally invasive ultrasound guided surgical techniques- a multidisciplinary approach

Brennan Boettcher, D.O.

Senior Associate Consultant at Mayo Clinic Orthopedics and Sports Medicine in Rochester, MN
Mayo Clinic

Dr. Boettcher is a Board-Certified Physical Medicine and Rehabilitation as well as Sports Medicine specialist at Mayo Clinic Sports Medicine in Rochester, MN. He received his medical degree from Lincoln Memorial University in Harrogate, TN. He completed a residency in Physical Medicine and Rehabilitation and Sports Medicine fellowship at Mayo Clinic in Rochester and Minneapolis respectively. He is an Instructor in Physical Medicine and Rehabilitation, and the Associate Program Director of the Sports Medicine Fellowship in Rochester, MN.

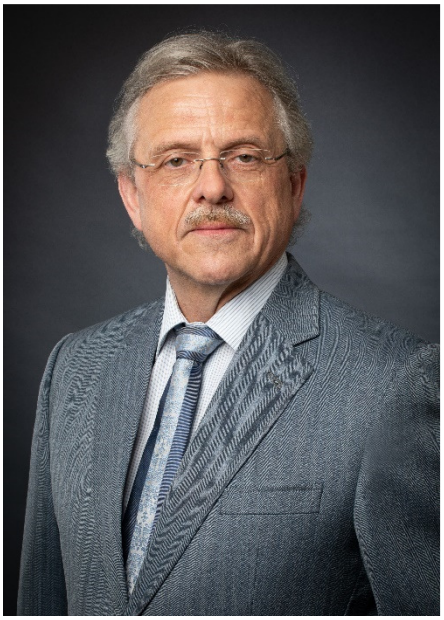
The majority of Dr. Boettcher's clinical practice is dedicated to diagnostic ultrasound and minimally invasive ultrasound guided procedures for the treatment of acute and chronic musculoskeletal conditions. Dr. Boettcher's research interests are primarily focused on the development of novel ultrasound guided minimally invasive surgical techniques, diagnostic/interventional ultrasound and orthobiologics.

1:00 – 1:25 PM

Ultrasound (US) and Anatomy: *the more you know, the more you'll see.

Following a short introduction focusing on the general *impact* of *US in Clinical Anatomy* (education and research) examples will be given, where *profound knowledge of *SONO-ANATOMY* helps to succeed in *clinical diagnosis and treatment*. Prior to the conclusion, an *outlook* targets on possible *new applications* within the field of Clinical Anatomy.

Bernhard MORIGGL, MD, FIACA
Professor, Department of Anatomy,
Histology and Embryology,
Medical University of Innsbruck



He started his University career in *1986* and has done *Ultrasonography (US) ever since*. He serves as *Mentor* and *senior author* for many of his *US-scholars.* Prof. Moriggl's *Clinical Training* led to *Engagement in RA and Pain*. In 2008 he became *Founding Father* of the *SIG US in Pain Medicine* (*ASRA).* Prof. Moriggl is *Contributor* of the *Practical Guide RA,* the *pocket-book RA: Principals and Practical Implementation,* both editions of the *Atlas of Ultrasound-Guided Procedures in Interventional Pain Management* (Spine and GON-chapter) and *Co-editor* of the *iBook Anatomy and Sono-anatomy of US-guided Pain interventions.* End of *July 2018*, the booklet *"Solid Nerve Sonography"* (Springer Germany) was *released (Editor).* The *English version (Editor) "Sonographic Peripheral Nerve Topography" A Landmark based Algorithm* followed 2019 end of April (Springer International). *He authored over 120 original papers*. Prof. Moriggl has plenty of *international cooperation, e.g.* with the *Denmark-people* around Jens Børglum and Thomas Fichtner Bendtsen, *Toronto University:* Vincent Chan and Philip Peng. He acted in *co-development, support* and as *inaugural CIPS examiner* (*WIP-certified)* of the *WAPMU* (and was first Chair of Scientific Committee). This year 2021 he started *active support of the GPS* (Gulf Pain School).

1:35 – 2:00 PM

Anatomic basis of Mohs surgery

Skin cancers usually arise in the epidermis and sequentially invade deeper anatomic layers as the cancer grows. Mohs micrographic surgery is a specialized technique that removes skin cancers with a layer-by-layer dissection. The Mohs surgeon first dissects the skin cancer to define its anatomic extent then excises an additional anatomic layer beyond the cancer. This lecture will illustrate a layer-by-layer Mohs surgery of a large squamous cell cancer of the infraorbital cheek. Using videos, clinical photos, and cadaver dissections, we will discuss principles of dissection and highlight the importance of collaboration between Mohs surgeons and anatomists.

Christopher J. Miller, MD

Director of the Penn Dermatology Oncology Center
Hospital of the University of Pennsylvania

Christopher J. Miller, MD is a Professor of Dermatology and the Director of the Penn Dermatology Oncology Center at the Hospital of the University of Pennsylvania. He earned his medical degree at Jefferson Medical College of Thomas Jefferson University in 2000 and his bachelor at University of Notre Dame in 1996. Dr. Miller's clinical practice focuses on the use of Mohs micrographic surgery and reconstructive surgery to treat patients with skin cancers, particularly melanomas of the head and neck and advanced tumors. He supplements his clinical practice with research concentrating on the clinical and epidemiologic aspects of various skin cancers. Dr. Miller's recent research evaluates the efficacy of Mohs surgery for melanomas of the head and neck and advanced reconstructive surgery techniques. He also continues to investigate his special interests in advanced techniques of Mohs micrographic surgery, dermatologic surgery education, and service excellence in health care delivery.

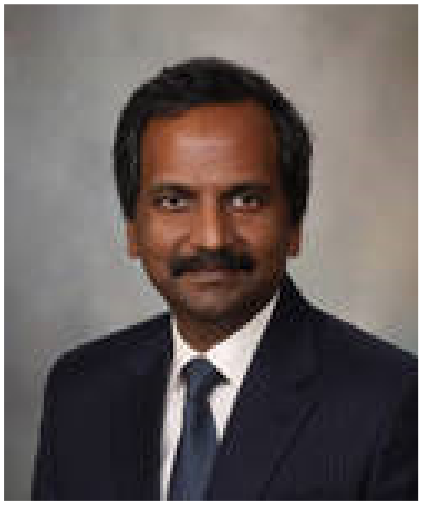
2:00 – 2:30 PM

Ventricular Anatomy for Arrhythmias.

Discussing the critical importance of understanding the underlying anatomy to treat ventricular Arrhythmias.

