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The Oregon Journal
of Orthopaedics

Volume VI May 2017



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Letter from the Editors

Welcome to the sixth volume of *The Oregon Journal of Orthopaedics*. We would first like to thank our faculty, residents, alumni and other supporters of the journal for their contributions this year. In addition, we are very pleased to announce the creation of a dedicated journal webpage. Please visit www.ohsu.edu/ojo to see the electronic copy of this journal and to access previous issues. We encourage you to share it with others.

In this sixth installment, we aim to highlight the outstanding accomplishments of orthopaedic surgeons and musculoskeletal healthcare providers across the state of Oregon. We visit with State Representative Dr. Knute Buehler and learn about Dr. Patrick Denard's academic pursuits in Medford. We highlight changes in musculoskeletal education at OHSU and learn about advances in ultrasound. We also have updates from Dr. Robert Orfaly, president of the Oregon Medical Association, as well as an update from the Oregon Association of Orthopaedic Surgeons.

We introduce you to our three new faculty members on the hill: Dr. Lucas Anissian, Dr. Kenneth Gundle, and Dr. Scott Yang. Dr. Anissian is practicing full time at the Portland VA, focusing on arthroplasty. Dr. Gundle joins us after completing an orthopaedic oncology fellowship and is sharing time between the VA and OHSU. Dr. Yang has joined the Doernbecher team after fellowship in pediatric orthopaedics.

We have a selection of research abstracts to highlight the investigative efforts happening in our community. We will showcase the senior projects from our five chief residents at OHSU.

Please enjoy Volume VI of *The Oregon Journal of Orthopaedics*.

The Editors:

Faculty Editor: Darin Friess, MD

Senior Editors: Elizabeth Lieberman, MD, and Peters Otlans, MD

Junior Editors: David Putnam-Pite, MD, and Nikolas Baksh, MD

Editors Emeriti: Ryland Kagan, MD, Ryan Wallenberg, MD, Ben Winston, MD, Karlee Lau, MD

Letter from the OHSU Chairman



A successful completion of residency requires competency in research. Because research is often tied to academic institutions, residents often feel that this is nothing more than a rite of passage. I have heard defenders of research curriculum say that it is needed to prepare the residents to evaluate research so that they can make reasoned choices about the treatment that they recommend. That logic certainly makes sense, but is that really the reason d'être of research curriculum?

When I was young, I found something appealing in Ralph Waldo Emerson's American Scholar. He spoke about being a true scholar:

“Man is thus metamorphosed into a thing, into many things. The planter, who is Man sent out into the field to gather food, is seldom cheered by any idea of the true dignity of his ministry. He sees his bushel and his cart, and nothing beyond, and sinks into the farmer, instead of Man on the farm. The tradesman scarcely ever gives an ideal worth to his work, but is ridden by the routine of his craft, and the soul is subject to dollars.”

In this distribution of functions, the scholar is the delegated intellect. In the right state, he is, Man Thinking.

Who is an orthopedic surgeon? Is he a carpenter of man? I would think that Emerson would have thought of him as Man in the care of fellow man's body. He does not regurgitate his knowledge in execution of his profession, but rather his calling requires more than the recitation of the work of other. It is he who through observations and discipline has to discover the relation between things and the nature itself.

“Since the dawn of history, there has been a constant accumulation and classifying of facts. But what is classification but the perceiving that these objects are not chaotic, and are not foreign, but have a law which is also a law of the human mind?”

It is what an orthopedic surgeon should do in his life. He is not one who does surgery, but he is one who learns, evaluates, discovers in service of his fellow man's well-being. It is what Emerson would have called “Man Thinking”.

Sincerely,
Jung Yoo, MD
Chair and Professor, OHSU Department of Orthopaedics & Rehabilitation

Letter from the OHSU Residency Program Director



Dear Colleagues:

We all have famous words from our mentors knocking around the brain. In perusing this sixth edition of the Oregon Journal of Orthopaedics I am reminded of the quote, “How do you eat an elephant sandwich?” The answer, is of course, “One bite at a time.”

The Orthopaedic Residency at OHSU continues in its daily work to teach and train wonderful orthopaedic surgeons. While some of the credit goes to a spectacular faculty, in truth most of the hard work is done by the residents themselves. It is hard to work 80 hours a week and still set aside time to read and study for an exam in your spare time. It is difficult to get up for a 6am conference every day for five years straight. In the midst of a 3am consult, it is not easy to set aside ten minutes to educate the medical student observing for the night. On top of all these difficult tasks, the residents still make time to produce research projects and answer important questions. They run the House Officers Association, and sit on critical OHSU quality improvement committees. They participate in the American Academy of Orthopaedic Surgery Residency council. They have produced another edition of a beautiful journal. They have once again demonstrated their extraordinary grit to tackle huge tasks.

I think the residents would turn around and thank the orthopaedic faculty as well. Teaching residents is hard work. The faculty still spend mornings giving lectures to the residents, and late afternoons reviewing the surgical cases for the following day. The routine and easier surgical cases are often given to the residents for learning experience, leaving too many difficult and complex cases for the faculty to do. There are more medical students interested in musculoskeletal medicine than ever before, and the faculty have risen to the occasion to teach courses at every stage of student education. The Residency curriculum continues to evolve with more surgical simulation, more competency testing, and more day-to-day feedback to residents. On top of everything, the faculty still find time to ask questions and seek answers through scholarly research. Clearly the faculty know how to eat an elephant sandwich.

During the monthly lineup of clinic, operating room, on-call days, and meeting after meeting it is easy to lose sight of the critical work we do on a daily basis. We forget that we are making patients walk again. We are curing cancer. We are restoring hands that can work and earn a living. We are fixing shoulders to cry upon. We are stabilizing knees that can run to give a hug. And every day we are training another surgeon to do the same thing in the future. I hope, in this Oregon Journal of Orthopaedics, you will be reminded of the joy to be found in the work we all do every day. Even the mundane tasks and small projects along the way are just one more bite out of the larger sandwich.

Sincerely,
Darin Friess, MD
Residency Program Director

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2. Cartner et al ORS 2014

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OXINIUM Retrieval

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Good Samaritan Regional Medical Center Orthopedic Surgery Residency Program Letter from the Program Director



The GSRMC Orthopedic Residency Program is pleased to report on developments during the 2016-17 academic year.

Our top priority this past year has been working with the ACGME to obtain accreditation. Through this transition, it has allowed us to add new processes and committees to our residency program. Some of these committees include a Program Evaluation Committee, a Clinical Competency Committee, and the Resident Quality Council. We would like to thank our Co-Associate Program Directors, Dr. Jacqueline Krumrey and Dr. Jonathan Evans for their work on chairing some of these committees. We look forward to the challenges ahead and hope to obtain our accreditation in the next year.

All three of our fifth year residents have matched into their desired ACGME fellowships; and will be moving forward with their training as follows:

- Craig Gillis, DO: Hand/Upper Extremity in Buffalo, NY
- Ryan Callahan, DO: Foot/Ankle in Hershey, PA,
- Andrew Nelson, DO: Sports Medicine in Newport, CA.

We are extremely proud of them, and wish them well in their fellowship training and beyond. We also want to thank them for their leadership as chief residents. One of their main goals was to help develop and strengthen our academic half day. This was reflected on our OITE scores with a jump from the 45th percentile in 2015 to 61st percentile among all programs in 2016.

As our program has progressed and grown over the past seven years, we would like to express our extreme gratitude for the teaching and mentorship of our faculty in Portland, OR and Visalia, CA. Our residents have enjoyed working with the faculty at OHSU, Portland Shriners Hospital for Children, and Summit Orthopaedics at Legacy Emanuel. Our fourth years are gaining valuable sports medicine experiences with fellowship trained surgeons at Orthopaedic Associates in Visalia, CA. These rotations have helped our residents to improve their surgical skills, diagnostic acumen, and research exposure. We are also excited to be gaining more pediatric orthopedic experience for our third years this current year, with the Legacy Emanuel group. These experiences gained during these rotations have helped us to solidify our program's overall education goals and milestones.

We want to thank Dr. Friess, Dr. Brady, and the OHSU residents for their collaboration with our faculty and residents during their weeklong arthroscopy boot camp. The feedback from our residents was that the experience was invaluable and very worthwhile. We are still growing our research experiences as a program, and have added new research staff to our GME. Our residents enjoyed participating in the annual OAOS meeting at Salishan in November while presenting posters and lectures at various other regional and national meetings this past academic year. We are committed to expanding our research efforts as we build on QI

As we look to the close of the academic year, we are proud to graduate our third class of residents, and are excited to welcome our new interns. As a program, we appreciate the hard work, dedication, and commitment that our residents and faculty (home and away) have demonstrated while continuing to help build our residency program.

Congratulations to the graduating classes of SHS and OHSU. We look forward to watching you continue to grow, and count you as colleagues in the future.

Sincerely,

A handwritten signature in black ink, appearing to read "Luis Vela".

Luis Vela, DO, FAOA

Program Director

Orthopedic Surgery Residency

Samaritan Health Services

Adult Reconstruction



Thomas Huff, MD



Kathryn Schabel, MD

Foot & Ankle



James Meeker, MD

Orthopaedic Oncology



Yee-Cheen Doung, MD



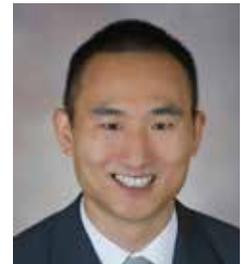
Kenneth Gundle, MD



James Hayden, MD, PhD



Matthew Halsey, MD



Scott Yang, MD

Pediatrics

Physical Medicine & Rehabilitation



Hans Carlson, MD



Nels Carlson, MD

Podiatry



Trish Ann Marie Otto,
DPM

Faculty and Resident Directory 2016–2017

OHSU

Research / Basic Science



Brian Johnstone, PhD
Director, Research



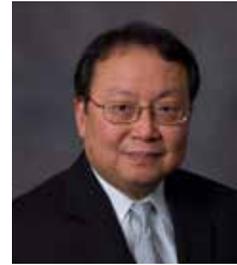
Lynn Marshall, ScD



Clifford Lin, MD



Jayme Hiratzka, MD
Director, Spine



Jung Yoo, MD
Chairman

Spine

Sports Medicine (Primary Care)



Rachel Bengtzen, MD



James Chesnutt, MD



Douglas McKeag, MD



Melissa Novak, DO



Ryan Petering, MD
Co-Program Director,
Sports Medicine Fellowship

Sports Medicine (Surgical)



Charles Webb, DO
Director, Sports
Medicine Fellowship



Dennis Crawford, MD, PhD
Director, Sports Medicine



Andrea Herzka, MD



Jacqueline Brady, MD
Associate Program
Director

Faculty and Resident Directory 2016–2017

OHSU

Trauma



Darin Friess, MD
Director, Trauma &
Residency Education,
Vice-chairman



Brad Yoo, MD



Adam Mirarchi, MD
Co-Director,
Hand Fellowship



Robert Orfaly, MD



Omar Nazir, MD

Upper Extremity

Shriners Hospital for Children



Michael Aiona, MD
Chief of Staff, Program
Director



Jeremy Bauer, MD



Charles d'Amato, MD
Director of Spinal
Deformity



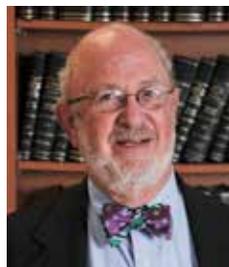
J. Krajbich, MD, FRCS(C)



Ellen Raney, MD



Dennis Roy, MD
Director of Education



Michael Sussman, MD



Michelle Welborn, MD

Faculty and Resident Directory 2016–2017

Legacy Emanuel Hospital



Doug Beaman, MD
Foot & Ankle



Britton Frome, MD
Hand/Upper Extremity



Richard Gellman, MD
Orthopaedic
Traumatologist
Foot & Ankle



Steve Madey, MD
Hand/Upper Extremity



Corey Vande Zandschulp, MD
Orthopaedic Traumatologist



Amer Mirza, MD
Trauma/Adult
Reconstruction

Kaiser Permanente, Pediatrics Faculty



Stephen Renwick, MD



Ronald Turker, MD

Faculty and Resident Directory 2016–2017

Orthopedic + Fracture Specialists



Brett Andres, MD



McPherson Beall III, MD



J. Brad Butler, MD



James Davitt, MD



Alex DeHaan, MD



Alec Denes Jr, MD



Paul Duwelius, MD



Edwin Kayser, MD



Jason Kurian, MD



Edward Lairson, MD



Hans Moller III, MD



Rosalyn Montgomery,
MD



Linda Okereke, MD



Rolf Sohlberg, MD



Venessa Stas, MD



Robert Tennant, MD

Faculty and Resident Directory 2016-2017

Portland VA Medical Center Faculty



Ted Vigeland, MD



Lucas Anissian, MD, PhD



Mark Berkson, MD



Kenneth Gundle, MD

Fellows 2016-2017

Sports Medicine Primary Care Fellows



Tiana Larsow, MD



Carl Rasmussen

Spine Fellow



Wesam Nasrallah, MD

Hand Fellow



Cara Lorentzen, MD

Ortho-politics: An interview with Dr. Knute Buehler, Oregon State Representative

By, Lizzie Lieberman, MD and Knute Buehler, MD



The phrase “Is there a doctor in the house?” has dual meaning in the state of Oregon. Dr. Knute Buehler is an orthopaedic surgeon currently serving as State Representative of Oregon’s 54th district. Dr. Buehler is a native Oregonian, graduate of

Oregon State University and alumni of OHSU’s orthopaedic residency program. He was elected to serve in Oregon’s House of Representatives in 2014 and is currently in his second term after being reelected in 2016. Dr. Buehler currently serves on the House Health Care and House Revenue Committees, as well as the Joint Committee on Tax Credits and Joint Ways and Means - Human Services Subcommittee. I interviewed Dr. Buehler to discuss his thoughts about serving in both “houses”.

In your view, how do medicine and politics overlap? What is the current role for physicians in politics?

Politics overlaps with many industries, but possibly none more than health care. Especially in our current time, health care has become an incredibly relevant and controversial topic in politics. No physician can ignore the political implications on our industry, and no legislature can hope to solve the complex problem of health care without input from physicians.

As a physician-legislator, I am in an unusual position. Unfortunately, there are not many of us – with only one other practicing physician in the Oregon legislature. I have found that my experience and understanding of medicine as a physician gives me a unique perspective and

credibility on health care legislation. And I am not the only one to realize this; many physician-legislators both currently serving and in the past have had a profound impact on state policy. I just wish more physicians were able to serve.

Finally, my experience as a doctor changes how I approach problems in the legislature. When a patient of mine comes in, I don’t ask if they are Republican or Democrat; I only want to provide them the best care possible. This is the same approach I have taken to Salem. In order to solve problems, we need to focus on caring for people and move beyond narrow partisan labels.

Do you feel like you had to make sacrifices in your orthopaedic practice to get involved in politics?

I am incredibly privileged to be able to serve in the legislature and represent my community. Yes, it means making sacrifices in my practice, but I am lucky enough to be in a position to do so. Not all physicians are in such a position, which is why so few currently serve. The time and resources required to serve in the legislature are untenable for most practices, forcing most physicians to have to choose one or the other. In the future, I hope the legislature finds a way to make serving more affordable and accommodating for physicians and other professionals.

Oregon has been considered a national leader in health care policy and reform. What do you think makes our state unique?

Oregon is the pioneer state. Our willingness to try new things is in our DNA. Over the past few decades, you will see that culture driving bold health care reforms – like the Oregon Health Plan, Coordinated Care Organizations, and markedly easing access to contraception. This intrinsic

quality has been central to Oregon's reputation as a leader in health care reform.