Samuel J. Asirvatham

Professor of Medicine
Professor of Pediatrics
Department of Medicine
Consultant in Cardiac Electrophysiology



Dr. Asirvatham is presently Professor of Medicine, Professor of Pediatrics, in the Department of Medicine and a Consultant in Cardiac Electrophysiology in the Department of Pediatric Cardiology, Division of Pediatric and Adolescent Medicine. He is also the Program Director for the Clinical Cardiac Electrophysiology Training Program at Mayo Clinic and Director of Strategic Collaborations with the Center of Innovation at Mayo Clinic, Rochester, MN.

These positions allow him to pursue his clinical interests (including radiofrequency ablation of ventricular tachycardia and atrial fibrillation and implantation of newer defibrillators and cardiac resynchronization devices, particularly in patients with congenital heart disease) and research interests (including development of a percutaneous epicardial system to close the left atrial appendage, development of a novel circuit to prevent coagulum formation during radiofrequency ablation procedures and specifically designed and created tools to allow electrophysiology mapping and ablation through the veins of the central nervous system to treat seizures and other central nervous system disorders).

3:45 – 4:10 PM

Transforming Medical Education and Creating New Capabilities in Clinical Practice: How Mayo Clinic Plans to Use Immersive Technologies

Mayo Clinic has a firm belief that the needs of the patient come first and a foundational culture that unites every health care provider, scientist, student, and trainee in a singular mission to provide hope and healing to the world. Through our education activities, we aim to develop the workforce of the future and lifelong learners who are trained on new models of care delivery, and ready to keep pace with changes in technology over their careers.

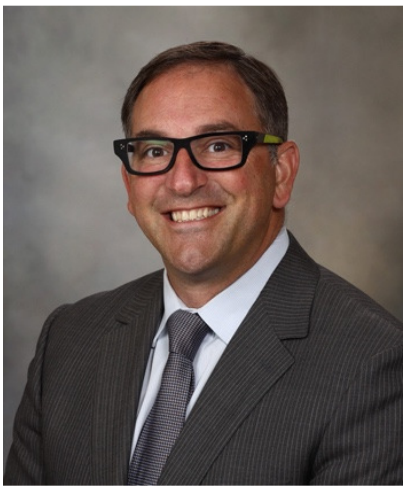
As we move forward in a bold new direction, Mayo Clinic aims to bridge excellence in education and clinical practice across our enterprise by investing in immersive technologies to deliver one-of-a-kind educational and training experiences.

It's important to recognize that Mayo Clinic has 3 campuses in 3 states (AZ, FL, and MN) with 65,000+ staff and a College of Medicine & Science that includes 5 distinct schools (School of Graduate Medical Education, Alix School of Medicine, School of Health Sciences, Graduate School of Biomedical Sciences, and School of Continuous Professional Development) with 4500+ active learners in 410+ subspeciality programs.

In this talk we will discuss Mayo Clinic's current journey to strategically deploy Extended Reality (XR)-enabled education across our vast and diverse learner populations (i.e., surgical/medical trainees, staff, medical students, nurses, technicians, therapists, and patients). Additionally, we will provide insights into our preliminary work to utilize XR intraoperative navigation of patient-specific 3D data in the operating room using an expert-novice proctoring approach. Lastly, we will overview our new, bold-thinking strategy for establishing proper governance and collaborate leadership in an agile organization that is always learning and evolving — and moving fast —

to expand knowledge and create new capabilities that will help transform health care delivery on behalf of patients.

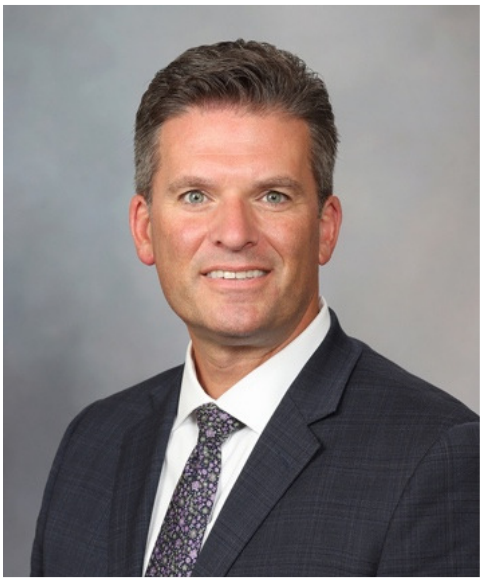
Jonathan Morris, MD
Department of Radiology
Mayo Clinic



Dr. Jonathan M. Morris is a Consultant in the Department of Radiology at Mayo Clinic. He received his M.D. at Howard University College of Medicine, completed an internship at Washington Hospital Center, a research fellowship at National Institutes of Health, and his radiology and neuroradiology fellowships at Mayo Clinic. He's a Board-Certified Radiologist, CAQ Neuroradiologist, Director of the 3D Printing Anatomic Modeling Lab, and Medical Director of Center for Biomedical and Scientific Visualization, Division of Experiential Learning at the Mayo Clinic. His expertise is in the use of point of care 3D printing/additive manufacturing for preoperative planning and custom surgical guides. Additionally, Dr. Morris is focused on the development and deployment of extended realities, VR/AR in medical education, intraoperative guidance, and medical capital equipment training. Clinically, he is expert in minimally invasive thermal ablation of tumors in the neuroaxis.

Robert Morreale, MS

Division Chair of Experiential Learning, Mayo Clinic;
Assistant Professor of Biomedical Communications
Mayo Clinic College of Medicine & Science



Bob Morreale is the Division Chair of Experiential Learning at Mayo Clinic and an Assistant Professor of Biomedical Communications in Mayo Clinic College of Medicine & Science. He received his BA and MS from Rochester Institute of Technology in Rochester, NY. He's a Board-Certified Medical Illustrator, a Fellow of the Association of Medical Illustrators (FAMI), and Administrative Leader for the Center for Biomedical & Scientific Visualization, the Multidisciplinary Simulation Center, the Center for Procedural Skills Mastery, and the Department of Clinical Anatomy at Mayo Clinic. Prior to joining Mayo Clinic, Bob's career path has taken him through Johns Hopkins and the Cleveland Clinic. His expertise is in creative thinking, visual storytelling, and medical & scientific illustration. Currently, Bob is focused on developing an experiential learning strategy that will help Mayo Clinic to evolve as a learning organization, influencing and facilitating the right people in the right environment, and transforming the delivery of medical education through real-life simulation-based environments.