I also believe Oregon has a special way of solving problems, which some have called the "the Oregon way". Past leaders such as McCall and Hatfield, have set a standard of bipartisan problem-solving that has persevered even in our age of constant gridlock at the Federal level.

As a member of the House Committee on Health Care, do you feel responsible for representing the interests of physicians, orthopaedic surgeons in particular?

I feel a responsibility to represent the interests of every Oregonian, and especially the district I represent, when I am on the Health Care Committee and during all of my legislative activities. My professional experience grants me special insight on health care legislation, but I try not to make decisions based on affiliations – partisan or otherwise.

Have you been involved in local or national orthopaedic Political Action Committees? What advice do you have for physicians who are interested in getting involved with politics?

I have been a long time, active member of the Oregon (and American) Association of Orthopedic Surgeons PAC's. Advice: Be engaged. Even if you cannot afford to run for office, engage in politics at whatever level you are capable of because your perspective matters. Be informed on what is going on at a local, state, and federal level. For too long, good people have not engaged in politics. It is vitally important we all step up and help in this important arena at a crucial time in our nation history.

With the nomination of Dr. Tom Price for Secretary of Health and Human Services, a lot of scrutiny has been placed on the relationship between physicians and manufacturers. What do you think is the role of government here? Is this something you deal with?

The appropriate role of government in this situation is to provide transparency and guidelines to regulate this important relationship. It is

essential that physicians and manufacturers work together to innovate and improve products that advance our field.

As our healthcare system evolves, what changes would you like to see regarding how we practice orthopaedic surgery in Oregon?

Orthopaedic surgeons need to provide crucial leadership as we transition to what I believe will be three different tiers of surgical care in Oregon – traditional inpatient, outpatient, and a new intermediate level. This intermediate level is being driven by changes in surgical techniques, improved anesthesia, and value based payment methods. In the near future I would expect most of our elective orthopaedic cases will be in this setting.

Academic Orthopaedics in Medford and the Creation of the Oregon Shoulder Fellowship

By: Patrick Denard, MD and Peters Otlans, MD



When Patrick Denard began residency at OHSU, the program was in transition. Jung Yoo was a first year chairman and Denard was in Yoo's first class of orthopaedic interns. OHSU was a homecoming of sorts for Denard who had grown up in Zig Zag and then The Dalles. While Denard had stayed in the Northwest for college, he attended medical school at Dartmouth. His return to Oregon came in part because his wife was from the Pacific Northwest as well, and wanted to return.

Denard labored through residency and as he advanced in his training, he found mentors in the OHSU faculty, particularly the chairman. He also developed a taste for teaching. As a chief resident, he was known for walking his junior residents through cases. In Dr. Yoo's mind, one episode in the trauma bay highlighted Denard's strength and desire to teach as a resident. Both Denard and Yoo responded to a call of a dislocated hip in the emergency room. Denard, who was a junior resident at the time, was asked by the emergency medicine resident to assist

with the reduction. Dr. Yoo recalls that with "no wasted motion" Denard jumped on the bed and demonstrated the reduction maneuver to the other house officer and then permitted the emergency resident to perform the reduction. To Yoo, the episode "showed you a little bit that he was confident and therefore able to teach." Near the end of his time at OHSU, Dr. Yoo asked Denard to join the staff, but at that time, as Dr. Yoo puts it, Denard had "wanted more freedom and he didn't want to be subjected to all the administration." So, Denard went into private practice, settling in rural Oregon. Despite the distance from the large university hospital, Denard has maintained an academic practice.

Denard had come to residency with an interest in spine surgery, but ultimately he pursued a shoulder fellowship. He was drawn to the variety in the field, a combination of open and arthroscopic work, and he fell in love with arthroscopy. To this day, his favorite procedure remains the arthroscopic rotator cuff repair. In

2010, he went off to fellowship in San Antonio to work with Dr. Stephen Burkhart, and as Denard puts it, his work with Burkhart “changed everything I was doing, not only technically, but really changed my career path dramatically.” Burkhart is “way ahead of a lot of people [...] The rest of us are just kind of doing [arthroscopy] and he is thinking ahead, which really opened my eyes.” Burkhart helped ignite Denard’s research interest as well. Burkhart was always quick to provide feedback and positive reinforcement for Denard’s work, which he found very motivating. The quick turn arounds increased output and Denard’s writing career took off.

After his time in Texas, Denard settled in Medford, joining the Southern Oregon Orthopedics group. He brought with him the productivity he learned in fellowship. Denard combines early mornings and late evenings with an efficient clinical practice to remain highly productive. He wakes up at 4:30 AM to exercise. Then, he will spend two hours working prior to his clinical duties. At night, after putting his kids to bed, he spends an additional two hours working before going to sleep. He makes several trips each year around the country for various speaking engagements, and will write while traveling. Today, he has over 70 publications listed on PubMed and he has written several book chapters. He is the only surgeon in his practice maintaining an academic practice, and his partners have remained supportive as Denard continues to maintain a full-volume practice.

Denard has established a work life balance. He began taking an academic day to maximize his efficiency but also to help free up time on the weekend to spend with family. He and his wife have two school-aged children. They travel a lot and the family sometimes accompanies Denard on his speaking engagements. When not traveling they are active outdoors – skiing, hiking, and other activities.

Recently, Denard has expanded beyond writing as a means to contribute to medical academia. About a year and a half ago, Denard began advertising for the Oregon Shoulder Fellowship. He started

the fellowship, in part, to return to teaching other surgeons, as he did as chief resident at OHSU. Denard maintains a very shoulder-focused practice, combining arthroplasty and other open and arthroscopic procedures, and he accepts referrals from local surgeons. Earlier this year, Denard finished 6 months with his first trainee, a surgeon who had completed a fellowship but was looking for more shoulder training. For Denard, what he loves about teaching is “just seeing people get it, just seeing the click, and feeling like you’re passing something on. If you’re helping them do it you’re potentially helping other people as well.”

Shoulder and Elbow fellowships are not accredited by the Accreditation Council for Graduate Medical Education, but there is a list of American Shoulder and Elbow Surgeons (ASES)-affiliated fellowships which require two ASES registered surgeons to help train the fellows. Currently, Denard is the only ASES member in his practice. In the future, Denard hopes to expand the Southern Oregon Orthopaedics practice by adding an additional shoulder and elbow surgeon. With a second ASES-member surgeon, Denard could not only perform collaborative research but he could get formal ASES sponsorship for the Oregon Shoulder Fellowship and join the ASES match, which would increase his likelihood of having a fellow in future years. He hopes this will allow him to sustain the fellowship for the long term. Denard has embraced the mentor’s role. He is no longer just interested in being a prolific writer to achieve publication numbers. He is increasingly becoming more interested in making a difference and mentoring others. He has no plans to leave Medford for any large academic center. Rather, he plans to continue to bring academics to him and rural Oregon through the fellowship and research so he can keep contributing through patient care and educating others in the field.

For more information about the Oregon Shoulder Fellowship, visit www.oregonshoulder.com/fellowship-patrick-denard.html

Musculoskeletal Education

By: Nels Carlson, MD and Marie Kane, MS

How did you first become interested in Musculoskeletal (MSK) education?

I was always interested in education and teaching. When I began at OHSU, there was very little MSK medicine content taught as part of the curriculum. At that time, I taught the physical exam for Principles of Clinical Medicine that included 4 hours of MSK content in the winter quarter for the 2nd year medical students. About 8 years ago, two students approached Hans and I to develop a MSK elective. We started a quarter-long MSK elective that covered anatomy, clinical correlates and physical exam. We branched out from there to an elective every quarter. I taught basic science during one quarter and Hans taught the physical exam one quarter. A third quarter was a general orthopaedic research elective, which Kathryn Schabel and Mathew Halsey have taken over.

In the old curriculum, we had a full block of required anatomy in the fall. Students knew their anatomy pretty well by the time they started the MSK electives. In the new curriculum, anatomy is woven throughout the blocks. The students may be getting their first exposure to anatomy during our electives. We have revamped the fall MSK elective to cover basics such as terminology and skeletal anatomy. We also now have a dedicated block in the new curriculum that includes MSK content. Skin, Bone and Musculature is a 7 week block that begins in January that I codirect with Lynn Morrison of Dermatology. Many departmental faculty teach in this course. We recommend that students that have not had anatomy take the fall MSK elective to prepare for this block. About 40-50 first year medical students were enrolled in the fall quarter MSK elective.

To what extent has MSK education changed since you were a medical student?

There is more focus on MSK education now, it is a dedicated block in our curriculum and many medical schools have devoted time to it. MSK conditions have large impacts on mobility, disability and quality of life. An example of the need for better MSK education is the current opioid crisis, some of which can be attributed to the over prescription of opioids to treat MSK problems.

Primary care physicians face a substantial amount of musculoskeletal and orthopedic complaints in their day-to-day practice. How do you think medical education could be changed to better meet this need?

We are addressing these problems with better MSK training of medical students, such as our MSK electives and the Skin, Bone and Musculature block. OHSU is also allowing medical students to take electives earlier in their education. This allows additional exposure to MSK specialties, such as Rheumatology, Physical Medicine and Rehab, and Orthopedics to help with their decision making regarding career choice.

Continuing medical education also has a big role in teaching MSK skills. I am the Assistant Dean of Continuing Professional Development in the School of Medicine. We now teach a dedicated 2-day course on musculoskeletal primary care. Now in its 3rd year, it will be held at the Sentinel Hotel in Portland on June 15-16 and will provide 13.5 hours of continuing professional development. This year's focus will be on spinal conditions.

Dr. Herzka is leading a course for physical therapists at the end of the April that will be taught by many of our OHSU faculty. Our department began a traveling CME program, which has now expanded into 5 additional service lines: the Knight Cardiovascular Institute, Knight Cancer Institute, Neurosciences, Center for Women's Health, and Doernbecher Pediatrics. This program is an offering of different sessions and lectures that faculty members have signed up to give in community practices.

Many programs are shifting away from cadaver based dissection for anatomy courses. Do you feel that it is still possible to get sufficient anatomy training without hands on dissection?

Cadavers are very important for MSK medical education. However, given the new curriculum which allows students to get earlier clinical experiences, the introductory basic science courses have been shortened from 24 to 18 months. Anatomy training now involves prosection in addition to dissection so that students are able to cover a similar amount of material.

What role do you see simulation playing in medical student education?

We are using the simulation lab in the Skin, Bone and Musculature block. Dr. Friess runs a joint aspiration lab, which is a good opportunity for medical students to get a hands-on, active learning experience to understand joint aspiration indications and analysis as opposed to sitting in a lecture. We also have students practice clinical skills in the simulation lab, where they take a history and perform a physical exam on standardized patients, to prepare them for their preceptor experiences.

What changes do you see coming to MSK education in the future and how do you see the needs changing?

I think we will see more active learning, reverse classroom, and non-classroom learning in the future. There will be an emphasis on care teams and quality improvement, and more interprofessional education.

Musculoskeletal Ultrasound for Diagnosing and Treating Orthopaedic Injuries

By: Lizzie Lieberman, MD and Ryan Petering, MD

Since the year 2000, the use of ultrasound (US) for diagnosis and treatment of musculoskeletal injuries has dramatically increased.¹ This technology is rapidly expanding into clinics, emergency departments, and even on the sidelines at sporting events. I had the opportunity to discuss current applications and future directions of musculoskeletal US with Dr. Ryan Petering, a fellowship trained sports medicine physician who has been using ultrasound in his clinic for over seven years.

US can be used as a diagnostic as well as interventional tool. Examples of diagnostic applications currently used by Dr. Petering include assessment of rotator cuff and other tendons, diagnosis of carpal tunnel syndrome, and assessment of muscle strains, to name a few. He uses US for interventional purposes including guiding injections in difficult to reach areas such as the hip joint, SI joint, and tendon sheath. US is also used for treatments such as needling and PRP injections. When compared with using landmarks to guide peri-articular injections, using US guidance significantly improves accuracy.²

There are many advantages to using US compared with other imaging modalities. US is inexpensive relative to CT or MRI scans, it does not expose the patient to radiation, it can provide dynamic examination of tissues, and it can be portable. One of the main benefits is that it can be performed as a point-of-care diagnostic tool, providing immediate answers. US used in emergency departments has been shown to increase patient satisfaction and confidence in providers.^{3,4} According to Dr. Petering, “there is great reward for patients to see the screen while we are examining them. Most are able to follow

along”. Advances in technology have made US easier and more economical to use. This has resulted in increased research and publications supporting the use of US for point-of-care management of musculoskeletal injuries.

Not all tissues can be evaluated using US. Articular cartilage injuries, shoulder or hip labral tears, and meniscus injuries are not well identified using US. The diagnostic utility of US is also highly dependent on the skill and knowledge of the provider performing the study. Another variable is the quality of the equipment used. In some comparative studies with MRI, US has been shown to be less sensitive in the diagnosis of rotator cuff tears, especially partial-thickness tears. Other studies report no difference in outcomes, creating an ongoing debate in orthopaedic literature.⁵⁻⁷ Dr. Petering and his partners are currently investigating the concept of a combined point-of-care assessment, with the aim of identifying the ideal assessment of an injured shoulder by combining physical exam with specific ultrasound views to augment exam findings. We will likely be seeing a lot more investigation in this area as US grows in popularity.

Medical students and residents are receiving US training with increasing frequency. For providers already in practice, there are many CME courses available, including 2 national courses offered through the OHSU Sports Medicine department, which offer hands on cadaver practice sessions. For anyone interested in incorporating ultrasound into their practice, Dr. Petering recommends starting with a strong knowledge of anatomy and an orientation to the basics of how US works. He

recommends, “to master the machine and start to use US to guide clinical decisions, substantial practice hours are needed”.

The use and utility of US for musculoskeletal injuries is rapidly advancing. As indications for use expand and technology improves, US will likely continue to play a major role in the diagnosis and treatment of orthopaedic injuries. Keep an eye out for Dr. Petering and OHSU’s Sports Medicine program as this exciting field progresses.

For more information about musculoskeletal US, contact Dr. Ryan Petering at petering@ohsu.edu

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Annual Oregon Association of Orthopaedic Surgeons Conference

By: Karlee Lau, MD

The annual conference of the Oregon Association of Orthopaedic Surgeons (OAOS) drew 108 orthopaedists, residents and physician assistants to Salishan this year. A highlight of the conference was surprising John Tongue, M.D., with the first ever John Tongue Advocacy Award. Tim Keenen, M.D., presented John with the award and narrated a slide show of John's career and advocacy for the orthopaedic profession and patients. The John Tongue Advocacy Award will be presented in future years to other OAOS members who demonstrate commitment to advocacy.

Orthopaedic surgeons from around the country provided presentations on trauma, arthroplasty, extremity reconstruction, quality measures, tumors, and leadership. The conference received high praise for the quality of speakers and variety of topics and educational content, such as: 1) Battling the Opioid Crisis, Robert Orfaly, M.D., OMA President; 2) Freehand Navigation in Total Knee Arthroplasty by Kevin Garvin, M.D., University of Nebraska Medical Center; 3) Taking Stock of Large Clinical Trials: When the Results Run Contrary to our "Own", Erik Kubiak, M.D., University of Utah Health Care; and 4) Bundled Payments by AAOS Advocacy Chair, Thomas Barber, M.D.

The Oregon Legislature has convened a session that is expected to last at least five months. OAOS member, Dr. Knute Buehler, was re-elected to the Oregon House of Representatives, which is great news for orthopaedists and for the State. It will be especially good to have him in the Legislature this year with issues such as extended care

for patients at ambulatory surgery centers and balance billing.

Oregon Medical Association Update

By: Robert Orfaly, MD

The engineers at Ferrari have designed a vehicle which can accelerate from 0-60 mph in 3.5 seconds. However, if you put this car on a road choked with traffic and riddled with potholes, it will not get you to your destination any faster than an old, rusted pickup.