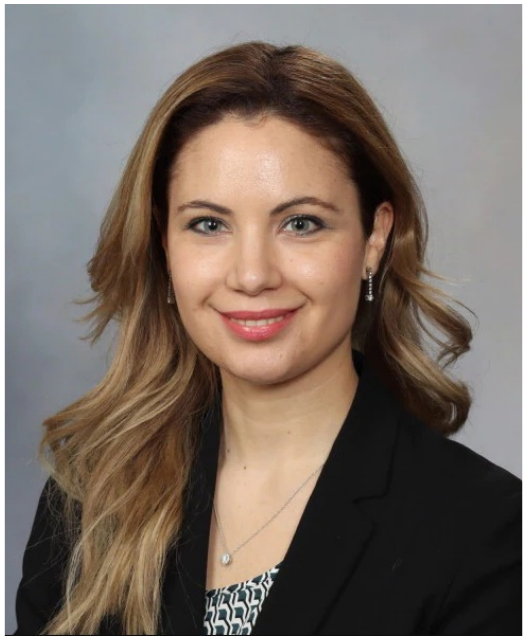
4:15 – 4:35 PM

Surgical anatomy and its application in neurosurgery and neurosurgical education: from the lab to the OR

Neurosurgical procedures require detailed knowledge of anatomy to perform accurate, gentle and safe surgeries. This talk reviews the importance of a surgical anatomy laboratory for training and to refine, develop and perfect surgical procedures.

Maria Peris Celda, MD, Ph.D

Associate Professor
Mayo Clinic



Dr. Peris Celda is an Associate Professor in neurosurgery who specializes in complex brain and skull base tumors and other neurosurgical cranial conditions. She is devoted to offer an individualized treatment to each patient including open, minimally invasive, and endoscopic techniques in order to maximize surgical resection and achieve surgical goals preserving quality of life.
Following her surgical anatomy fellowship under world-renowned neurosurgeon Professor A.L. Rhoton, Dr. Peris Celda's research interests have focused on the development of safer surgical techniques and approaches based on a detailed surgical anatomy knowledge. Dr. Peris Celda's neurosurgical anatomy laboratory team comprises fellows of different backgrounds, national and international, who are deeply committed to surgical education and to advance the surgical techniques towards safer, more accurate surgeries.

AACA Regional Meeting Platforms

All times listed are in Central Time

9:35 – 9:45 AM

Merve Didem Eşkin Tanrıverdi[1], Gözde Kara[2], Nevriye Tezer[3], Mustafa Erkan Sarı[4], and Ayhan Cömert[5]. [1] Ankara City Hospital, Ankara, Turkey. [2] Yozgat Department of Forensic Medicine, Yozgat, Turkey. [3] Forensic Medicine Ankara Group Presidency, Ankara, Turkey. [4] Ancyra Gynecology and Obstetrics Clinic, Ankara, Turkey. [5] Ankara University Faculty of Medicine, Anatomy Department, Ankara, Turkey.

Surgical Anatomy and Intrapelvic Course of Obturator Nerve.

INTRODUCTION: The aim of this study is to reveal the obturator nerve (ON) and its relationship with the important surrounding anatomical structures in pelvic surgery.METHODS:20 fresh-frozen female cadavers were studied bilaterally to measure the distances from several parts of the left and right ONs to relevant anatomical landmarks surrounding them, including the fundus apex and isthmus of the uterus, cervico-uterine junction (CUJ), promontorium, and external iliac artery, and vein. The correlations between the distance between the left and right anterior superior iliac spines (disASIS) and the above measurements were evaluated.SUMMARY: The mean age of the cadavers was 51.13±17.46 (24-76) and their body mass index was 26.07±5.71 (18.03-38.58). The mean total length from the nerve root to the obturator canal of the left and right ON were 116.7±28.5 and 116.5±24.2 mm, respectively ($p>0.05$). The mean distances of the midpoint of the left ON to the fundus apex and isthmus of the uterus, CUJ, and promontorium were 55.1±10.4, 52.9±12.4, 54.8±11.3, and 58.5±15.2 mm, respectively, while they were 58.7±8.1, 52.5±13.1, 61.4±17.8, and 62.2±19.7 mm on the right side, respectively ($p>0.05$ for all values). The mean distance between the nerve root of the left ON and promontorium was 59.1±28.4 mm, it was 59.7±26.2 mm on the right side ($p>0.05$). The mean distances of the nerve root/midpoint/endpoint of the left and right ONs to external iliac artery and vein were 29.7±7.7/30.0±9.2/43.8±15.2 mm and 29.1±7.8/30.2±7.7/46.0±16.4 mm, and 35.7±25.7/27.6±8.8/29.5±8.1 and 36.9±32.2/27.8±8.6/29.0±8.6 mm, respectively ($p>0.05$ for all values). There were positive correlations between disASIS and the distances between ON and the fundus apex and isthmus of the uterus, and external iliac artery ($r=0.497$, $p=0.002$, $r=0.726$, $p<0.001$, and $r=0.399$, $p=0.011$, respectively).CONCLUSIONS:The obturator nerve, which has sensory and motor functions, can be damaged during pelvic surgeries. This study may help improve the accuracy of pelvic surgeries to better establish treatment plans and reduce obturator nerve-related complications.

9:48 – 9:58 AM

Haughton DM, McClellan JT, Ford BM, Jackson JA. Department of Anatomy and Cell Biology, Burrell College of Osteopathic Medicine, Las Cruces, NM, USA 88001.

Building 3D interactive e-learning content using anatomical photogrammetry.

INTRODUCTION: The COVID-19 pandemic exposed many limitations in online anatomy instruction; foremost being lack of access to donor specimens with which to teach 3D anatomical relationships. As part of a summer research experience bridging anatomical dissection and educational research, we developed an inexpensive workflow for generating 3D digital models from dissection specimens. Practical e-learning content (interactive models and quizzes) was developed using these digital specimens. INNOVATION: We crafted rotating support structures to photograph multiple human dissection specimens from all angles using 35 mm DSLR cameras. The photo files were loaded into Meshroom, which generated 3D virtual models from the image files. Blender was used for model editing. Using Jupyter Notebook, we wrote custom Python code that allowed annotation of the models, highlighting of regions of interest, addition of labels, and conversion to HTML format. GitLab was used to securely host our models via a private link per Anatomical Gift Program rules. SUMMARY: We produced fifteen interactive 3D models for anatomical instruction. The resolution of these models was of generally high quality and allowed us to generate several prototype interactive quizzes. We have made these models accessible in a variety of formats, including those that can be 3D printed with reasonable resolution. All these models will be crucial for better online instruction of anatomical regions of interest. DISCUSSION: This project demonstrated a valuable solution to not having direct access to gross anatomical specimens by creating high quality virtual 3D models from human anatomical dissections. In addition to creating a local resource for our students to use outside of the lab environment, these high-quality 3D interactive resources may present an opportunity to share the Burrell Anatomical Gifts Program resources outside of Burrell through licensure or collaboration agreements with other health education users.

2:35 – 2:45 PM

Shawna Rodabaugh, Fayetteville Technical Community College, Fayetteville, NC 28303, USA.
Methods of anatomical preservation, and ideal applications of each methodology.

INTRODUCTION: The preservation of human remains for anatomical study has a long history of various methodologies, chemical components and results that have varied greatly throughout the history of utilizing human remains for anatomical study. In the anatomical field, this has led to multiple methodologies in the current preservation of human remains, in which some are more effective than others, depending on the goal of anatomical study in that particular case. The purpose of this project is to identify and describe the three main types of anatomical preservation, indicate the methodologies used in these forms of preservation, and identify the

optimal utilization for each form of preservation as it applies to anatomical study. RESOURCES: The main resource utilized in the preparation of this study is the embalming and anatomical laboratory at Fayetteville Technical Community College, where we offer a continuing education certification program in human anatomical preservation and basic human anatomical dissection methods. DESCRIPTION: The first method of preservation is the industry standard use of a formaldehyde and phenol solution for long term preservation of human remains for dissection. The second method of preservation is referred to as a soft curation method. Rather than using the typical formaldehyde and phenol solution for preservation, the main preservative is ammonium nitrate, which allows the tissues to remain soft and pliable, as well as retaining the natural coloration of the tissues. The final preservation method is the utilization of a non-toxic embalming solution that results in a firm specimen, but one that is still pliable enough to enhance the ability to isolate smaller structures during the dissection process. We refer to this method as “medium curation”. SIGNIFICANCE: The significance of these methods in clinical anatomy is the proper application of the methods described dependent on the ultimate goal of study in each instance. The standardization of these processes allows for predictability in results, and better utilization of anatomical donors in educational environments.

2:48 – 2:58 PM

N Mogale, University of Pretoria; A Masenge, University of Pretoria; CA Kilian, Life Groenkloof Hospital; MA de Beer, Life Groenkloof Hospital; and N Keough, University of Pretoria, Khalifa University.

Variations of the branching pattern of the axillary artery and its related branches: a cadaver study.

INTRODUCTION: The rotator cuff (RC) muscles, which contribute to the movement of the shoulder joint, receive their main blood supply from the subscapular and suprascapular arteries. Knowledge of the normal and variable anatomy of the RC blood supply is important for diagnostic interpretation and surgical intervention. As such, the subscapular, suprascapular and axillary arteries were studied as relating to RC vasculature. The axillary artery was investigated along with its anomalous branching pattern and variations documented. METHODS: A hundred (n=100) male (n=30) and female (n=22) cadaveric shoulders (left and right) of age range 28 – 98 years were dissected. The three parts of the axillary artery were identified and pinned, measured, and branches emerging from these parts observed. The suprascapular artery, as emerging from the thyrocervical trunk, was identified and dissected out. SUMMARY: Statistically significant differences were documented in the length of the second ($p<0.000$) and third parts ($p<0.014$) of the axillary artery. Statistically significant differences were noted for the height ($p<0.025$) of individuals ≤1.6m and >1.6m and BMI ($p<0.023$) differences between individuals <18kg/m2 and ≥25.1kg/m2. Variations that were noted in this study included the collateral brachial artery in 3% of cases. These included the emergence of the clavipectoral trunk (1%), suprascapular artery (4%), thoracoacromial artery (34%) from the first part of the axillary artery. Common trunks were documented between the thoracoacromial and lateral thoracic artery (8%); as well as the lateral thoracic, subscapular and posterior circumflex

humeral artery (3%). CONCLUSION: The unusual branching pattern of the axillary artery appears to be the norm rather than the exception. Numerous variations with regard to origin of branches were documented in this study and follow close similarities with previously published literature on the matter. The subscapular artery emerged from the second part in 18% of cases. Knowledge of axillary artery variations is important for accurate diagnostic interpretations of ultrasounds and MRI images as well as in the prevention of intra-operative bleeding.

AACA Regional Meeting Posters

All times listed are in Central Time

10:15 – 10:17 AM

Maryna Al-Fauri, Daniel Lee, and Paul Kelly. American University of Caribbean School of Medicine, Cupecoy, Sint Maarten.

Applied Cranial Morphology.

INTRODUCTION: Introduced by Retzius (1840) classification of the shape of the skull subdivided all individuals into three phenotypical groups with wide (brachycephalic), narrow (dolichocephalic), or normal (mesocephalic) shapes of the skull. The relationship between the value of the cranial index and morphology of the skull base structures is still unclear till now. Our goal is to study the topography of the abovementioned structures in brachycephalic, mesocephalic, and dolichocephalic subjects and provide surgeons with reliable landmarks. METHODS: Fifty-four cadavers and sixty magnetic resonance images of the head were included in this study, all without known osteological pathology and visible head deformation. SUMMARY: We found that the shape of the middle cranial fossa correlates positively with the laterolateral diameter of the skull. The brachycephalic skulls possessed the larger length of the superior border of the temporal pyramid, the distance from the apex of the pyramid to the squama of the temporal bone, and the angle between the pyramid and the lateral wall of the middle cranial fossa (SB-angle). On the contrary, the dolichocephalic skulls had a 4.65 mm shorter apex to squama distance and about 20º reduced pyramid to the lateral wall angle. We would like to emphasize that the angle between the internal acoustic canal and the superior border of the temporal pyramid (IAC-angle) showed reversed distribution; it was twice as large in the dolichocephalic specimens compared to the brachycephalic ones. These data show a clear pattern of distribution of the variables between the cranial phenotypes and can help to systemize the wide range of variability of the structures of the skull base. The findings on the shape of the middle cranial fossa, degree of inclination of the pyramid, and topography of the internal acoustic canal in different cranial phenotypes are novel. CONCLUSION: The cranial phenotype shapes the middle cranial fossa, the temporal pyramid, and the internal acoustic canal. The parameters of the middle cranial fossa and the length of the temporal pyramid are larger in the brachycephalic skulls. The superior border of the temporal pyramid angles from the lateral wall of the middle cranial fossa and the axis of the internal acoustic canal in a specific pattern reflecting the shape of the skull. The data presented in this research could help in the preliminary evaluation of patients and individual planning of surgeries on the middle cranial fossa.

10:17 – 10:19 AM

Alger, Joshua; Wang, Dennis; Murillo-Ruiz, Aaron; Belmares, Ricardo Ph.D., Niño, Diego M.D., Ph.D. Paul L. Foster School of Medicine, Texas Tech University Health Sciences Center, El Paso, TX, USA.

Learning heart anatomy using an online radiographic and cadaveric anatomy (ORCA) module.