Why am I telling you this obvious fact? It is because it should be equally obvious that research has produced some wondrous technology to overcome many diseases. We are also very fortunate to have access to some of the best medical education in the world, leading to highly skilled physicians and other medical providers. However, the delivery systems in place are a critical component to determining whether patients in need of a particular treatment are identified and cared for in an appropriate and timely manner. Delivery systems could potentially be the most complex of the steps in providing care for a population and undoubtedly are the most expensive. This step goes well beyond issues of insurance coverage, though these have dominated discussion as of late. Everything from licensure to hospital mergers to electronic medical records have an effect.

As the current president of the Oregon Medical Association and member of the Board of Directors of the American Academy of Orthopaedic Surgeons, I see professional medical associations as critical players in ensuring that physicians enjoy a rewarding practice and our population receives the best possible health care. Despite the remarkable proliferation of information technology, medical associations have a key role in developing and vetting reliable educational material and bringing together physicians to

discuss new treatment strategies. They also often facilitate the research that has brought so many new techniques and devices to our profession. However, the aspect I would like to emphasize is the advocacy role our associations perform and break down the myths that prevent many physicians from becoming more involved.

For many among us, “committee” is a four letter word and this perception can be well grounded. We are used to action and making a tangible and positive difference for the patient in front of us. The board room by contrast lives up to its name – often boring, and separated from the practice we worked so hard to develop. As an orthopaedic surgeon, I certainly can relate to the need for action and to experience the satisfaction of making an often dramatic difference in a patient’s life. At the same time, as I reflect back on the 17 years of practice leading up to my current leadership roles, I can tell you that I have been in more committee meetings than I could possibly count. Looking into the future, I see even more.

So why would a physician become engaged in advocacy work? Exactly because it works a “different muscle” in one’s professional development and should be seen as a vital part of our commitment to the health of our population. It’s about working with a talented team of individuals, often so much bigger and more diverse than just the group sitting beside you, with the goal of making incremental changes that impact the lives of many. While it takes patience and long term vision, the payback can be enormous. In today’s world in which there is so much uncertainty regarding the direction health care may be taking, there is a reassurance

in knowing that there are dedicated physician led teams working to make the system better for all. We also see a world in which care coordination, research collaboration and a public health perspective are taking on increasing importance. Medical associations can play a key role in these areas as organizations not bound to a particular health system or practice.

When I look at the number of physicians reporting symptoms of burnout, I see the satisfaction of caring for patients blurred by ever mounting administrative and regulatory burdens and limitations in practice. Working towards positive change is, I believe, the antidote for these symptoms. The good news is that there are as many paths to follow as there are caring physicians. Efforts can be made at the national, state or local level, in the legislative area or within your own hospital system. In fact, it has been shown that creating a positive culture of collaboration at the workplace is more effective in producing physician engagement and preventing burnout than teaching coping strategies to individuals at risk. It is imperative that we work together and seek out other stakeholders to ensure the medical profession is healthy so that we may protect the health of others.

None of us have unlimited time or expertise in all areas relevant to medical practice. However, many of us have passions in advancing research, teaching the next generation of physicians, or improving care delivery systems. All of us have dedicated ourselves to caring for our patients. I encourage each of you to consider your passions in a holistic manner and to think about ways you can contribute to positive change to the bigger picture. You can then plot a course to effect this change in ways large or small. I believe that this is the core of advocacy and something that can energize us all.

New Faculty Spotlight:

A Q&A session with Lucas Anissian, MD, VA Orthopaedics

By: Nick Baksh, MD



Hometown: Stockholm, Sweden

Residency: Stockholm, Sweden

Fellowship: University of Chicago, Chicago, IL and Buffalo General Hospital, Buffalo, NY

What brought you to Portland?

Location and job opportunity

What is your favorite thing (or least favorite thing) about the Northwest?

Rain and Rain!

How has the transition to a new city and program been? Any unexpected challenges?

Overall the transition has gone smoothly and I feel very welcomed to the VA Portland and OHSU Orthopaedics.

What inspired you to go into total joints?

Hip and knee replacement surgeries usually have a very predictable outcome and improve a patient's quality of life dramatically. These are definitely inspiring factors that prompted me to elect adult reconstructive as a subspecialty.

Are there unique aspects of the VA that are of particular interest to you?

The educational objectives at the VA Orthopaedics are to provide educational opportunities for the residents, allowing them to broaden their experiences in adult reconstruction, sports, and oncology orthopaedics in the setting of a not too infrequent, complex medical history. Taking on challenging cases without concern

for the patient's insurance status, helping the veterans of our country, along with teaching and research opportunities are what interests me and I find unique and rewarding with the VA system.

What are your hobbies outside of work? Any hidden talents?

Spending quality time with my family, youth soccer coaching, cooking.

New Faculty Spotlight:

A Q&A session with Kenneth Gundle, MD, orthopaedic oncology surgeon at OHSU

By: Peters Otlans, MD



Hometown: Portland, OR

Residency: University of Washington, Harborview Medical Center

Fellowship: University of Toronto, Mt. Sinai Hospital

How has the first year of your practice gone?

The first few weeks I remember doing a fair bit of sitting around, completing computer training on both sides of the sky bridge, and being eager to really get going clinically. Suddenly then the flip switched, and I've been happily surprised by how fast everything ramped up. While to a person everyone has been incredibly supportive, I'm particularly indebted to my partners Dr Hayden and Dr Doung, who have really welcomed me and done so much to provide every opportunity for success.

How did you end up back in Portland? What's changed?

I feel extremely fortunate to have returned home after many years away. While it was something I hoped for, each day as I turn onto Terwilliger and wind my way up the Hill it still feels like a dream. I'm grateful to the Department for this opportunity.

Portland has certainly grown... I seem to remember being able to cruise downtown on 26 without traffic except on Blazer game nights - no more! But where I see the most change is the amazing expansion of the South Waterfront. OHSU has managed to keep its campus connected (via Ariel Tram, and yes I still have an original shirt from celebrating its opening) yet able to grow, which is an unparalleled infrastructure advantage for an urban academic medical center.

What steered you toward a career in Orthopaedic Oncology?

While in medical school I rotated on a musculoskeletal oncology service, and immediately it seemed like the right fit. That experience is what led me to orthopaedic residency, and while all my rotations were great, I kept being drawn to the tumor service. Among much good advice I've received, someone wise said that while of course surgeons love their OR days, if you pick a field where you enjoy clinic then life is good. Entering patients' lives at a difficult moment and partnering with a multidisciplinary sarcoma team is very meaningful, and due to routine surveillance we get to build longer term relationships with our patients. Perhaps most of all I love musculoskeletal anatomy, and the complex and sometimes outside-the-box surgical care to maximize oncologic and functional outcomes throughout the body poses ongoing intellectual challenges.

What are your research interests?

To date my greatest interest has been in rigorous clinical outcomes research, using new technologies to measure outcomes that matter most to patients, as well as big data approaches with advanced analytical techniques to answer questions that will impact clinical care. While I'm not a bench scientist, I also am looking forward to opportunities to collaborate on translational research. By next year's journal I'll have more to report.

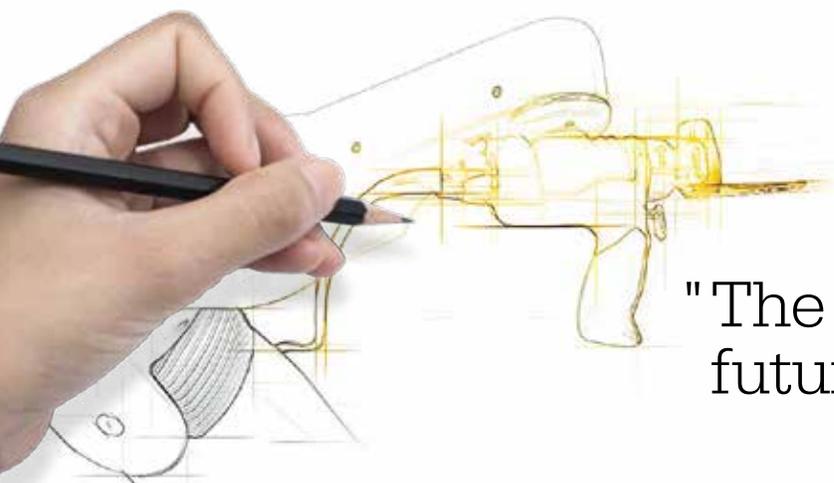
What do you like about working at the Portland VA?

I have a longstanding desire to serve the Veteran population going back to college, when I volunteered at a geropsychiatric ward for four years. In residency I rotated every year at

the VA hospital, and it was always among my favorite places - I'd like to help provide a similar experience for our residents. In addition to clinical care, the Portland VA also provides opportunities for research support that are otherwise quite rare for academic orthopaedic surgeons, and I plan to ultimately compete for national funding mechanisms.

What interests outside of medicine do you have?

Most important of course is getting to spend time with my amazing wife Megan and our son Robert. Megan and I both have family and friends throughout Oregon, which is fantastic (a welcome change from Toronto!). I also like vegetable gardening, making food from scratch like cheese and kimchi, and trying to keep up my Japanese.



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New Faculty Spotlight:

A Q&A session with Scott Yang, MD, pediatric orthopaedic medicine surgeon at OHSU

By: Elizabeth Lieberman, MD



Hometown: Los Angeles, CA
Residency: University of Virginia
Fellowship: Children's Hospital Los Angeles

What brought you to Portland?

The exciting opportunity to expand pediatric orthopaedic care at Doernbecher Children's Hospital. I don't have any family nearby in Portland though have always enjoyed new adventures and changes in life.

What is your favorite thing (or least favorite thing) about the Northwest?

My favorite aspect of the Northwest is its scenery. There is no shortage of beautiful sights in Oregon. My least favorite aspect so far is traffic that seems to move slower than Los Angeles' rush hour at times.

How has the transition from residency to faculty been? Any unexpected challenges?

The transition has been as expected for the most part. Residency and fellowship have prepared me well for the fundamentals, though I still take every day as a learning experience (hence it's called "practice"). My fellowship year was essentially an attending year where we performed independent cases and took call for kids in the large metro city of Los Angeles, which I am very thankful for now with regard to comfort level. The most challenging aspect is not so much the medical aspects of patient care, but having the patience to build a practice from the ground up after leaving a very high volume training center.

What inspired you to go into pediatric orthopaedics?

There wasn't one particular event or setting that inspired me. It was a culmination of what fit the best. I enjoy developing long term relationships. It is truly a privilege to be able to help someone from birth all the way until adulthood, and to have a lifelong impact on a person's health. A newborn infant with with hip dysplasia, for example, or congenital scoliosis will need continued care until they reach late adolescence / adulthood. I particularly enjoy the challenge that comes with variety as well. The specialty requires constant reading and curiosity due to the plethora of genetic conditions, and the tremendous variety of pathology. Pediatric orthopaedics is also one of the few remaining specialties in orthopaedics where a physician can provide comprehensive musculoskeletal care from neck to toe. Adult specialties often focus on a few anatomic regions.

What aspect of pediatric orthopedic surgery are you most interested in?

I particularly enjoy the pediatric spine (scoliosis, kyphosis, spinal deformity) and hip (dysplasia, scfe, perthes, deformity, trauma).

What are your goals for the pediatric orthopaedic service at OHSU?

Doernbecher has the proper machinery with multiple other pediatric subspecialists (ie: pediatric neurology, cardiology, pulmonology, intensive care, etc) to be able to collaboratively take the best care of any child with a pediatric orthopaedic condition from simple to the most complex. I would like to expand the pediatric orthopaedic service to be a very busy and respected center

across the state of Oregon that takes care of all pediatric orthopaedic conditions. I also seek to expand the pediatric spinal deformity practice with my current partners such that Doernbecher becomes the most experienced facility in Oregon and nearby Northwest for this. My goal for rotating residents is to have a solid fundamental way to think about pediatric orthopaedic conditions - because once you graduate the fundamentals / basic principles are the most important, as new techniques will always change. I have been improving the resident educational experience with developing a new pediatric indications conference and plan to assist in their academic development with research ideas.

What are your hobbies outside of work? Any hidden talents?

Since I had my daughter one year ago, it seems like the word hobbies doesn't even exist in the dictionary. My extracurricular activities change monthly. At the moment, they consist of picking up toys, playing hide and seek, and guarding the staircase. However, I still enjoy staying active and participating in occasional triathlons. I can cook a pretty decent pasta dish or cheesecake, but other than that I'm a pretty simple guy.



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1. Clatworthy, M. (2015). An Early Outcome Study of the ATTUNE® Knee System vs. the SIGMA® CR150 Knee System. DePuy Synthes Companies White Paper. DSUS/JRC/0814/0418. In an IRB approved early outcomes study, physiotherapists collected data on 40 patients implanted with ATTUNE Knees and 40 patients with SIGMA CR150 Knees. The results demonstrated that patients implanted with the ATTUNE Knee had statistically significant improvements in some early outcomes, other outcomes demonstrated a trend favoring the ATTUNE Knee, and some outcomes were equivalent.

2. Etter, K., Lerner, J., de Moor, C., Yoo, A., Kalsekar, I. (2016). PMD10-Comparative Effectiveness of ATTUNE® Versus Triathlon™ Total Knee Systems: Real-World Length of Stay and Discharge Status.™ Value in Health 19(3): A298.

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Adult Reconstruction

Delayed diagnosis of catastrophic ceramic liner failure with resultant pelvic discontinuity and massive metallosis. Winston BA; Kagan RP; Huff TW. *Arthroplasty Today* (in press).

With newer-generation ceramic components used in total hip arthroplasty, component fracture is a rare complication. However rare, when ceramic component fracture does occur, prompt identification and revision is necessary as delay can lead to dramatic failure with resultant metallosis as the extremely hard ceramic debris abrades remaining components.

We present a case of a 70-year-old woman with ceramic liner fracture and an estimated 10-year delay in intervention with failure resulting in pelvic discontinuity and massive metallosis with associated cutaneous manifestation. She was treated with a complex revision and reconstruction and is 2 years postrevision without major complication.

Orthopaedic Oncology

Is there a time delay to achieve stable compressive osseointegration fixation?

Kagan R; Opel D; Hiratzka S; Schulman C; Espana K; Laursen R; Hayden J; Doung Y-C. *Musculoskeletal Regeneration* (in press).

Compressive osseointegration fixation using the Compress® is an alternative to traditional intramedullary fixation for endoprosthetic reconstruction. The aims of this retrospective review are to evaluate if there is a time delay to achieve stable compressive osseointegration fixation using the Compress device, and to determine if anatomic location affected any time delay. Between 2006 and 2014, surgeons at one center treated 116 patients with 137 Compress® implants for lower extremity oncologic reconstruction, revision arthroplasty, and fracture nonunion or malunion. Patients were prescribed limited weight bearing for 6 weeks and we report on minimum of 2-year follow up (mean 4 years; range 2-9 years). Kaplan-Meier survival plots with 95% Hall-Wellner bands were produced; survivorship free from overall and aseptic failure at 2 months, 6 months, 1 year and 2 year time points was calculated along with 95% confidence intervals. Cox and extended cox models were used to examine the relationship between location and time with hazard of failure. Twenty-seven failures (including 6 aseptic failures) occurred among the

116 implants. No aseptic failures were observed prior to 2 months in any group, with the first aseptic failure occurring at 81 days. Cox proportional hazards modeling demonstrated differences in hazard ratio (HR) by location ($p=0.049$). The extended cox model demonstrated an increased hazard for the proximal tibia group relative to the proximal femur group ($HR=4.42$, $p=0.052$) for overall failure, along with a time dependent interaction ($p=0.008$), reflecting that the increased hazard for the proximal tibia group occurred at 4-6 months, with no failures after this point. We were unable to identify a clear temporality for aseptic failure and compressive osseointegration fixation in our patient series, and the 6-week post-operative time point showed no relationship with increased risk of failure. More research is necessary to understand the early stability of compressive osseointegration fixation and its ability to withstand physiologic loads, i.e. immediate weight-bearing, prior to biologic osseointegration.