PURPOSE: A popular method for teaching human anatomy has been the use of radiographic imaging to supplement in-person cadaveric laboratory sessions. While some studies show that this method is effective in teach in-person anatomy, few studies explore the use of radiographic imaging with cadaveric pictures for teaching anatomy online. The need for remote-learning materials has provided an opportunity for us to develop a radiographic and cadaveric based online module to teach heart anatomy. We hypothesize that our cardiovascular Online Radiographic and Cadaveric Anatomy (ORCA) Module will address the need for more remote-learning materials and will assist students in learning clinically relevant heart anatomy. METHODS: The module was accessible to all students (Class of 2024, n = 116). Participation was voluntary. Axial cross-sections of donated cadavers were photographed with the inferior aspect of the cross-section facing the camera lens and the superior aspect facing away from the camera. Additional photographs of the open thoracic cavity and gross heart were taken from the cadavers and from 2D anatomic models. The images were correlated with echocardiographs, chest x-rays, and axial chest CT's obtained from our radiology department. Learning objectives were obtained from our school's established anatomy learning objectives. Student feedback was collected anonymously after completion of the module. SUMMARY: Of the 47 students who completed the module. 75% stated that the module overall was useful for learning heart anatomy. 60% of the students agreed that the cadaveric images were especially useful for learning heart anatomy. DISCUSSION: Study results suggest that a virtual module incorporating cadaveric and radiographic images along with 2D anatomy models can successfully teach cardiovascular anatomy. Additionally, we believe that further implementation of similar radiographic and cadaveric imaging can help teach clinically relevant anatomy for other organ systems.

10:19 – 10:21 AM

AMOS, Ashton S., Maxwell R. HANSEN, Ronald G. LOTT, Emily C. SNELL, Emily A. KELLY, and Christine M. LOMIGUEN. Lake Erie College of Osteopathic Medicine, Erie, PA 16509, USA.
Juvenile Scoliosis and Associated Arnold-Chiari Malformation.

INTRODUCTION. Idiopathic scoliosis is the most common spinal deformity, yet no causative etiology has been identified. Neural axis abnormalities (NAA) commonly present with scoliosis and include Arnold-Chiari malformations (CMs), syringomyelia, and tethered cord syndrome. The rates of these neural axis abnormalities are as high as 50% in infantile and juvenile idiopathic scoliosis. RESOURCES. An extensive literature review was performed on CM and scoliosis to obtain the most relevant information for clinicians to better educate and understand association, common manifestations, and clinical outcomes. DESCRIPTION. CM is a group of cerebellar anomalies ranging in grade from I to III, with grade IV being debatable. CMI is the least severe and consists of one or both cerebellar tonsils herniating into the foramen magnum. CMII is CMI plus brainstem and vermis herniation. CMIII involves herniation of the

hindbrain. CMIV involves an underdeveloped cerebellum. CMIII and CMIV have a poor prognosis. CMs cause compression in spinal fluid dynamics resulting in a range of clinical manifestations. The most common sign of CM is headache but can be an incidental finding on MRI in asymptomatic cases. Other symptoms include dizziness, numbness, and difficulty swallowing. Treatment for symptomatic CM is posterior fossa decompression depending on other present NAA and cervical instability. SIGNIFICANCE. Idiopathic scoliosis has been demonstrated to have a prevalence ranging from 0.5-5% of all births. Current research has found nearly 20% of all scoliosis presumed to be idiopathic may involve NAA such as CM. Better understanding of this condition can improve prognosis in a wide range of affected individuals. Because this condition is commonly taught in neuroanatomy in professional education, further research on NAA is vital. Identification, management, and treatment of these patients is important in preventing potential motor dysfunction and mortality.

10:21 – 10:23 AM

Aaron Beger, Beatrix Dudzik, Randall L. Woltjer, and Paul L. Wood. Lincoln Memorial University DeBusk College of Osteopathic Medicine, Harrogate, TN 37752.

Human brain lipidomics: Assessing the influence of embalming on the basal ganglia lipidome.

INTRODUCTION. Lipidomic studies of postmortem human brain tissue have expanded the understanding of the biochemical underpinnings of neurological health and disease. However, declining autopsy rates and inflated operational costs of biorepositories have limited the accrual of post-mortem human brain tissue, threatening advancement of this field. Embalmed whole body donors willed to academic institutions offer a potential supplemental tissue source that has yet to be analyzed with lipidomic techniques. METHODS. The potential utility of these specimens was assessed by comparing lipid levels in embalmed and cryopreserved fresh samples of caudate, putamen and globus pallidus using electrospray ionization high resolution mass spectrometry. SUMMARY. The most stable species belonged to sphingomyelin and choline plasmalogen subclasses, followed by diacylglycerides and saturated species of phosphatidylcholine. Ceramides, lysophosphatidylcholines, and N-acylethanolamides were elevated in all regions, while unsaturated species of phosphatidylcholine were decreased. Phosphatidylethanolamines and phosphatidylserines were not identified in embalmed samples. CONCLUSIONS. These findings suggest that the cerebral lipidome is widely altered in embalmed brains, with sphingomyelins and choline plasmalogens being the most commensurate in fresh and fixed brain tissue. Embalmed human brains could therefore support the study of these lipid subclasses, offering a narrow range of potential applications that includes the study of Alzheimer's disease.

10:23 – 10:25 AM

Michael Cox[1], and Amanda Troy[2]. [1]Liberty University College of Osteopathic Medicine, Lynchburg, VA 24502; [2]Rocky Vista University College of Osteopathic Medicine, Parker, CO 80134.

Osteopathic-oriented dissection guide to the superficial back.

INTRODUCTION. Understanding anatomy is a basis to learning osteopathic medicine in the osteopathic medical curriculum. However, the process of learning osteopathy in cadaveric dissection is underutilized across osteopathic medical schools. INNOVATION. In order to enhance student learning in medical school, this project aims to produce a more personal and interactive dissection guide for first-year medical students. Osteopathic teachings were incorporated into a superficial back dissection guide written by osteopathic medical students at Liberty University College of Osteopathic Medicine. The "OMM Considerations" are brief texts in the dissector guide that invite students to palpate and "feel" important anatomic structures on the human body that are commonly studied and treated in osteopathy. SUMMARY. With osteopathic medical students required to learn osteopathy in addition to the common medical school curriculum, the dissector guide integrates various aspects of the osteopathic medical school curriculum to facilitate comprehensive learning. DISCUSSION. However, the implications of an osteopathic approach to a cadaveric dissection guide needs further evaluation. Future research should address the project's impact on medical students' knowledge of anatomy and osteopathy. The correct practice of osteopathy becomes another skill for future osteopathic physicians. This guide has the potential to tie osteopathic principles to one of the foundational components of medicine, increasing the confidence and exposure to this additional skill of the osteopathic physician.

11:20 – 11:22 AM

Jessica Immonen, Mackenzie Kitchen, Landen Broadhead, and Conner Paul. University of Nevada Las Vegas, School of Dental Medicine, Las Vegas, NV 89106.

Transitioning a medicine-based cadaveric research program in osteoarthritis to dentistry.

INTRODUCTION. The objective of this study was to determine if a validated scale for disease severity of osteoarthritis (OA) in the knee joint can be utilized to discuss and interpret disease severity in the temporomandibular joint (TMJ) of formalin-fixed cadavers. Investigators aimed to develop a dentistry-focused arm of osteoarthritis research based on gaps in knowledge in the dental literature. RESOURCES. Twelve intact TMJs from 8 cadaveric donors were harvested from skull dissections with the calvaria and brain removed. A standard lateral dissection approach was implemented. DESCRIPTION. Specific types of lesioning seen in the knee joint articular cartilage were investigated on the head of the mandible and the mandibular fossa of the temporal bone such as linear cracks, stellate fractures, fraying, fibrillations, erosions, osteophyte development and cortical bone mass exposure. It was determined that superficial

fibrillations and fraying were the most common forms of degeneration in donors with mild TMJ OA in this population. Donors demonstrating severe TMJ OA revealed cortical bone exposure and more substantial erosions. One donor did demonstrate an osteophyte on the posteromedial side of the condyle which was an unexpected finding, especially given it did not occur at a cortical bone – articular cartilage transition. The pathology demonstrated in the TMJs did not include notable stellate fractures or linear cracks, pathology commonly seen in arthritic knee joints. SIGNIFICANCE. Given the validated scale does not specifically address these types of abnormalities as a requirement to be classed as a 0-4 Grade it is concluded that this scale for osteoarthritis disease severity which was validated in the hip, wrist and knee joint could be effectively used to class disease severity in a population of arthritic TMJs. Utilization of this scale to assess OA in a cadaveric population will lead to new morphometric knowledge on the presentation of disease in the TMJ.

11:23 – 11:25 AM

KELLY, Emily A., Ashton S. AMOS, Maxwell R. HANSEN, Emily C. SNELL, Ronald G. LOTT, and Christine M. LOMIGUEN. Lake Erie College of Osteopathic Medicine, Erie, PA 16509, USA.
Syringomyelia-associated juvenile scoliosis: A review.

INTRODUCTION. Neural axis abnormalities (NAA) such as syringomyelia, Arnold-Chiari malformations, and tethered cord syndrome are common abnormalities present with scoliosis. The rates of these NAA are as high as 50% in infantile and juvenile idiopathic scoliosis. Despite idiopathic scoliosis existing as the most common spinal deformity, no causative etiology has been identified. RESOURCES. Literature on scoliosis and syringomyelia in children was reviewed to study common associations, clinical manifestations, and outcomes. DESCRIPTION. Juvenile scoliosis is a secondary clinical manifestation to syringomyelia in children. Syringomyelia, a fluid-filled cyst, or syrinx, within the spinal cord, is vital to recognize and diagnose due to attributable neurologic deficits. Idiopathic scoliosis associated with NAA may have atypical presentations, such as left thoracic curve, high thoracic apex, and apical hyperkyphosis which should raise suspicion during evaluation. Bracing is not a useful treatment, and currently, no other widely-accepted option exists. Although juvenile scoliosis may be due to syringomyelia, treating the syrinx does not predict progression of the scoliotic curve. Treatment of a syrinx before or after surgical correction of the scoliotic curve may be beneficial in reducing neurological risks. SIGNIFICANCE. Idiopathic scoliosis is prevalent in 0.5-5% of all births. It is important for better understanding of this condition to improve prognosis in a wide range of affected individuals. Further research and subsequent education on NAA is vital as current research describes nearly 20% of all scoliosis presumed to be idiopathic may involve NAA. Syringomyelia must be properly identified and treated to reverse neurological deficits and associated pain; avoiding irreversible injury. This research aims to provide a clinically relevant, modern overview of syringomyelia in association with juvenile scoliosis that may serve in proper identification and treatment.

11:26 – 11:28 AM

Kathryn Lazarchick, Ian Schultheiss, Blake Ivey, Chika Motanya, and Aaron Beger. Anatomy Department, DeBusk College of Osteopathic Medicine, Lincoln Memorial University, Harrogate, TN 37752.

Unilateral agenesis of the ascending part of trapezius: A case study and review of the literature.

INTRODUCTION. The trapezius is a superficial muscle of the shoulder girdle with descending, transverse, and ascending parts. Morphological abnormalities of the trapezius include supernumerary muscular variants (e.g. the cleido-occipitalis cervicalis), as well as partial or total agenesis, with possible concomitant involvement of the sternocleidomastoid as these muscles share a developmental anlage. The purpose of this case study is to document and discuss unilateral agenesis of the ascending part of trapezius identified during a routine dissection of an 85-year-old female by first-year osteopathic medical students. RESOURCES. The superficial back was exposed via sharp dissection and borders of the trapezius were delineated bilaterally. Exploration of the shoulder girdle followed to determine the extent of the anomaly. A review of the literature was conducted to identify the incidence and possible origin of the anomaly. DESCRIPTION. The ascending fibers of the left trapezius were absent, with marked reduction in overall thickness and surface area compared to the right. Surrounding shoulder girdle and upper limb muscles, as well as sternocleidomastoid muscles were intact and symmetrical. No signs of trauma or surgical intervention were identified. SIGNIFICANCE. Structural abnormalities of the trapezius are infrequently reported. Similar findings have been linked to congenital conditions such as Poland's sequence and CHARGE syndrome. Our findings of an isolated muscular anomaly suggest a discrete developmental insult involving the lateral plate mesoderm of the occipital region. Possible functional deficits, compensatory hypertrophy of ipsilateral musculoskeletal elements, and the influence of these factors on surgical interventions of this region highlight the clinical relevance of this case.

3:13 – 3:15 PM

Mohamad Nawras[1], Jihad Aoun[1], Vahid Yazdi[1], Mordechai Hecht[1], Sadik Khuder PhD[2], Patrick Frank D.C.[1] [1] Department of Medical Education, College of Medicine and Life Sciences, University of Toledo. [2] Departments of Medicine and Public Health, University of Toledo.

Assessing the Ethical Concerns of Medical Students in the Gross Anatomy Lab.

INTRODUCTION: Cadaver dissection has become the gold-standard for anatomical education in US medical schools. Ethical issues regarding cadavers may not be as obvious as in living patients, which can lead to their underemphasis in medical school curriculums. In this study we (1) assessed the different ethical concerns (EC) of medical students regarding cadavers in the gross anatomy lab (GAL), (2) gathered student information, including self-reported academic performance (AP) in the GAL, and (3) determined the best predictors for a student's EC. METHODS: All 2nd-year medical students at the University of Toledo were invited to complete an anonymous, online-survey. 112 (63%) responses were recorded. Participants were

presented with 10 hypothetical but realistic lab scenarios and were asked to rate their EC for each on a standardized scale. Gender, age, and scores received in the GAL course were also collected. SUMMARY: The 10 scenarios were scored on a five-point Likert scale. A multiple linear regression model was used to find the best predictors of the total EC score. Non-parametric tests were used to test for differences in each scenario by age, gender, and academic performance. The highest EC was for Q7: Taking pictures of the cadaver. The lowest EC was for Q10: The dissection of cadavers itself is an ethical concern. CONCLUSIONS: Gender was the best predictor of the total EC, followed by age. Female total EC was significantly higher than that for males (35.8 ± 5.5 vs 33.1 ± 7.9). Moreover, female scores for Q1 and Q2 were significantly higher than those for male students. Total EC for students in the age group 25-34 was significantly higher than those in the age group 18-24 (35.9 ± 6.1 vs 33.9 ± 7.2). No significant difference was found for individual scenarios. AP was not significantly related to either the total score or the scores of the individual scenarios. Further investigation of EC in the GAL can help shape future ethical education curriculum reforms.