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Pediatrics

An adaptive Bayesian Sequential Design for determining the subject-specific optimal treatment length. Chen Y; Chen Z; Gao L; Halsey MF; Lapidus J.

While Bayesian adaptive designs have been widely used to find the optimal dose to be used in patients, and to select the most effective treatment from several candidates, they are rarely used to determine the optimal duration of a treatment, for which the principle of selection is not much different from dose-finding or treatment-picking problems. In this study, we propose a Bayesian randomized adaptive sequential design for phase II clinical trials to determine the recommended treatment length for each patient. This design can be

widely applied to any treatment of which a prolonged duration would lead to potential serious harm while an insufficient length of duration would result in undesired treatment effect. Examples of such treatment include radiation chemotherapy for cancer patients, and the antibiotic therapies. As the optimal duration of a treatment can be subject-specific, we incorporate the covariates to the design consideration to come up with a more of personalized recommended optimal duration of treatment for each patient.

R shiny app for an Adaptive Bayesian Sequential Design: interactive onsite treatment assignments. Chen Z; Gao L; Halsey MF; Chen Y.

Nowadays, Adaptive Bayesian Sequential Design (ABSD) has been increasingly applied in various phase I and II clinical trials. The advantages of a ABSD includes more power in identifying the most effective treatment through dropping inferior arms early, and improved patient outcomes by adaptively allocating patients to allow a better chance of receiving superior treatment for enrolling patients. Many ABSDs have been proposed in literature, whereas much fewer has been implemented in the real world. One major obstacle of applying an ABSD is the difficulty of determining the adaptive allocation onsite. ABSD requires most updated patient results and covariates to estimate the posterior distribution of certain parameters. Additionally, ABSD is often very specific, requiring either the development of new statistic programming or the customization of an existing software in order to fit the new study. All of these make an onsite adaptive allocation a very challenging task without a 24/7 available statistician, or a

reliable software that can be easily used by a nurse or a physician who has no solid statistic training. In this study, we share our experience of developing an R Shiny interactive tool for a Bayesian randomized adaptive sequential design developed specifically for a phase II clinical trial to determine the recommended treatment length for children with displaced supracondylar humerus fracture. This design can be practically applied to any treatment of which a prolonged duration leads to potential serious harms whereas an insufficient length of duration results in under treatment. We illustrate how to integrate this novel ABSD and interactive web application seamlessly through R shiny. This practical tool allows user to implement the adaptive design for onsite adaptive allocation to find the optimal treatment length. Our study shows the implementation of ABSD can be easy and possible for real-world application. This is likely to substantially boost the adoption and impact of ABSD in the medical world.

Physical Medicine & Rehabilitation

Delayed onset brachial plexopathy due to hypertrophic clavicular callus - a case report and literature review. Carpenter BM; Pettersson DR; Mirarchi AJ; Groshong D; Carlson HL.

Clavicular fractures are common orthopaedic injuries which have traditionally been managed non-surgically and thought to heal without clinically significant sequelae. Rarely, healing clavicular fractures may develop hypertrophic callus formation that compresses the brachial plexus. These cases may present months to years after initial injury with varying degrees of pain, paresthesia and weakness on the affected side, and are usually treated by surgical resection of the hypertrophic callus. We present a case of a patient with brachial plexopathy due to hypertrophic clavicular callus causing weakness and paresthesia. The plexopathy was confirmed with imaging and electrodiagnostic studies. This case was unusual in that resolution of symptoms was achieved non-surgically. A review of the literature demonstrated 36 previously reported cases, in addition to the case reported here, of delayed brachial plexopathy caused by hypertrophic callus formation. Electrodiagnostic testing was described in 13 of the 37 cases, with the majority of these demonstrating some degree of brachial plexopathy. One previous case was treated non-surgically with resolution of symptoms. All other cases of plexopathy were eventually treated surgically, with patients achieving symptom resolution in 32 out of 35 surgical cases. Surgery was largely successful even in patients who received initial conservative treatment and underwent later surgical correction. These results suggest that for patients with stable symptoms resulting from a hypertrophic clavicular callus, it may be reasonable to begin with conservative therapy before proceeding to surgery.

Research / Basic Science

Reoxygenation enhances tumour necrosis factor alpha-induced degradation of the extracellular matrix produced by chondrogenic cells. Markway BD; Cho H; Anderson DE; Holden P; Ravi V; Little CB; Johnstone B. *Europ Cells and Materials* (2016) Vol 31; 425-439.

Mesenchymal stem cells (MSCs) have been considered as a potential source for cell-based therapies in arthritic diseases for both their chondrogenic and anti-inflammatory properties. Thus, we examined how MSC-based neocartilage responds to tumour necrosis factor alpha (TNF- α) compared to articular chondrocyte (AC)-based neocartilage. Since oxygen tension is altered in arthritic joints, we also examined how increased oxygen tension influences this process. Monolayer-expanded healthy human ACs and bone marrow MSCs were cultured in chondrogenic medium in three-dimensional culture under hypoxia. They were then exposed to TNF- α under hypoxic or increased oxygen tension. We found no inherent anti-inflammatory advantage of MSC-derived neocartilage as it pertains to the enzymes studied here: more degradative enzymes were upregulated by TNF- α in MSCs than in ACs, regardless of the oxygen tension. MSCs were also more sensitive to reoxygenation during TNF- α exposure, as indicated by increased proteoglycan loss, increased aggrecanase-generated metabolites, and further upregulation of the major aggrecanases, ADAMTS4 and ADAMTS5. There was also evidence of matrix metalloproteinase (MMP)-mediated aggrecan interglobular domain cleavage and type II collagen loss in response to TNF- α in both MSCs and ACs, but more MMPs were further upregulated by reoxygenation in MSCs than in ACs. Our study provides further evidence that consideration of oxygen tension is essential for studying cartilage degradation; for example, neocartilage produced from MSCs may be more sensitive to the negative effects of repeated hypoxia/reoxygenation events than

AC-derived neocartilage. Consideration of the differences in responses may be important for cell-based therapies and selection of adjunctive chondroprotective agents.

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Lower urinary tract symptoms and risk of nonspine fractures among older community dwelling U.S. men. Marshall LM; Lapidus JA; Wiedrick J; Barrett-Connor E; Bauer DC; Orwoll ES; Parsons JK; for the Osteoporotic Fractures in Men (MrOS) Research Group. *J Urology* (2016) 196:166-172.

PURPOSE

Among older men, moderate and severe lower urinary tract symptoms are associated with increased fall risk compared to mild lower urinary tract symptoms. Falls are a major risk factor for fractures. Therefore, we assessed associations of lower urinary tract symptoms with fracture risk in community dwelling U.S. men age 65 years or older.

MATERIALS AND METHODS

We conducted a prospective study in the MrOS (Osteoporotic Fractures in Men Study) cohort. Men were enrolled at 6 U.S. sites. The AUA-SI, lower urinary tract symptoms medication use, fracture risk factors and potential confounders were recorded at baseline and every 2 years thereafter for 4 assessments. Lower urinary tract symptom severity was categorized from the AUA-SI as mild (0 to 7 points), moderate (8 to 19 points) or severe (20 or more points). Associations of lower urinary tract symptom severity with fracture rate were estimated with HRs and 95% CIs from extended proportional hazards regression.

RESULTS

Among 5,989 men with baseline AUA-SI score and hip bone mineral density measures, 745 incident nonspine fractures occurred during 43,807 person-years of followup. In a multivariable model adjusted for age, enrollment site, baseline hip bone mineral density, falls in the last year and prevalent fracture before baseline, there were no significant associations of moderate (HR 0.9, 95% CI 0.8e1.1) or severe (HR 1.0, 95% CI 0.8e1.3) lower urinary tract symptoms with fracture risk. None of the

individual lower urinary tract symptoms assessed on the AUA-SI, including nocturia and urgency, was associated with increased fracture risk.

CONCLUSIONS

In this cohort of older U.S. men, lower urinary tract symptoms were not independently associated with fracture risk.

A prospective study of back pain and risk of falls among older community-dwelling men. Marshall LM; Litwack-Harrison S; Makris UE; Kado DM; Cawthon PM; Deyo RA; Carlson NL; Nevitt MC; for the Osteoporotic Fractures in Men Study (MrOS) Research Group. *J Gerontology: Med Sciences* (2016) [Epub ahead of print].

BACKGROUND

Musculoskeletal pain is associated with increased fall risk among older men. However, the association of back pain, the most prevalent type of pain in this population, and fall risk is unknown.

METHODS

We conducted a prospective investigation among 5,568 community-dwelling U.S. men at least 65 years of age from the Osteoporotic Fractures in Men Study (MrOS). Baseline questionnaires inquired about back pain and its location (such as low back), severity, and frequency in the past year. During 1 year of follow-up, falls were summed from self-reports obtained every 4 months. Outcomes were recurrent falls (≥ 2 falls) and any fall (≥ 1 fall). Associations of back pain and fall risk were estimated with risk ratios (RRs) and 95% confidence intervals (CIs) from multivariable log-binomial regression models adjusted for age, dizziness, arthritis, knee pain, urinary symptoms, self-rated health, central nervous system medication use, and instrumental activities of daily living.

RESULTS

Most (67%) reported any back pain in the past year. During follow-up, 11% had recurrent falls and 25% fell at least once. Compared with no back pain, any back pain was associated with elevated recurrent fall risk (multivariable RR = 1.3, 95% CI: 1.1, 1.5). Multivariable RRs for 1, 2, and 3+ back pain locations were, respectively, 1.2 (95% CI: 1.0, 1.5), 1.4 (1.1, 1.8), and 1.7 (95% CI: 1.3, 2.2). RRs were also elevated for back pain severity and frequency. Back pain was also associated with risk of any fall.

CONCLUSIONS

Among older men, back pain is independently associated with increased fall risk.

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Spine

Selecting caudal fusion levels: 2 year functional and stiffness outcomes with matched pairs analysis in multilevel fusion to L5 versus S1. Daniels AH; Koller H; Hiratzka SL; Mayer M; Meier O; Contag AG; Eltorai AEM; Hiratzka J; Hamilton DK; Shaffrey CI; Smith JS; Bess S; Klineberg EO; Ames CP; Lafage V; Line B; Schwab FJ; Hart RA; International Spine Study Group. *European Spine J* 2016 Sep 27 [Epub ahead of print].

PURPOSE

Controversy persists as to whether to end multilevel thoracolumbar fusions caudally at L5 or S1. Some argue that stopping at L5 may preserve greater function, but there are few data comparing functional limitations due to lumbar stiffness in patients with fusion to L5 versus S1. The aim of this study was to evaluate whether patients undergoing multilevel thoracolumbar fusions with an L5 caudal endpoint have a better lumbosacral function than patients with an S1 caudal endpoint.

METHODS

Patients undergoing successful thoracolumbar fusion of 5 or more levels to L5 or S1, with solid fusion at 2 year follow-up, were examined from a single European center in addition to a multi-center North American database of 237 patients. In total, 40 patients with a distal stopping point of L5 were matched with a subset of 40 patients with a distal endpoint of S1 ± pelvic fixation. The L5 and S1 groups were matched for the final Oswestry Disability Index (ODI), Sagittal Vertical Axis (SVA C7- S1), number of fusion levels, and age. Impacts of lumbar stiffness on function as measured by the Lumbar Stiffness Disability Index (LSDI) were compared using the conditional logistic regression.

RESULTS

After matching, there was no significant difference between the S1 and L5 groups for the final ODI (29.22 ± 21.6 for S1 versus 29.21

± 21.7 for L5; $p = 0.98$), SVA (29.5 ± 40.3 mm for S1 versus 33.7 ± 37.1 mm for L5; $p = 0.97$), mean age (61.6 ± 11.0 years for S1 versus 58.3 ± 12.6 years for L5; $p = 0.23$), and number of fusion levels (9.7 ± 3.3 levels for S1 versus 9.0 ± 3 levels for L5; $p = 0.34$). The final 2-year postoperative LSDI scores were not significantly different between the S1 group (28.08 ± 21.47) and L5 group (29.21 ± 21.66) (hazard ratio 0.99, 95 % CI 0.97–1.03, $p = 0.81$).

CONCLUSION

The analysis of patients with multilevel thoracolumbar fusions demonstrated that after minimum 2 year follow-up, self-reported functional impacts of lumbar stiffness were not significantly different between the patients with distal endpoints of L5 versus S1. The choice of distal fusion level of L5 does not appear to retain sufficient spinal flexibility to substantially affect postoperative function.

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Failure to launch: what the rejection of lumbar total disk replacement tells us about American spine surgery. Hart RA; DePasse JM; Daniels AH. *Clin Spine Surg* 2016 Jul 11 [Epub ahead of print].

STUDY DESIGN

Spine surgeon survey.

OBJECTIVE

The objective was to investigate the failure of widespread adoption of lumbar total disk replacement (L-TDR) in the United States.

SUMMARY OF BACKGROUND DATA

L-TDR has been available for use in the United States since 2005. L-TDR has not gained wide acceptance as a treatment for degenerative disk disease despite substantial investments in product development and positive results in randomized controlled trials.

METHODS

Estimates of the number of L-TDR procedures performed in the United States from 2005 to 2010 were calculated using the Nationwide Inpatient Sample database. Insurance policies were assessed for L-TDR coverage through Internet search. Finally, an 18-question survey regarding surgeons' opinions toward L-TDR was distributed to the members of North American Spine Society.

RESULTS

The estimated number of primary L-TDR procedures performed in the United States decreased from 3650 in 2005 to 1863 in 2010, whereas revision L-TDR procedures increased from 420 to 499. Of 14 major insurers, 11 (78.6%) do not cover L-TDR. In total, 613 spine surgeons responded to the survey. Over half of respondents (51.1%, 313/612) have performed L-TDR, although only 44.6% (136/305) of initial adopters currently perform the surgery. However, 81.5% (106/130) of those currently

performing L-TDR have been satisfied with the results. When asked about their perceptions of L-TDR, 65.0% (367/565) indicated a lack of insurance coverage for L-TDR in their region, 54.9% (310/565) worry about long-term complications, and 52.7% (298/565) worry about the technical challenges of revision.

CONCLUSIONS

Despite early enthusiasm for L-TDR, wide adoption has not occurred. A primary reason for this failure seems to be a lack of insurance coverage, despite intermediate-term clinical success. In addition, surgeons continue to express concerns regarding long-term outcomes and the technical difficulties of revision. This case study of a failed surgical innovation may signal increasing involvement of payers in clinical decision-making and may be instructive to surgeons, policymakers, and manufacturers.

Incidence of non-fracture pathology in osteoporotic vertebral compression fractures during kyphoplasty. Kim J; Blaty D; Yakel S; Lewis T.

We carried out a retrospective study to examine the incidence of non-fracture related pathology when performing biopsies during balloon kyphoplasty for presumed benign osteoporotic vertebral compression fractures. Our secondary purpose was to evaluate subjective pain improvement at the fracture site at follow-up. Electronic medical records of 264 consecutive patients who were diagnosed with presumed osteoporotic vertebral compression fractures were reviewed. 243 patients with biopsy results following single or multi-level balloon kyphoplasty were analyzed to obtain the incidence of non-fracture pathology. 251 patients had available follow-up information to evaluate subjective pain improvement at the fracture site. Of the 243 patients, 11 patients (4.5%) had non-fracture pathology and 232 patients (95.5%) had fracture pathologies. 299 total levels were available for analysis and 14 levels (4.7%) had non-fracture pathologies while 285 levels (95.3%) had fracture pathologies. 225 patients (89.6%) reported improvement in pain symptoms. 26 patients (10.4%) did not report improvement in pain symptoms.

Sports Medicine

Arthroscopic mechanical chondroplasty of the knee is beneficial for treatment of focal cartilage lesions in the absence of concurrent pathology. Anderson DE; Rose MB; Wille AJ; Wiedrick J; Crawford DC. *Orthopaedic Journal of Sports Medicine* (in press).

BACKGROUND

Articular cartilage lacks ability for intrinsic repair following acute injury, and focal articular cartilage lesions cause significant morbidity worldwide. Arthroscopic debridement (chondroplasty) represents the majority of cartilage procedures of the knee; however, limited data exists regarding outcomes following chondroplasty performed in isolation of concurrent procedures or not as a primary treatment for osteoarthritis.

HYPOTHESIS

Arthroscopic mechanical chondroplasty is beneficial for patients with a focal cartilage lesion of the knee in the absence of meniscal pathology or osteoarthritis.

STUDY DESIGN

Case Series.

METHODS

Potential subjects were identified by querying billing data from a 3-year period in a single surgeon practice, and eligible subjects were verified to meet inclusion criteria through electronic medical record review. Osteoarthritis was quantified through Kellgren-Lawrence (KL) scoring. Subjective patient reported outcomes (PROs), including IKDC, KOOS, WOMAC, Tegner, Lysholm, and VR-12, were collected pre-operatively and at follow-up intervals. International Cartilage Repair Society (ICRS) grade and lesion size were determined at arthroscopy. Linear regression was used to determine the effect of baseline score on final follow-up score. Correlated regression

equations were used to assess the relationship of covariates and change in PRO scores.

RESULTS

Fifty-three of 86 (62%) eligible subjects completed post-operative questionnaires at an average of 31.5 months (range 11.5-57). Average age was 37.3 ± 9.7 , average BMI was 27.7 ± 5.6 , and 33 (62%) were women. Average treated lesion size was 3.3 ± 1.9 cm², 36 (68%) were ICRS grade 2 or 3, and 42 (79%) had a KL score of 0-2. On average, the cohort demonstrated significant improvement from baseline for almost all PRO scores. Regression analysis of change in score versus baseline indicated subjects with lower pre-operative scores gained more benefit from chondroplasty. Correlated regression equations showed KL score > 0 and male sex had a consistent positive effect on change in PRO scores, high ICRS grade had a consistent negative effect, and lesion size, age, and obesity had no effect. Eight subjects (15%) required further surgical intervention within the follow-up period.

CONCLUSION

The clinical efficacy of chondroplasty for repair of focal cartilage defects of the knee has not been studied in isolation from concurrent orthopaedic procedures. Our data shows that arthroscopic mechanical chondroplasty is beneficial to subjects, and response to surgical intervention is correlated to baseline PRO scores, sex, ICRS grade, and KL score.

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Magnetic resonance imaging characterization and clinical outcomes after Neocart surgical therapy as a primary reparative treatment for knee cartilage injuries. Anderson DE; Williams RJ III; DeBerardino TM; Taylor DC; Ma B; Kane MS; Crawford DC. *American Journal of Sports Medicine* [Epub ahead of print].

BACKGROUND

Autologous cartilage tissue implants, including the NeoCart implant, are intended to repair focal articular cartilage lesions. Short-term results from United States Food and Drug Administration (FDA) phase I and phase II clinical trials indicated that the NeoCart implant was safe when surgically applied as a cell-based therapy and efficacious compared with microfracture.

HYPOTHESIS

Quantitative magnetic resonance imaging (MRI) analysis would reveal NeoCart tissue maturation through to 60-month follow-up.

STUDY DESIGN

Case series; Level of evidence, 4.

METHODS

Patients with symptomatic full-thickness cartilage lesions of the distal femoral condyle were treated with NeoCart in FDA clinical trials. Safety and efficacy were evaluated prospectively by MRI and clinical patient-reported outcomes (PROs) through to 60-month follow-up. Qualitative MRI metrics were quantified according to modified MOCART (magnetic resonance observation of cartilage repair tissue) criteria, with an independent evaluation of repair tissue signal intensity. Subjective PROs and objective range of motion (ROM) were obtained at baseline and through to 60 months.

RESULTS

Twenty-nine patients treated with NeoCart were observed over a mean of 52.0 ± 15.5 months (median, 60 months). MOCART analyses indicated significant improvement ($P < 0.001$) in cartilage quality from 3 to 24 months, with stabilization from 24 to 60 months. Signal intensity of the repair tissue evolved from hyperintense at early follow-up to isointense after 6 months and to hypointense after 24 months. The temporal progression toward hypointense T2 signals

at later time points observed here indicated a further reorganization of the repair tissue toward a dense tissue that was less similar to the surrounding native tissue. However, 80% of patients showed evidence of subchondral bone changes on MRI at all time points; 4 patients (14%) showed no improvement of MRI criteria. Compared with baseline values, significant improvement ($P < 0.001$) was seen in PROs (mean [\pm SD] baseline to mean [\pm SD] final follow-up), including the International Knee Documentation Committee score (47.9 ± 17.4 to 75.5 ± 22.1), physical component summary of the Short Form-36 (40.5 ± 7.2 to 51.4 ± 8.1), and all 5 domains of the Knee injury and Osteoarthritis Outcome Score (Pain: 64.8 ± 12.1 to 86.1 ± 17.3 ; Activities of Daily Living: 75.5 ± 14.8 to 91.6 ± 13.8 ; Quality of Life: 28.6 ± 15.5 to 69.4 ± 28.0 ; Symptoms: 65.8 ± 13.8 to 86.6 ± 13.4 ; Sports and Recreation: 41.4 ± 24.3 to 72.4 ± 28.8). Significant ($P < 0.0001$) decreases from baseline scores for the visual analog scale for pain (34.6 ± 22.5) were seen by 6 months and sustained at final follow-up (14.3 ± 18.4). ROM significantly ($P < 0.0001$) improved from baseline ($131.5^\circ \pm 7.9^\circ$) to final follow-up ($140.7^\circ \pm 6.3^\circ$).

CONCLUSION

Longitudinal MRI analysis demonstrated that NeoCart-based repair tissue is durable and evolves over time. For a majority of patients, this progression trended from an initial hyperintense signal to a hypointense signal at later follow-ups. Changes in radiographic measures over time corresponded with improvement in clinical measures, with maximum benefits experienced at 24-month follow-up. Similarly, clinical efficacy for the total cohort, determined by clinical outcome scores, reached a maximum at 24 months without decline to 60 months. Results from safety and exploratory clinical trials indicate that NeoCart is a safe and effective treatment for articular cartilage lesions through to 5-year follow-up.

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Wearable inertial sensors allow for quantitative assessment of arthroscopic skill in a cadaveric knee model. Rose M; Curtze C; O'Sullivan J; El-Gohary M; Crawford D; Friess D; Munch J.

PURPOSE

Surgical simulation is an increasing part of Orthopaedic resident education. We developed a novel model using wearable inertial sensors to assess performance of Orthopaedic residents while performing a diagnostic knee arthroscopy.

METHODS

Fourteen subjects performed a diagnostic scope on a cadaveric right knee. Participants were divided into novices, intermediates, and experts based upon experience. Arm movement data were collected using inertial measurement units (Opal™ Sensors, APDM® Portland, Oregon).

RESULTS

For both the right and left upper extremity, skill level corresponded well with shoulder adduction-abduction and elbow pronosupination. Novices required an increased range of motion compared to intermediates and experts to complete the procedure. Histogram data showed novices had markedly more variability in left and right shoulder abduction/adduction compared to the other groups.

CONCLUSIONS

Our data show wearable inertial sensors can measure joint kinematics during diagnostic knee arthroscopy. Motion pattern-based analysis shows promise as a metric of resident skill acquisition and development in arthroscopy.

Posterior humeral circumflex artery aneurysms in two collegiate pitchers. Scrivens B; Redinger D; Aukerman D; Vela L.

INTRODUCTION

Upper extremity athletes including baseball and volleyball players place extreme physiologic stress on their anatomy. While vascular injuries are rare, they have been reported in instances of thoracic outlet syndrome and cases of Paget-Schroetter syndrome. Injuries to the axillary artery and its branches are less commonly described, specifically the development of aneurysms and subsequent thromboemboli. We report on two collegiate baseball pitchers who developed posterior humeral circumflex artery aneurysms.

METHODS

The two patients underwent vascular procedures to ligate and excise the aneurysms with one requiring repair of the axillary artery.

RESULTS

At 9 months both players had returned to full activity including pitching from the mound.

DISCUSSION

Posterior humeral circumflex artery aneurysms remain rare injuries in upper extremity athletes. The occurrence of similar pathology in two collegiate pitchers raises questions for screening and appropriate early diagnosis/treatment. It is apparent that a high index of suspicion is paramount to proper management, followed by appropriate imaging and expeditious definitive treatment.

The utility of obtaining post-mobilization imaging in non-operative pelvic injuries.

Winston BA; Gehling P; Sarker M; Eagleton C; Friess D.

PURPOSE

Pelvic fractures represent a wide spectrum of injury severity from high-energy, unstable fracture patterns with a high rate of morbidity and mortality to low energy, stable patterns that require minimal – if any – intervention. Determining where along this spectrum a patient's injury pattern lies defines the appropriate treatment regimen as a missed unstable injury can be catastrophic. As one method to determine treatment for likely stable fracture patterns, post-mobilization films (AP, inlet and outlet views) are obtained to assess for occult instability unidentified at the time of presentation. The purpose of this study was to investigate the utility of routinely obtaining these post-mobilization films by examining whether or not it alters treatment recommendations.

METHODS

Records at our single institution from January 2007 through December 2014 were retrospectively reviewed with IRB approval as identified by CPT and ICD-9 codes for pelvic and acetabular fractures. Of the 1057 unique records identified, 655 of these were treated operatively based on their evaluation and imaging at the time of presentation and 402 were planned for non-operative treatment. Basic demographic data for all 1057 patients were collected including patient's age, gender, injury mechanism and trauma activation status. For the 402 patients with a non-operative treatment plan at presentation, a detailed chart review was performed to record treatment recommendations and identify those patients that had post-mobilization imaging obtained.

Further review of those select patients to identify if there was a change in treatment recommendations after the post-mobilization imaging was completed.

RESULTS

Of the 1057 patients identified, the average age was 50 years (\pm 20 years) with age range from 18 to 103. 61% were male, 39% were female. The most prevalent mechanism of injury was motor vehicle crash (40%) and the next most prevalent mechanism was fall from height (21%). 50% of the patients presented as trauma activations. Of the 402 patients planned for non-operative treatment at presentation, 192 (48%) had post-mobilization films completed. For 3 of these 192 patients a change in plan was instituted and the patient underwent surgical stabilization for their pelvic injury after the post-mobilization films were completed. Importantly, in all 3 of these cases the post-mobilization films were read as minimal or no displacement and in each case the chart notes specifically indicated that the decision to proceed to operative intervention was based on the patient's complaint of pain with attempted mobilization and not based on the imaging.

CONCLUSIONS

Routinely obtaining post-mobilization imaging for patients with pelvic injuries that have a low likelihood for instability is not necessary. Eliminating this step would result in lower cost and decreased patient exposure to radiation. Instead, orthopedic surgeons should base the need for further diagnostic imaging on clinical scenario.

Cost-benefit analysis of syndesmotic screw versus suture-button fixation in tibiofibular syndesmotic injuries. Ramsey DC; Friess DM.

OBJECTIVES

To evaluate the cost-effectiveness of suture buttons in syndesmosis repair.

METHODS

A decision-tree model was constructed to describe outcomes after syndesmosis repair using suture buttons and standard syndesmosis screws. Outcomes were uneventful healing, removal of symptomatic implants, osteomyelitis requiring debridement, and persistent diastasis requiring revision. Weighted literature averages were used to estimate variables to define a baseline model. Outcomes were measured in quality-adjusted life years (QALYs). Procedure and implant costs were derived from Medicare reimbursement rates and the University Health System Consortium (HSC), respectively. An incremental cost-effectiveness ratio (ICER) threshold of \$50,000 per QALY was used to evaluate cost-effectiveness.

RESULTS

Suture buttons were not cost-effective at a price of \$850 (the median price per the HSC), though it was at \$792. With all other variables held constant (including suture button price of \$850), if the removal rate of symptomatic screws is less than 8% more than the same rate for suture buttons, then the former is more cost-effective. Sensitivity analysis showed that the model is exquisitely sensitive to small perturbations in reoperation rates.

CONCLUSIONS

Moving away from the practice of routinely removing all screws has changed the cost dynamics of the screw versus suture button question for syndesmosis repair. Suture buttons are cost-effective in patient groups in which screw removal is expected to be above a certain calculable threshold. However, there remain patient populations for which almost no suture button price significantly higher than the price of screws are cost-effective.

Comparison of fluoroscopic techniques for assessment of femoral rotational alignment. Lieberman EG; Jansen K; Mast L; Brady JM; Yoo BJ.

INTRODUCTION

Anatomic rotational reduction of diaphyseal femur fractures is essential in restoring limb mechanics. Many techniques for assessing intraoperative control of rotation require the surgeon to reproduce anteroposterior (AP) or lateral knee reference radiographs of the uninjured contralateral limb. Errors in this technique could result in inaccuracies during rotational reduction. We examined whether fluoroscopic rotational variation can be observed with the same degree of precision with AP and lateral distal femur projections.

METHODS

AP and lateral radiographs were obtained from intact knees of seven cadaveric specimens using fluoroscopic image intensification. Images in increments of 2 degrees of rotation up to +/- 16 degrees from neutral on the AP view and up to +/- 10 degrees from neutral on the lateral view were obtained; these were then analyzed by three reviewers. The lateral condylar width and coronal femoral width from the AP images and the

posterior condylar offset and sagittal femoral width from the lateral images were measured. Interclass correlation coefficients among the three reviewers were calculated. The mean data from all reviewers was plotted against degree of rotation, and the slope (M) and regression (R) of the line determined.

RESULTS

The ICC was 0.997 (lateral) and 0.994 (AP), demonstrating excellent interobserver agreement. The mean (\pm SD) M value for lateral images was 0.016 ± 0.001 and for AP images was 0.0091 ± 0.0007 . The higher M value for the lateral images represents a more appreciable difference in size of the measured segment for the same rotational change.

DISCUSSION AND CONCLUSION

The observed change with rotation was 1.76 times greater on lateral images compared to AP images; thus, the lateral images may be more precise as a reference for rotation. The routine use of lateral knee radiographs to guide intraoperative rotational alignment of the femur may therefore be justified.



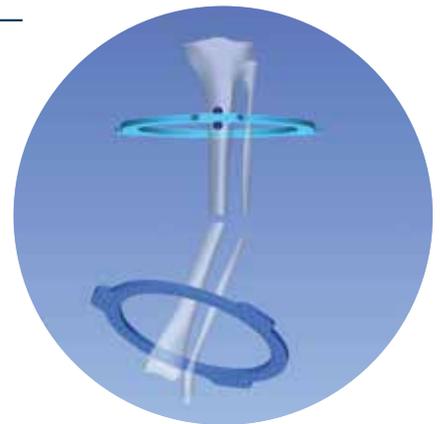
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Upper Extremity

Multiple cultures and extended incubation for upper extremity revision arthroplasty impact clinical care: a cohort study. DeHaan A; Mahylis JM; Domont ZB; Orfaly RM; Barnes P; Mirarchi AJ.

Skin flora organisms (SFOs; Coagulase negative Staphylococcus, Corynebacteria species and Propionibacteria) isolated from 1-2 tissue samples during shoulder and elbow revision arthroplasty are difficult to distinguish as contamination or infection. We examined the change in microbiological diagnosis and resultant antibiotic treatment when the number of intra-operative samples held for 10-day incubation was increased to a minimum of 5.