3:16 – 3:18 PM

Murillo-Ruiz, Aaron; Alger, Joshua; Wang, Dennis, Belmares, Ricardo Ph.D., and Niño, Diego M.D., Ph.D. Paul L. Foster School of Medicine, Texas Tech University, El Paso, TX 79905.
Learning anatomy using online radiographic and cadaveric anatomy modules.

INTRODUCTION: Virtual modules are convenient for students, but their utility compared to in-person anatomy didactics is unclear. We evaluated the utility of virtual anatomy modules for teaching renal and genitourinary (GU) anatomy. METHODS: We created an online anatomy module that incorporated cadaveric images, 2D models, and radiology for the purpose of teaching renal and GU anatomy to first year medical students (MS1) at Paul L. Foster School of Medicine in preparation for their weekly renal Readiness Assessment Test (RAT). At the end of the module, a five-question test was administered to assess the MS1's comprehension of the module's content. A RAT was given within one week of module completion, and we compared the performance on renal-anatomy questions on the RAT between MS1s who did and did not complete the module using a paired Z-test ($p = 0.05$). A voluntary survey was sent to the MS1 class to assess their opinions on the utility of the module. SUMMARY: Of the 78 MS1s who completed the module, 53% scored 80% or higher on the post-module quiz, and 14% scored a 20% or lower. There was no statistically significant difference in the performance on renal-anatomy questions on the RAT between MS1's who did and did not complete the module ($Z = 1.6$; $p = 0.105$). Of the 23 MS1s who completed the post-unit survey, 47.8% found the module useful for teaching urinary system anatomy, 52.2% want similar modules for future anatomy labs, and 43.5 % feel confident applying their knowledge of renal anatomy to case-based clinical questions. CONCLUSION: Our results suggest that a virtual module with cadaveric images, 2D anatomy models, and radiology may be helpful in teaching renal and GU anatomy. More studies

are needed to assess whether they significantly improve test performance. Finally, a plurality of MS1s found the module useful for their renal summative and feel confident applying their knowledge to vignettes, and a majority want similar modules for future anatomy units.

3:19 – 3:21 PM

Livashin Naidu, and Carmen O. Rennie. Department of Clinical Anatomy, School of Laboratory Medicine and Medical Sciences, College of Health Sciences, University of KwaZulu-Natal, Durban, KwaZulu Natal, South Africa.
An anatomical study of the extracranial course of the facial nerve.

INTRODUCTION Facial nerve paralysis is a common complication during parotidectomies, possibly due to the close relationship of the tumor and facial nerve (along its extracranial course). This study aimed to explore the extracranial course of the facial nerve in terms of branching patterns, variations, and bony anatomical landmarks. METHODS The study sample comprised of twenty embalmed adult cadaveric heads, dissected bilaterally for a total of 40 facial nerve specimens. The parameters recorded and analyzed were trunk division, branching patterns (Types I-VI) and variations. The distance between the facial nerve trunk and bony anatomical landmarks (mastoid process, angle of the mandible and external auditory canal) was also measured. All parameters were classified and compared according to sex and laterality. SUMMARY Bifurcation of the nerve trunk was observed in 90% of cases, whilst trifurcation was observed in only 10%. Trifurcation cases displayed variations. Branching pattern Type V was observed most frequently (27.5% of cases), whilst Type I was observed least frequently (7.5% of cases). The six types were further subdivided into three subtypes, based on buccal branch origin. The angle of the mandible was the only landmark to display significant differences according to sex (p-value <0.001) and laterality (p- value =0.002). CONCLUSIONS The present study proposes the use of this classification system together with the three subtypes. All three landmarks displayed good-excellent reliability (ICC values: 0.82 - 0.95) as bony anatomical landmarks for the localization of the nerve trunk. Anatomical knowledge regarding the extracranial course of the facial nerve and bony anatomical landmarks, for its localization, are of importance to surgeons during parotidectomies.

3:22 – 3:24 PM

Daniël Johannes van Tonder[1], Dietrich Ernst Lorke[1], Trust Nyirenda[1], Natalie Keough[1,2].
[1]Department of Anatomy and Cell Biology, College of Medicine and Health Sciences, Khalifa University, Abu Dhabi, United Arab Emirates. [2]Department of Anatomy, School of Medicine, Faculty of Health Sciences, University of Pretoria, South Africa.
An uncommon, unilateral motor variation of the intercostobrachial nerve.

INTRODUCTION: The intercostobrachial nerve (ICBN) is commonly defined as a purely sensory nerve supplying the skin of the lateral chest wall, axilla, and medial arm. However, numerous branching patterns and distributions, including motor, have been reported. RESOURCES: This report describes an uncommon variant of the right ICBN observed in both an 86-year-old white female cadaver and a 77-year-old white male cadaver. DESCRIPTION: In both cases the ICBN presented with an additional muscular branch, termed the “medial pectoral branch”, piercing and therefore innervating the pectoralis major and minor muscles. SIGNIFICANCE: Clinically, the ICBN is relevant during surgical access to the axilla and can result in sensory deficits (persistent pain/loss of sensory function) to this region following injury. However, damage to the variation observed in these cadavers may result in additional partial motor loss to pectoralis major and minor.

3:25 – 3:27 PM

Sailabala Vanguri, California Northstate University-College of Medicine, Elk Grove, CA 95757.
A novel and easy way to dissect hippocampus.
INTRODUCTION: - Hippocampus is an area of the brain which attracts a lot of curiosity from the students. Its role in long term memory and its deep-seated location within the temporal cortex make it more enigmatic and also a difficult to dissect area by most students as well as anatomy teachers. A simple and minimally destructive method to dissect and demonstrate the hippocampus was developed. This method facilitated successful dissection by the novice medical student in a reasonable period of time. RESOURCES: - Formalin fixed brain specimen, probe and a scalpel. DESCRIPTION: - This method involves an approach from the lateral aspect of the occipital lobe and proceeding anteriorly. This is a novel and easy method of dissecting and demonstrating the Hippocampus, Fimbria and Crus Fornix. SIGNIFICANCE: - An advantage of this technique is that most of the structures in the medial and inferior surfaces of the cerebral hemisphere are undisturbed and thus will enable the learning of all the surfaces of brain using fewer brain specimens.