The patient cohort was collected over a 26-month period. No patients received antibiotics within 1 month of revision surgery. Infection was defined as ≥ 3 cultures growing the same SFO, or any 1 culture growing any other virulent organism (VO). SFOs growing in 1-2 samples were defined as skin flora contaminant. Potentially missed VOs were cases where the VO grew in fewer than 100% of the samples taken, when compared to traditional culture techniques. All patients had >1 year follow-up from their index revision arthroplasty.

Forty cases (33 patients) fulfilled the inclusion criteria: 50% of these were culture negative, and 35% grew Propionibacteria. When compared to the standard of obtaining 1 sample, this protocol altered the microbiological diagnosis and subsequent antibiotic treatment in 45% of cases (95% Confidence Interval (CI) 29-62%). Additionally, this protocol had a predictive value of joint sterility in 95% of culture negative cases (95% CI 74-99%).

The addition of 5 or more samples held for 10-day incubation reliably differentiated between

joint infection, contamination, and sterility, which changed the course of care in 45% of surgical cases.

OHSU Chief Residents



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Hometown: Gallup, NM

Medical School: University of New Mexico

Fellowship plans: Adult Reconstruction - Scripps Health, San Diego, CA



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Medical School:
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Fellowship Plans:
Hand and Upper
Extremity



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Medical School:
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Washington School
of Medicine

Orthopaedic Surgery Residents

PGY-5 Class



Ryan Callahan, DO



Craig Gillis, DO



Andrew Nelson, DO

PGY-4 Class



Douglas Blaty, DO



Jun Kim, DO



Stefan Yakel, DO

PGY-3 Class



Tim Degan, DO



Brian Scrivens, DO



Heidi Smith, DO

Faculty and Resident Directory 2016-2017

Samaritan Health Services Residents

PGY-2 Class



Erick Krohn, DO



Jennifer Sharp, DO



Mark Williams, DO

PGY-1 Class



Justin Brohard, DO



Shaun Conley, DO



Justin Than, DO

Where are They Now?



ZACHARY DOMONT, MD

I completed my medical school training at Northwestern University followed by an intern year at Loyola University in Chicago and my orthopaedic surgery residency at OHSU. Following residency, I completed a fellowship in adult & pediatric sports medicine at the University of Pennsylvania and the Children's Hospital of Philadelphia.

After graduating from my fellowship, I returned to my hometown of Chicago and have been in practice in the northern suburb of Lincolnshire with the Advocate Medical Group for nearly a year and a half. I specialize in Sports Medicine with my entire practice being composed of sports injuries. I have a special focus and interest in pediatric sports injuries (growth-plate sparing), cartilage restoration, and complex knee reconstruction using meniscal allograft transplants and osteotomies. I also treat the entire spectrum of shoulder and hip injuries with arthroscopic techniques.

My wife, Ivy, and I have a two year old son named Beck and are expecting our second baby boy in May. We tremendously miss living in the Pacific Northwest and are waiting for any chance we can find in the near future to return. The closest thing we have to a ski resort or wine country an hour away is a landfill, but I do still enjoy (travelling for) skiing whenever I have the chance.

I would like to express my deepest and sincerest gratitude to all of the amazing teachers and surgeons who instilled their knowledge in me during my training at OHSU. I would not be who I am today without you. I hope I can make you proud. And to my co-residents, Kevin, Rich, Brent, and Trevor, I could not have asked to spend every long day of training with a better group of guys.

Update: Theo Ike Domont was born on 5/4/2017! All are doing well.

Where are They Now?



KEVIN KO, MD

After finishing my time at OHSU, I did a yearlong fellowship in Shoulder & Elbow surgery at the Rothman Institute in Philadelphia, PA. I was able to train at the highest volume shoulder hospital in the country and was fortunate to work with mentors like Surena Namdari, Charlie Getz, Joseph Abboud, Mark Lazarus, Mathew Ramsey, and current AAOS President, Gerald Williams. Along with the great training I received at OHSU, I felt more than prepared to enter practice.

I currently work at Orthopedic Physician Associates at the Swedish Orthopedic Institute in downtown Seattle, WA with a specialty practice focusing on shoulder & elbow surgery. I feel fortunate to have found a position with a bunch of well-respected and supportive partners and in a group that is large enough to focus my practice in my particular area of interest. I am a year and half into my practice now and I still regularly

think back to the basics that I learned during my time at OHSU. I have been back to OHSU to participate in the arthroscopy lab and hope that in this small way I can continue to support future residents the same way that I felt supported during my time there.

My wife, Laura Matsen Ko (and fellow OHSU alum) and I have enjoyed growing our practice and family in Seattle. We currently have a one-year-old boy, Logan, who occupies most of our time outside of work. We have enjoyed getting him out to show him the best of what the Pacific Northwest has to offer and feel fortunate to have many friends and family nearby.

Where are They Now?



RICHARD MYERS, MD

After graduation, we packed our family up and moved back east where I completed fellowship at the R Adams Cowley Shock Trauma Center. It was an incredible year of training, where I gained the skills and confidence to handle anything that could possibly come through the ER or trauma bay. We also had the unique experience of living in the city during the Baltimore Riots, a far cry from our home in SW PDX during residency!

We settled on a unique trauma job in the Tidewater area of Southeastern Virginia and currently live in Virginia Beach, where I split my time in a practice covering trauma in Virginia Beach and Norfolk, Virginia. I have the pleasure of remaining academically connected, working with 5th year residents from the Portsmouth Naval Hospital as well working at Norfolk General. The unique schedule of 7 days on call at Norfolk General (Level 1), 7 days off, 7 days on at Virginia Beach General (Level 3), and 7 days off, allows me to spend time traveling, relaxing, playing at the beach, and being husband to Kristen, and Father to Ellery (now 3!) and Ayalet (almost 1).

I am incredibly thankful for my time in the Pacific Northwest and my training at OHSU. Not only did the program give me a wonderfully broad exposure and skill set that I still use every day in practice, but we built relationships and friendships that will last a lifetime while there. We miss PDX terribly and will always hold OHSU in a special place in our hearts!

Where are They Now?



BRENT ROSTER, MD

After finishing up residency at OHSU, I completed a one-year fellowship in foot and ankle surgery; this was split between UC Davis in Sacramento, CA, and the Reno Orthopaedic Clinic in Reno, NV. I then joined Missoula Bone & Joint in Missoula, Montana, a private group of 11 orthopaedic surgeons and one non-operative sports medicine specialist. I see and treat the full spectrum of foot and ankle pathology, as well as general orthopaedic and hand trauma on call.

Since leaving OHSU, my wife Grace and I have welcomed Wade, our third child, into the world. We've very much enjoyed exploring Montana and all that it has to offer. I try to cram as much hunting, fishing, camping, and family time in as a busy private practice allows.

I will always be grateful to OHSU for such phenomenal training and surrounding me with great people and mentors. Thank you!



Lumbar MRI findings in patients with and without Waddell Signs Cox JS; Blizzard S; Carlson H; Hiratza J; Yoo JU.

BACKGROUND CONTEXT

Waddell Signs (WS), introduced as a method to establish patients with substantial psychosocial components to their low back pain, carry a negative association despite no literature evaluating whether physical disease is associated with them.

PURPOSE

To compare lumbar MRI findings between the patients with and without Waddell's Signs.

STUDY DESIGN

Retrospective cohort study based on prospectively collected data

PATIENT SAMPLE

Thirty patients aged 35-55 with an ODI score >50 randomly selected such that there was an even distribution of patients based on number of WS

OUTCOME MEASURES

ODI and SF-12 scores, number of WS, presence and severity of spinal pathology

METHODS

MRIs were reviewed by three spine specialists blinded to clinical exam findings, number of WS, and patient identity. Type and severity of pathology and presence of surgical and non-surgical lesions were assessed, and findings were rank-ordered based on overall impression of the pathology. There was no external funding or potential conflicts of interest for this study.

RESULTS

There were significantly more individual pathologic findings in those without WS

($p=0.02$). However, there was no difference in the severity of pathology based on WS ($p=0.46$). Furthermore, the rank ordering based on overall impression of severity showed no difference between the patients with and without WS ($p=0.20$). Although 100% of the patients without WS showed pathologic findings on MRI, 70% of WS patients also had significant pathology on MRI. The prevalence of spondylolisthesis, stenosis, and disc herniation was similar ($p=0.41$, $p=0.22$, and $p=0.43$, respectively). The prevalence and mean number of lesion amenable to surgery did not differ based on presence of WS ($p=0.21$ and $p=0.18$, respectively).

CONCLUSIONS

Patients with WS present a difficult diagnostic challenge for the physician as their organic symptoms are often co-existent with emotional fear avoidance behavior. While there is more overall pathology in those without WS, a significant number of these patients appear to have comparable spinal pathology with equivalent severity, which may be contributing to patients' symptoms and disability. Presence of these non-organic symptoms often makes us doubt these patients. However, as part of effective treatment, physicians should better understand both physical and psychological components of patient disability.

Intramedullary nail fixation and risk of delirium among patients with intertrochanteric hip fracture Kagan R; Schulman C; Coleman J; Marshall LM; Friess D.

OBJECTIVES

To compare the risk of post-operative delirium according to long versus short intramedullary nails in patients with intertrochanteric femur fractures

DESIGN

Retrospective cohort study

SETTING

Community Hospital

PATIENTS

208 patients with low energy intertrochanteric fractures (AO/OTA class 31 A) treated from June 1, 2011 to February 3, 2015

INTERVENTION

Long intramedullary nails (LN, 114 patients); short intramedullary nails (SN, 94 patients)

Outcome Measurements: Post-operative delirium based on the confusion assessment method (CAM)

RESULTS

There were no group differences in age, sex, BMI, Charlson comorbidity index, UTI, hemoglobin, or hematocrit. Post-operative delirium was more frequent among patients age >85 years ($p=0.002$) or who received a transfusion (63%, compared to 37% without transfusion; $p<0.001$). Delirium was observed in 32% of patients with LN and 24% with SN ($p=0.28$). The relative risk (RR) associating delirium with LN compared to SN was 1.3 (95%CI: 0.8, 2.0). Transfusions were given in 59% with LN and 36% with SN ($p<0.001$). Adjustment for transfusion status completely attenuated the association of LN with delirium (RR=1.0, 95% CI: 0.7, 1.6).

CONCLUSIONS

Delirium risk was not significantly elevated among patients receiving LN compared with SN. The RR association was completely attenuated when controlling for post-operative transfusion; thus, surgeons should consider blood management strategies to reduce post-operative delirium.

Effect of angiotensin II blockade on range of motion after total knee arthroplasty

Langston JR; Ramsey D; Skoglund K; Schabel K.

BACKGROUND

Stiffness following knee arthroplasty is a challenging problem and investigating methods to prevent or reduce the incidence of post-operative arthrofibrosis is critical. Other medical specialties have found that angiotensin converting enzyme inhibitors (ACEI) and angiotensin receptor blockers (ARB) are efficacious at preventing fibrotic disorders in the lungs, liver, kidneys, and eyes.

METHODS

In a retrospective review, we analyzed 371 consecutive total knee arthroplasties (TKAs) done at a single institution by a single surgeon from December 2010 to December 2014. Analysis was done comparing patients taking ACEI, ARB, versus neither medication. Independent variables recorded were gender, age, BMI, presence of diabetes or pre-operative opioid or statin use, pre-operative knee flexion, extension, total arc of motion, and use of ACE inhibitors or ARBs. Dependent variables recorded were post-operative knee flexion, extension, and total arc of motion. The primary outcome variable was success or failure of achieving 118° total arc of motion post-operatively, based on a study that found significant compromise of function in TKA patients who failed to obtain this goal. Secondary endpoints were measurements of post-operative knee flexion, extension, and total arc of motion.

RESULTS

Use of neither ACEIs nor ARBs showed a significant difference in attaining greater than 118° of motion post-operatively compared to controls at 6 months. Patients taking ACEIs and ARB had greater improvements in motion compared

to controls; 9.75% for ACEIs and 8.49% for ARBs versus 6.3% for controls. However, secondary analyses of sum improvement in flexion, extension, and total arc of motion was not significantly different between the groups. Significant predictors of successfully obtaining more than 118° motion were BMI ($p < 0.05$), pre-operative flexion ($p < 0.001$), and total pre-operative arc of motion ($p < 0.002$). Significant predictors of post-operative flexion were BMI ($p < 0.0002$), pre-operative flexion ($p < 0.00004$), and total pre-operative arc of motion ($p < 0.0003$). Significant predictors of post-operative extension were pre-operative extension ($p < 0.04$) and total pre-operative arc of motion ($p < 0.03$).

CONCLUSIONS

The principle predictor of postoperative ROM was BMI and pre-operative ROM. Use of ACEIs or ARBs did not result in greater likelihood of obtaining satisfactory ROM post-operatively.

A prospective randomized comparison of two distinct allogenic tissue constructs for anterior cruciate ligament reconstruction Rose MB; Domes C; Farooqi M; Crawford DC. *The Knee* 2016;23:1112–20.

BACKGROUND

Conduct a prospective randomized study to compare clinical outcomes of anterior cruciate ligament (ACL) reconstruction using quadrupled hamstring tendon (HT) allograft or doubled tibialis anterior (TA) allograft. Limited level 1 data exist comparing outcomes of different soft tissue allograft constructs for ACL reconstruction. We hypothesized no difference would exist in the patient reported outcomes (PRO), arthrometric testing, or rate of re-rupture between the two constructs.

METHODS

Ninety eight subjects undergoing primary ACL reconstruction were randomized to HT (n = 47) or TA (n = 51) allograft. Subjects completed validated (PRO) measures preoperatively, and six months and two years post-operatively. Arthrometric testing was performed at six months to assess integrity of the reconstruction.

RESULTS

Fifty-eight percent of subjects (57/98) completed a two-year follow up. Allograft re-tear rates were similar between groups (6.2% HT vs. 4.0% TA, respectively, p= 1.0). The relative risk of re-tear in the HT group was 1.5 compared to the TA group (p= 0.7). The TA group improved significantly more on the physical portion of the VR-12 (p= 0.046) and Lysholm score (p= 0.014) compared to the HT group. There was no difference in the change from baseline for the other PRO scores at two years.

CONCLUSIONS

Our data indicate no difference in graft failure rate and similar improvement from baseline in most PRO scores between treatment groups after two years. Based on these findings, TA allograft appears to provide a reliable and satisfactory option for patients who elect to undergo allograft ACL reconstruction.

MRI-based 3-D volumetric assessment of fatty infiltration and muscle atrophy in rotator cuff tears Wallenberg R; Belzer M; Ramsey D; Opel D; Berkson M; Gundle K; Nagy M; Boucher R; McCarron J.

INTRODUCTION

The Goutallier and Warner classification systems are widely used in clinical decision-making about rotator cuff reparability and surgical outcomes. However, data is limited on how accurately the parasagittal scapular-Y view used in both systems reflects the three-dimensional (3-D) changes in fat infiltration (FI) and muscle atrophy (MA) that occur throughout the muscle as a whole. Nor is there an understanding of how tendon retraction in the setting of a tear might influence the perception of these changes. This study's objectives are: 1) measure the 3-D volume of the supraspinatus muscle on MRIs of the shoulder with intact rotator cuffs, and in the setting of tears with varying magnitudes of retraction; 2) measure the 3-D volume of FI in the supraspinatus muscle in these conditions; 3) determine influence of tendon retraction on perceived FI and MA when using the Goutallier and Warner classification systems.