3:27 – 3:29 PM

Wang, Dennis; Alger, Joshua; Murillo-Ruiz; Laks, Shaked; Olexiuc, Edith; Belmares, Ricardo; Niño, Diego. Texas Tech Health Science Center at El Paso Texas, Paul L. Foster School of Medicine, El Paso, TX 79905.
Efficacy of a novel pulmonary online radiographic and cadaveric anatomy module for medical students.

INTRODUCTION: In today’s current day and age, online education has been growing exponentially. Additionally, radiology education in medical school curricula has been greatly underrepresented. The objective of our study was to develop, deploy, and evaluate the efficacy of an online pulmonary anatomy module that incorporates clinically relevant radiological imaging modalities for teaching medical students. INNOVATION: We developed an interactive

module that integrates 2D anatomical diagrams, cadaveric, and radiographic images of the respiratory system. Radiographic imaging modalities included were chest x-rays, computed tomography, and angiography. The module was deployed to first year medical students of Paul L. Foster School of Medicine in preparation for their pulmonary summative exam. Efficacy of our online module was assessed through a pre- and post- test assessment. Finally, a voluntary survey was given to the class to gather students' thoughts and opinions of this type of learning experience. SUMMARY: Out of 116 students in the PLFSOM MS1 class, 85 students completed the module. The percentage of students who scored an 80% or above on the pre and post test were 25% and 47%, respectively. Additionally, over 85% of the students who responded to the voluntary survey indicated that they found the module useful in learning the anatomy of the respiratory system, and over 70% felt they could apply the knowledge learned to better answer clinical vignette questions. DISCUSSION: Incorporation of different radiological imaging modalities to illustrate pulmonary anatomy in clinically appropriate scenarios allows for increased exposure of radiology to medical students. The results of our pilot study suggests that our online module may prove helpful in teaching anatomy in a more clinically oriented manner. Student feedback from our voluntary survey was overwhelmingly positive with many comments suggesting a similar type of module to be used for learning future organ systems.

3:29 – 3:31 PM

Andrew Zhao, Hershey High School; Nathan Fritz, Messiah University.
The relationship of the types of accessory naviculars to the development of the flat foot.

INTRODUCTION: The most common accessory ossification of the foot and ankle is the accessory navicular bone which occurs in 4-14% of the population. Some patients with accessory navicular syndrome also have flat feet because the posterior tibial tendon attached to the sesamoid bone weakens, leading to the arches weakening. This weakening may lead to Posterior Tibial Tendon Dysfunction. In this study, we investigate the relationship between the types of accessory navicular bones and radiological parameters of the foot. METHODS: Patients (12 women and 17 men) with a mean age and standard deviation of 32.6 +/- 13.3 years grouped by the types of accessory navicular bone examined. Three radiographic parameters were measured, including Talonavicular Angle, 1st Metatarsal Angle, and Calcaneal pitch. RESULTS: There was no significant difference between type 1 and type 2 in all radiological parameters. CONCLUSIONS: We found that there is no difference on the radiological measurements of the foot for the different types of accessory navicular bones in which we examined.

3:31 – 3:33 PM

Alexsaundra Zywicki, Dana Mihaila, and Lauren Germain. State University of New York Upstate Medical University, Syracuse, NY 13210
Reviewing the impact of anatomy teaching modalities in physician training.

INTRODUCTION Time dedicated to gross anatomy in undergraduate medical education has decreased, requiring students learn the same information in a compressed amount of time. The emphasis on cadaveric dissection and traditional lecture remains, but instruction now includes newer methods such as active learning exercises, flipped lectures and various technologic resources. To date there has been no review of the published literature in this area. RESOURCES The authors conducted a narrative review of the modalities used in anatomy education and their associated outcomes. An electronic search of PubMed and SCOPUS identified articles discussing modalities used to teach anatomy at Liaison Committee on Medical Education (LCME) accredited institutions in the United States from 2015 to present. Other articles were obtained from a manual search of references from retrieved sources. Studies were organized according to Kirkpatrick's Four Level Evaluation Model for educational outcomes. DESCRIPTION A total of 54 out of 1765 articles met inclusion criteria. A variety of teaching interventions was represented, with cadaver dissection referenced most. According to Kirkpatrick's Four Level Evaluation Model, 26 articles assessed student satisfaction and preferences (Level 1) while 28 addressed student attitudes, skills and knowledge (Level 2). No articles demonstrated changes in student clinical behavior or improved patient outcomes (Levels 3 and 4). SIGNIFICANCE**:** Literature reflects that a multimodal approach is preferred in anatomy education, yet the most effective combination has not been established. The data collected are subjective, focusing on student preferences rather than a meaningful change in knowledge acquisition, clinical behavior or patient outcomes. Studies often used non-standardized assessments from local to individual institutions rather than nationally normed measures. With the USMLE Step 1 exam now pass/fail, it may be worthwhile to investigate the impact that various modalities have on medical student performance on the USMLE Step 2 exam or surgical clerkship. This review establishes the current climate of medical anatomy education and the need to define the most effective combinations of teaching modalities for improving student clinical behaviors.

3:33 – 3:35 PM

Alexsaundra Zywicki, and Kennedy Nye. State University of New York Upstate Medical University, Syracuse, NY 13210

The role of audition in anatomy: a medical student's perspective on podcasts.

INTRODUCTION A podcast is an easily accessible auditory resource allowing for anywhere, anytime learning that fits a demanding medical student schedule. Podcasts benefit listeners, but the production of an educational learning tool also allows for development of critical thinking and communication skills imperative for future physicians. The purpose of our project was to highlight the role for podcasts in reviewing board-relevant anatomy and the willingness of students to utilize podcasts to study a highly visual topic. INNOVATION The authors created Body Talk, a USMLE Step 1 anatomy review podcast available on streaming sites including Apple Podcast and Spotify. Recorded and edited using GarageBand on Mac laptop with an external microphone. Episode content outline developed from popular board review books and topics frequently tested in question banks. Assessed based on Spotify statistics including followers,

unique listeners and total listens. SUMMARY The podcast includes eight episodes all under 30 minutes. Statistics are as follows: 208 followers, 2,280 total listens with 614 unique listeners. The most listened to episode was Episode 1: The Upper Extremity with 553 plays. For podcast creators, development contributed to content repetition and strengthened anatomy knowledge. Expanded communication skills by succinctly delivering information while highlighting important anatomy concepts to listeners. DISCUSSION The flexibility, portability and option for repetition at a medical student's leisure makes podcasting a promising supplemental resource to be used alongside "traditional" anatomy teaching methods. Offers a cost-effective way for students interested in medical education to move forward as clinical educators while facilitating collaboration amongst peers and colleagues. A pass/fail USMLE Step 1 opens doors for a more clinically focused pre-clerkship curriculum and podcasts may be a desired approach to connect anatomy principles to clinical situations. Our podcast statistics highlight a willingness for medical students to utilize an auditory resource to review anatomy, a primarily visual subject.