METHODS

Between August 2015 and February 2016 all shoulder MRIs at the Portland VA Medical Center were standardized to include imaging that extended to the medial scapular border. MRIs and charts were reviewed for inclusion/exclusion criteria. Included MRIs were categorized into 4 groups (Control and Tear Groups 1-3). Supraspinatus muscle and fossa areas were traced by 2 readers on T1 parasagittal cuts then used to create 3-D volumes using Osirix. A standardized protocol was used to measure the FI within the supraspinatus muscle. Additional physicians (2 radiologists, 2 orthopaedic surgeons, 1 orthopaedic resident, 1 radiology resident) were given T1 parasagittal scapular-Y images and asked to grade the supraspinatus muscle using the Goutallier, and Warner classification systems.

These grades were compared to 3-D measured FI and MA. The influence of tendon retraction on the perceived grades were also evaluated.

RESULTS

One-hundred seventy-seven of 300 MRIs met inclusion/exclusion criteria. Ten MRIs for each group (N=40) were included for image analysis. Supraspinatus volume tracings were highly reproducible and consistent between tracers. There was no statistical difference in age between the 4 groups. Supraspinatus muscle volumes were shown to decrease, and whole muscle, global fat infiltration was shown to increase with greater degrees of tendon retraction.

In tendons with less than 10% global fat, the distribution of fat concentrated predominantly in the lateral third of the muscle. In muscle with more than 10% global fat content, fat distributed more diffusely throughout the muscle from medial to lateral. In comparing the scapular-Y to a medial cut, the inter-rater reliability was shown to decrease between the first and second round of MRI reads. On the first round of readings, moving to the more medial parasagittal cut changed the readers' assessment of Goutallier score towards a greater degree of fat infiltration for patients with minimal to moderate degrees of tendon retraction (Groups 1 and 2). On the second reading, more medial parasagittal imaging shifted the readers' Goutallier grade to a lesser degree of fat infiltration in tendons with the highest degree of tendon retraction (Group 3). Assessment of muscle atrophy resulted in less perceived muscle atrophy when moving to more medial cuts, especially in tears with greater tendon retraction.

DISCUSSION

FI and MA are known to correlate with rotator cuff reparability and functional outcomes after surgery, however, the 3-D nature of these changes are not well defined. Tear retraction may alter the Goutallier or Warner grade of rotator cuff tears as assessed on scapular-Y parasagittal views, independent of the actual magnitude of these changes within the 3-D structure of the muscle. We found that in muscles with <10% global FI, there was a higher percentage of FI along the lateral tendon, but as global FI increased greater than 10%, the distribution of fat became more uniformly distributed along the muscle-tendon unit. The perceived FI at the scapular-Y compared to the medial cut was different between the two reads, which may have been influenced by the amount of global FI. The perception of MA improved consistently at the medial cut in larger degrees of tendon retraction. Our study suggests there might be an objective threshold of FI or MA that alters the distribution of fat along the muscle-tendon unit. With this insight and further clinical trials, we may be able to help determine which rotator cuff tears have irreversible degenerative changes and ultimately improve efficacy of rotator cuff repair.

Past and Present: OHSU Annual Beals Lectureship



The Beals memorial lectureship is an annual event established in honor of the late Rodney K. Beals, MD, Professor Emeritus in the Department of Orthopaedics & Rehabilitation at Oregon Health & Science University,

who taught orthopaedics for more than 50 years. Dr. Beals was a lifelong “Oregonian” and spent his entire professional career practicing orthopaedic surgery in Portland, OR. Dr. Beals was a committed clinician, master surgeon, revered educator and accomplished researcher. It was not only out of respect for his scientific accomplishments, but for his humble guidance and mentorship that the OHSU Department of Orthopaedics & Rehabilitation established the annual Beals Memorial Lecture Series.

Dr. Beals attended Willamette University for his undergraduate training, graduating in 1952, and received his medical degree from the University of Oregon Medical School (precursor to OHSU) in 1956. He completed his internship at Minneapolis General Hospital followed by a General Surgical Residency in San Bernadino County Hospital in California. He ultimately completed his training in Orthopaedic Surgery at the University of Oregon Medical School in 1961. Dr. Beals immediately joined the faculty and rapidly rose through the ranks at OHSU, serving as Head of the Division of Orthopedics from 1981 to 1994. Dr. Beals also served as the first chairman for the Department of Orthopaedic Surgery at OHSU in 1994. At the age of 77, he remained an active member of the Orthopaedic faculty at OHSU until the time of his passing on August 7, 2008.

Dr. Beals was an accomplished researcher throughout his career. He was nationally recognized for his research on skeletal manifestations of growth disturbances in children. He authored more than 150 peer-reviewed publications. Dr. Beals was also a revered educator. During his tenure at OHSU, he helped train more than 150 orthopaedic surgeons in residency. He also helped thousands of patients and mentored countless numbers of medical students. Throughout his remarkable career, Dr. Beals represented and personified excellence in medicine and orthopaedic surgery.



Guest Lecturer 2017
Michael Ries, MD

GUEST BEALS LECTURER 2017

Dr. Michael Ries is an orthopedic surgeon in Reno, Nevada and is the Arthroplasty Fellowship Director at the Reno Orthopaedic Clinic. He is affiliated with multiple hospitals in the area, including Renown Medical Center, South Meadows Hospital, St. Mary's Hospital, and Northern Nevada Medical Center. He received a BS and MS from MIT, and his medical degree from Geisel School of Medicine at Dartmouth and has been in practice for more than 25 years.

Dr. Ries has a practice limited to hip and knee arthroplasty surgery and treatment of arthritic hip and knee conditions. He was on the full time faculty at the University of California, San Francisco from 1997 to 2013 where he was professor of Orthopaedic Surgery and Chief of Arthroplasty. During this time, he also participated regularly in laboratory and clinical research. Dr. Ries has published 210 peer reviewed journal articles and 52 book chapters on topics related to clinical outcomes and biomaterials used in hip and knee replacement. He has helped develop a number of hip and knee replacement implants, and is an inventor on 45 US patents.

Shriners Hospital for Children – Portland Lectureship Series

BEATTIE LECTURE SERIES

Mr. Byron J. Beattie was the owner and operator of a printing plant in Portland, Oregon. Mr Beattie became acquainted with Dr “French” Eldon Chuinard, while Dr Chuinard was the chief of staff at Shriners Hospital for Children, Portland. He was so impressed with the importance of the educational mission of Shriners Hospital that he created an endowment fund to support our local education activities. The first seminar was held in 1985.



Guest Lecturer 2016
Matthew B. Dobbs, MD
Professor, Orthopedic
Surgery, St. Louis
Children’s Hospital
Shriners Hospitals for
Children - St. Louis

GUEST LECTURER 2016

Dr. Matthew B. Dobbs earned his medical degree from the University of Iowa in Iowa City in 1995. Following a residency in orthopedic surgery at the University of Iowa Hospital and Clinics, he completed a fellowship in pediatric orthopedic surgery at Shriners Hospital for Children in St. Louis. Dr. Dobbs is a board-certified orthopedic surgeon and Professor and Director of Strategic Planning in the Department of Orthopedic Surgery at Washington University School of Medicine. A pediatric orthopedist specialist at St.

Louis Children’s Hospital, Dr. Dobbs specializes in the treatment of pediatric foot and lower limb deformities, congenital muscular torticollis, and cerebral palsy spasticity. He is director of the Clubfoot Treatment Center at Saint Louis Children’s Hospital and is consistently listed in Best Doctors in America. Along with Dr. Christina Gurnett, Dr. Dobbs is co-director of the Washington University Musculoskeletal Genetics Laboratory.

GUEST LECTURER 2016

Dr Christina A. Gurnett received her MD and PhD degrees from the University of Iowa, and completed residency in pediatric neurology at Washington University in St Louis. She co-directs the Washington University Pediatric Musculoskeletal DNA Databank with Dr Matthew Dobbs. Together, they identified the importance of the PITX1-TBX4-HOXC pathway in clubfoot pathogenesis. Dr Gurnett is currently involved in identifying the genetic risk factors for severe adolescent idiopathic scoliosis, and in translating this into improved care for children with spinal deformities.



Guest Lecturer 2016
Christina A. Gurnett,
MD, PhD
Associate Professor,
Neurology, St. Louis
Children’s Hospital

Resident and Teaching Awards

Leo S. Lucas Outstanding Orthopaedic Educator Award: Presented to the faculty member most instrumental in the development of future orthopaedic surgeons.

Morris Hughes Award: Presented to the resident who best demonstrates concern for patients and for education of the next generation of physicians.

Research Award: Presented to the resident recognized for a commitment to the development, execution and publication of original research during residency.

YEAR	LEO S. LUCAS	MORRIS HUGHES	RESEARCH AWARD
2007	Tom Ellis	Rob Tatsumi	Joseph Schenck
2008	Dennis Crawford	Stephan Pro	Kate Deisseroth
2009	Darin Friess	Stephan Pro	N/A
2010	Amer Mirza	Gary Kegel Gregory Byrd	Patrick Denard
2011	James Hayden	Jayme Hiratzka	Jayme Hiratzka Matthew Harrison
2012	Jesse A. McCarron	Luke Rust	Dawson Brown Matthew McElvany
2013	James Hayden	Laura Matsen Ko Jacqueline Munch	Adam Baker
2014	Adam Mirarchi	Rich Myers	Trevor McIver
2015	Kathryn Schabel	Dustin Larson	Alexander DeHaan
2016	Paul Duwelius	Jacob Adams	Thomas Kowalik

Extreme Makeover: OHSU Cast Cart Edition

By: Kirsten Jansen, 2016 PGY 5



Our orthopaedic cast cart was adorned with a mural made out of leftover casting material by Kirstin Jansen, graduate of the class of 2016



OHSU Orthopaedic Program Alumni Directory

GRADUATE	FELLOWSHIP TRAINING	CURRENT PRACTICE LOCATION
2016		
Jake Adams	Adult Reconstruction - Mayo Clinic, Scottsdale, AZ	
Kristen Jansen	Adult Reconstruction - Indiana University, Indianapolis, IN	
Tom Kowalik	Trauma & Adult Reconstruction - Dr. Paul Duwelius, Orthopedic + Fracture Specialists, Portland, OR and Sydney Australia Arthroplasty & Trauma	
Jared Mahylis	Shoulder & Elbow - Cleveland Clinic, Cleveland, OH	
Farbod Rastegar	Spine - Cleveland Clinic, Cleveland, OH	
2015		
Alex DeHaan	Adult Reconstruction - Tahoe Reno Arthroplasty Fellow, Reno, NV	Orthopedic + Fracture Specialists, Portland, OR
Troy Miles	Adult Reconstruction - UC Davis, Davis, CA	Shasta Orthopaedics, Redding, CA
Dustin Larson	Hand and Upper Extremity - Univ. of New Mexico, Albuquerque, NM	The Center Orthopedic & Neurosurgical Care & Research, Bend, OR
Vivek Natarajan	Pediatrics - Children's Hospital of Pittsburgh, PA	Advocare, Cedar Knolls, NJ
John Seddon	Foot & Ankle - Melbourne Orthopedic Group, Melbourne, Vic, Australia/ Summit Orthopaedics, Portland, OR	Olympic Medical Physicians Orthopaedic Clinic, Port Angeles, WA
2014		
Zachary B. Domont	Sports Medicine - Univ. of Pennsylvania, Philadelphia, PA	AMG-Lincolnshire Orthopedics, Lincolnshire, IL
Jia-Wei Kevin Ko	Shoulder & Elbow - Rothman Institute, Thomas Jefferson Univ., Philadelphia, PA	Orthopedic Physician Associates, Seattle, WA
Trevor C. McIver	Spine - Spine Institute of Arizona, Scottsdale, AZ	St. Cloud Orthopedics, St. Cloud, MN
Richard J. Myers	Orthopaedic Trauma - Univ. of Maryland, College Park, MD	Sentara Orthopedic Trauma Specialists, Norfolk, VA
Brent M. Roster	Foot & Ankle - Univ. of California Davis Medical Center, Sacramento, CA	Orthopedic Physician Associates, Seattle, WA
2013		
Adam P. Baker	Foot & Ankle - Northwest Orthopedic Specialists, Portland, OR	Adventist Hospital, Portland, OR
Michael Kuhne	Trauma Orthopedics - Univ. of California, San Francisco General Hospital, San Francisco, CA	Camp Lejeune Naval Hospital, Jacksonville, NC
Laura J. Matsen Ko	Adult Reconstruction - Thomas Jefferson Univ., Philadelphia, PA	Orthopedic Physician Associates, Seattle, WA
Jacqueline L. Munch	Shoulder Surgery, Sports Medicine - Hospital for Special Surgery, New York, NY	Oregon Health & Science Univ., Portland, OR
Daniel C. Wiekling	Foot & Ankle - Melbourne Orthopaedics, Melbourne Australia	Asante Physician Partners, Grants Pass, OR
2012		
Dawson S. Brown	Sports Medicine - Southern California Orthopedic Institute, Van Nuys, CA	West Sound Orthopedics, Silverdale, WA
Peter D. Fredericks	Trauma Orthopedics - Indiana Orthopaedic Hospital, Indianapolis, IN	Colorado Springs Orthopedic Group, Colorado Springs, CO
Matthew D. McElvany	Shoulder & Elbow - Univ. of Washington Medical Center, Seattle, WA	Kaiser Permanente, Santa Rosa, CA
Cuchulain Luke Rust	Foot & Ankle - Orthopaedic Associates of Michigan, Grand Rapids, MI	Rebound Orthopedics, Vancouver, WA
2011		
Matthew J. Harrison	Foot & Ankle - Oakland Bone & Joint Specialist Clinic, Oakland CA; Middlemore Hospital, Auckland, New Zealand	Alta Orthopedics, Santa Barbara, CA
Jayne R. Hiratzka	Spine Surgery - Univ. of Utah, Salt Lake City, UT	Oregon Health & Science Univ., Portland, OR
Jackson B. Jones	Adult Reconstruction - Harvard Medical School's Brigham and Women's Hospital, Boston, MA	Reno Orthopedic Clinic, Reno, NV
2010		
Matthew W. Bradley		Orthopedic Sports Medicine & Spine Care Institute, St. Louis, MO
Gregory D. Byrd	Hand - Beth Israel Deaconess Medical Center, Boston, MA	Olympia Orthopedics, Olympia, WA
Adam E. Cabalo	Spine - Spine Care Medical Group, Daly City, CA	Southern Oregon Orthopedics, Medford, OR
Patrick J. Denard	Shoulder - Centre Orthopédique Santy, Lyon, France and San Antonio Orthopaedic Group, San Antonio, TX	Southern Oregon Orthopedics, Medford, OR
Gary Kegel	Hand - St Luke's-Roosevelt Hospital Center, New York, NY	Group Health Capital Hill Medical Center, Seattle, WA

OHSU Orthopaedic Program Alumni Directory

GRADUATE		FELLOWSHIP TRAINING	CURRENT PRACTICE LOCATION
2009			
Stephen L. Pro	Sports Medicine - Santa Monica Orthopaedic and Sports Medicine Group, Santa Monica, CA	Ortho Kansas, Lawrence, KS	
Khalid Shirzad	Foot & Ankle - Duke Univ. School of Medicine, Durham, NC	Northwest Orthopedic Specialist, Spokane, WA	
Abner M. Ward	Hand - SUNY Stony Brook Univ. Hospital & Medical Center, Stony Brook, NY	VAMC and Tripler Army Medical Center, Honolulu, HI	
2008			
Kate B. Deisseroth		Malcolm Grow Medical Center, Andrews Air Force Base, MD	
Andy J. Kranenburg	Surgery and Trauma - San Francisco Spine Institute, San Francisco, CA	Southern Oregon Orthopedics, Medford, OR	
Kenna Larsen	Hand - Univ. of New Mexico, Albuquerque, NM	Utah Orthopaedics, Ogden, UT	
2007			
William Magee	Sports Medicine - TRIA Orthopaedic Center, Park Nicollet Methodist Hospital, Minneapolis, MN	Rockwood Clinics, Spokane, WA	
J. Rafe Sales	Spine - San Francisco Spine Institute, San Francisco, CA	Summit Spine, Portland, OR	
Joseph Schenck	Sports Medicine - Perth Orthopaedic Sports Medicine Center, Perth, Australia and Arthroscopic Surgery and Computer Navigated Total Joint Arthroplasty - Sir Charles Gairdner Hospital, Nedlands, Western Australia	Orthopedic & Sports Medicine, Portland, OR	
Robert L. Tatsumi	Spine - LA Spine Institute, Santa Monica, CA	Oregon Spine Care, Tualatin, OR	
2006			
Catherine A. Humphrey	Trauma - Vanderbilt Univ. Medical Center, Nashville, TN	Univ. of Rochester Medical Center, Rochester, NY	
Amer J. Mirza	Trauma - Harborview Medical Center, Seattle, WA	Summit Orthopaedics, LLP, Portland, OR	
Mark B. Wagner		Orthopedics NW, Tigard, OR	
2005			
Patrick A. Dawson	Upper Extremity and Sports Medicine - Congress Medical Associates, Pasadena, CA	Cascade Orthopaedic Group, Tualatin, OR	
Suresh Kasaraneni		Scott Memorial Hospital, Scottsburg, IN	
Christopher M. Untch	Surgical Services - Davis Monthan AFB, Tucson, AZ	Arizona Orthopedics, Tucson, AZ	
Corey J. Vande Zandschulp	Trauma - OrthoIndy, Methodist Hospital, Indianapolis, IN	Summit Orthopaedics, LLP, Portland, OR	
2004			
Benjamin C. Kam		Joint Base Elmendorf - Richardson, Anchorage, AK	
Britton (Polzin) Frome	Hand Surgery - UT Southwestern, Dallas, TX	Summit Orthopaedics, LLP, Portland, OR	
2003			
Jennifer R. Miller	Sports Medicine - Congress Medical Associates, Pasadena, CA	Idaho Sports Medicine Institute, Boise, ID	
John B. Reid		Taos Orthopedic Institute, Taos, NM	
Eric F. Shepherd	Trauma - UC Davis Medical Center, and Auckland City Hospital, NZ	Santa Barbara Orthopedic Associates, Santa Barbara, CA	
2002			
Michael A. Binnette	Spine - Univ. of Washington, Seattle, WA	OA Center for Orthopaedics, Portland, ME	
Kevin M. Kahn	Trauma - Universitatsspital, Zurich Switzerland, Vanderbilt Orthopaedic Inst., Nashville, TN	Rebound Orthopedics & Neurosurgery, Vancouver, WA	
Tamara S. Simpson	Trauma - UCSF - Sports Medicine; Hennepin Medical Center, Minneapolis, MN	Cascade Orthopaedic Group, Tualatin, OR	
2001			
Michael J. Gustavel	Sports Medicine - San Diego Sports Medicine and Orthopaedic Center, San Diego, CA	Idaho Sports Medicine Institute, Boise, ID	
James B. Hayden	Musculoskeletal Oncology - Massachusetts General Hospital, Boston, MA	Oregon Health & Science Univ., Portland, OR	
Todd W. Ulmer	Sports Medicine - Univ. of Washington, Seattle, WA	Columbia Orthopedic Associates, Portland, OR	

OHSU Orthopaedic Program Alumni Directory

GRADUATE	FELLOWSHIP TRAINING	CURRENT PRACTICE LOCATION
2000		
Mark S. Metzger	Joint, Spine & Tumor - Harvard Medical School, Boston, MA	
Lorenzo L. Pacelli	Hand & Microvascular Surgery - Hand Center, San Antonio, TX	Scripps Clinic Torrey Pines, La Jolla, CA
Edward A. Perez	Trauma - R. Adams Cowley Shock Trauma Center, Baltimore, MD	Campbell Clinic Orthopaedics, Germantown, TN
1999		
Anthony I. Colorito	Sports Medicine - Cincinnati Sports Medicine and Orthopedic, Cincinnati, OH	Orthopedic & Sports Medicine, Portland, OR
John M. Kioschos	Shoulder and Elbow Surgery - Florida Orthopaedic Institute, Tampa, FL	Tri Star Skyline Medical Center, Nashville, TN
Jill A. Rider-Graves		
1998		
John D. Curtis		Dory Orthopaedics, Uab Medical West, Bessemer, AL
Darrin F. Eakins	Sports Medicine and Knee - Royal N Shore Hospital, Sydney, Australia	Ortho Wilmington, Wilmington, NC
Ronald D. Wobig	Sports Medicine and Knee - Louisiana State Univ., Lake Charles, LA	Beaver Sports Medicine, Corvallis, OR
1997		
Dennis J. Davin		
Kevin M. Lee		Upper Valley Orthopedics, Rexburg, ID
Ronald L. Teed		Cascade Orthopedic Surgery, Hillsboro, OR
1996		
Knut C. Buehler	Lower Extremity Reconstruction - Scripps Clinic and Research Foundation, San Diego, CA	Center Orthopedic & Neurosurgical Care & Research, Bend, OR
Thomas J. Croy		310 Villa Road, Ste 108, Newberg, OR
Marc R. Davidson	Sports Medicine - The Hughston Clinic, Columbus, GA	Advantage Orthopedic and Sports Medicine Clinic, LLP, Gresham, OR
1995		
Douglas R. Bagge		Cortez Orthopedics, Cortez, CO
Robert A. Foster	Hand and Microvascular Surgery - Univ. of Minnesota, MN	Texas Orthopedics Sports and Rehabilitation Association, Austin, TX
Gregory A. Voit	Hand and Microvascular Surgery - Univ. of New Mexico Health Sciences Center, Albuquerque, NM	
1994		
Robert J. Grondel	Sports Medicine and Shoulder - Mississippi Orthopaedic & Sports Medicine Clinic; Trauma - Emanuel Hospital, Portland, OR	Orthopaedic Institute of Henderson, Henderson, NV
Allen L. Hershey	Lower Extremity Reconstruction - Scripps Clinic and Research Foundation, San Diego, CA	Precision Orthopedics and Sports Medicine, Salinas, CA
Brian J. Padrta	Foot and Ankle - Florida Orthopaedic Institute, Univ. of South Florida, Tampa, FL	Northwest Orthopaedic Specialists, Spokane, WA
Mark R. Rangitsch		Cheyenne Orthopaedics LLP, Cheyenne, WY
1993		
Blaine A. Markee		
Dean K. Olsen		Park Nicollet Orthopaedics, Burnsville, MN
Andrew H. Schmidt	Adult Reconstruction, Shoulder Surgery, Trauma - Hennepin County Medical Center, Minneapolis, MN	Hennepin County Medical Center, Minneapolis, MN
1992		
Edward C. Pino	Sports Medicine - Cincinnati Sports Medicine, Cincinnati, OH; Foot & Ankle - Michigan Internat. Foot and Ankle Center, Detroit, MI	Kaiser Permanente, Denver, CO
Stephen S. Tower		Anchorage Fracture & Orthopedic Clinic, Anchorage, AK
Michael R. Van Allen	Hand and Microsurgery - Univ. of Alabama, Birmingham, AL	Legacy Meridian Park Medical Center, Tualatin, OR

OHSU Orthopaedic Program Alumni Directory

GRADUATE	FELLOWSHIP TRAINING	CURRENT PRACTICE LOCATION
1991		
Ronald R. Bowman		Tigard Orthopedic & Fracture Clinic, Portland, OR
William H. Dickinson		
Richard A. Rubinstein	Methodist Sports Medicine Center, Indianapolis, IN	Providence Portland Medical Center, Portland Knee Clinic, Portland, OR
1990		
Gregory T. Bigler	Sports Medicine and Arthroscopy - Harvard Medical School, Massachusetts General Hospital, Boston, MA	Thomas & Bigler Knee and Shoulder Institute, Las Vegas, NV
Adrian B. Ryan		Anchorage Fracture & Orthopedic Clinic, Anchorage, AK
Theodore S. Woll	Foot and Ankle - Univ. of Washington, Seattle, WA	Rebound Orthopaedics, Vancouver, WA
1989		
James R. Hazel		Tri-City Orthopaedics, Kennewick, WA
Asa E. Stockton		Eureka Community Health Center, Eureka Open Door, Eureka, CA
Keith J. Ure	Joint Replacement - Joint Replacement Institute, Orthopaedic Hospital, Los Angeles, CA	Olympic Medical Center, Sequim, WA
Robert G. Zirschky		Hope Orthopedics of Oregon, Salem, OR
1988		
John D. DiPaola		Occupational Orthopedics, Tualatin, OR
Jeffrey E. Flemming	Texas Southwestern Medical Center - Texas Back Institute, Dallas, TX	Providence Portland Medical Center, Portland, OR
Morris Hughes		
Michael B. Wyman		Orthopedic Specialists, Portland, OR
1987		
Dale G. Bramlet	Orthopaedic & Plastic Surgery, Hand and Upper Extremity - Univ. of Rochester Medical Center, Rochester, NY	Advent Orthopedics, Pinellas Park, FL
Scott B. Jones		Orthopedic & Sports Medicine Center of Oregon, Portland, OR
Stefan D. Tarlow	Knee Surgery - Dr. Jan Gillquist, Sweden; Sport Medicine - Dr. James Andrews, Birmingham, AL	Advanced Knee Care, PC, Scottsdale, AZ
1986		
Mark J. Buehler	Hand - Duke Univ., Durham, NC	Providence Hospital, Portland, OR
Wendell D. Ferguson	Providence Medical Center, Portland, OR	Vallejo Kaiser Medical Center, Vallejo, CA
Paul A. Switlyk	Shoulder - Univ. of Western Ontario, London, ON	Orthopedic & Sports Medicine Center of Oregon, Portland, OR

OHSU Orthopaedic Program Alumni Directory

1985	Stanley J. Neitling Daniel N. Ovadia	1976	Wayne C. Kaesche Walter A. Smith Stephen J. Thomas	1968	Benjamin F. Balme James D. Kunzman James D. Nelson Frederick D. Wade	1959	Raymond A. Case James V. Harber	1947	Edward A. LeBold
1984	Steven J. Bruce Kenneth A. Hermens Wendy M. Hughes	1975	Randy W. Crenshaw John O. Hayhurst Patrick T. Keenan Kelsey C. Peterson Ned R. Schroeder	1967	Michael S. Baskin John W. Gilsdorf John W. Thompson	1958	Richard G. Gardner William D. Guyer	1946	William P. Horton Clyde D. Platner Faulkner A. Short
1983	Michael J. Grundy Paul J. Mills John C. Schwartz	1974	Thomas W. Hutchinson Robert J. Porter Frederick L. Surbaugh	1966	Charles A. Bonnett McGregor L. Church Don D'Amico Fred G. Grewe Howard E. Johnson	1957	Hadley F. Fitch Richard S. Gilbert	1945	Joseph H. Gill
1982	Julie Isaacson James D. Livermore John S. Toohey	1973	James L. Baldwin David A. Haaland Craig MacCloskey	1965	Arthur L. Eckhardt John Hazel Richard L. Mercer	1956	William E. Hummel Joseph R. McProuty Jack B. Watkins	1943	Paul G. Hafner
1981	Christopher A. Blake Wayne K. Nadamoto Samuel K. Tabet	1972	Michael S. Hmura Grant D. Lawton Michael R. Marble	1964	Robert F. Corrigan Richard C. Zimmerman	1955	Edward A. Attix Max M. Bocek	1942	Rodney Begg Harold E. Davis
1980	Lenart C. Ceder Jonathan H. Hoppert Robert W. Jordan	1971	Charles B. Bird Robert G. Chuinard Jim Dineen Ilmar O. Soot	1963	Donn K. McIntosh Michael R. Rask	1954	Howard I. Popnoe Dale D. Popp	1940	Leslie S. Porter
1979	Brian Laycoe Donald Peterson James Robbins	1970	Philip J. Fagan Robert J. Foster Art Hauge Edwin A. Kayser Gerald T. Lisac Ira M. Yount	1962	Phaen Gambee Norman D. Logan Keith A. Taylor	1953	Donald D. Smith	1938	Arthur M. Compton
1978	Lyle Mason Edgar K. Ragsdale Enoch D. Shaw	1969	Thomas E. Fagan Michael H. Graham George W. Ingham Joseph P. Klein Scott Struckman	1961	Rodney K. Beals Thomas A. Edwards George Keyes Ralph E. Peterson	1952	Melvin L. Makower	1935	E.G. Chuinard
1977	David L. Noall Byron K. Skubi Robert K. Smith Theodore J. Vigeland	1960	Charles A. Fagan Calvin H. Kiest Betty J. Hohmann Robert W. Straumford Bud Yost	1951	Bob Maris William E. Snell James W. Weed	1950	Ralph Thompson	1931	Harry Leavitt
				1949	Howard Cherry Boyd G. Holbrook Richard J. Hopkins	1948	Robert F. Anderson George W. Cottrell Carl L. Holm	1929	D.G. Leavitt
				1948				1928	Leslie C. Mitchell
								1925	John LeCocq
								1924	Leo S. Lucas

Special Thanks

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Mrs. Joyce Beals & Ms. Brynn R. Beals

The Beals family continues their generosity to our department with contributions in the name of Dr. Rodney Beals, and in their estate plans as an eventual beneficiary. The history of our department and orthopaedics in the state of Oregon would not be the same without the significant contributions of Dr. Beals, and the Beals family contributions are vital to keeping Dr. Beals hopes for Oregon Orthopaedics alive.

Steven S. Tower, MD, 1992 Graduating Resident, OHSU

Steve continues surgical practice focused on primary and revision joint replacement and is studying cobalt poisoning from hip replacement (arthroprosthetic cobaltism). His wife Janice is the epicenter of Alaskan cycling.

In Addition

In addition, we sincerely thank the contributors who wish to remain anonymous, as well as the past and present residents, faculty and staff who so kindly donate to our department.



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Residency Coordinator

A special thanks to our Residency Program Coordinator, Robin Sasaoka. She is our continual resource for all resident needs. She coordinates all conferences, call schedules, educational schedules, financial paperwork, and much more.

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Technical Writer

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Website and Social Media

The editors also thank Pete Dahlgren for producing our new website, found at www.ohsu.edu/ojo, where all volumes of our journal can be found.

The goal of this publication is to grow and mature over the next several years. We would love any input from our alumni and local community on ways to improve the journal.

If you are an alumni and your information has changed with regard to your current practice type and/or practice location, please contact us so that your information can be updated for next year's journal.

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Photo by Ryan Moore, MD, Radiology resident, OHSU

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A horizontal timeline with a blue line and yellow circular markers containing a plus sign. The timeline is flanked by images of various orthopaedic products. On the left side, from top to bottom: three headless compression screws (Acutrak 2, 2003), an elbow plating system (2000), a posterolateral plate (2011), a distal clavicle plate (2010), and an Acu-Loc 2 wrist plating system (2011). On the right side, from top to bottom: an anatomic radial head portfolio (2003), an ankle plating system 3 (2015), and a slide-loc anatomic radial head system (2016). In the center, from left to right: a clavicle plating system (2003), an Acu-Loc volar distal radius plate (2004), a hand fracture system (2014), and another view of the ankle plating system 3 (2015).

- 1994: Acutrak® Headless Compression Screw
- 2000: Elbow Plating System
- 2003: Clavicle Plating System
- 2003: Acutrak 2® Headless Compression Screw System
- 2004: Acu-Loc® Volar Distal Radius Plate
- 2010: Distal Clavicle Plate
- 2011: Posterolateral Plate
- 2011: Acu-Loc® 2 Wrist Plating System
- 2014: Hand Fracture System
- 2015: Ankle Plating System 3
- 2016: Slide-Loc™ Anatomic Radial Head System
- 2003: Anatomic Radial Head Portfolio

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