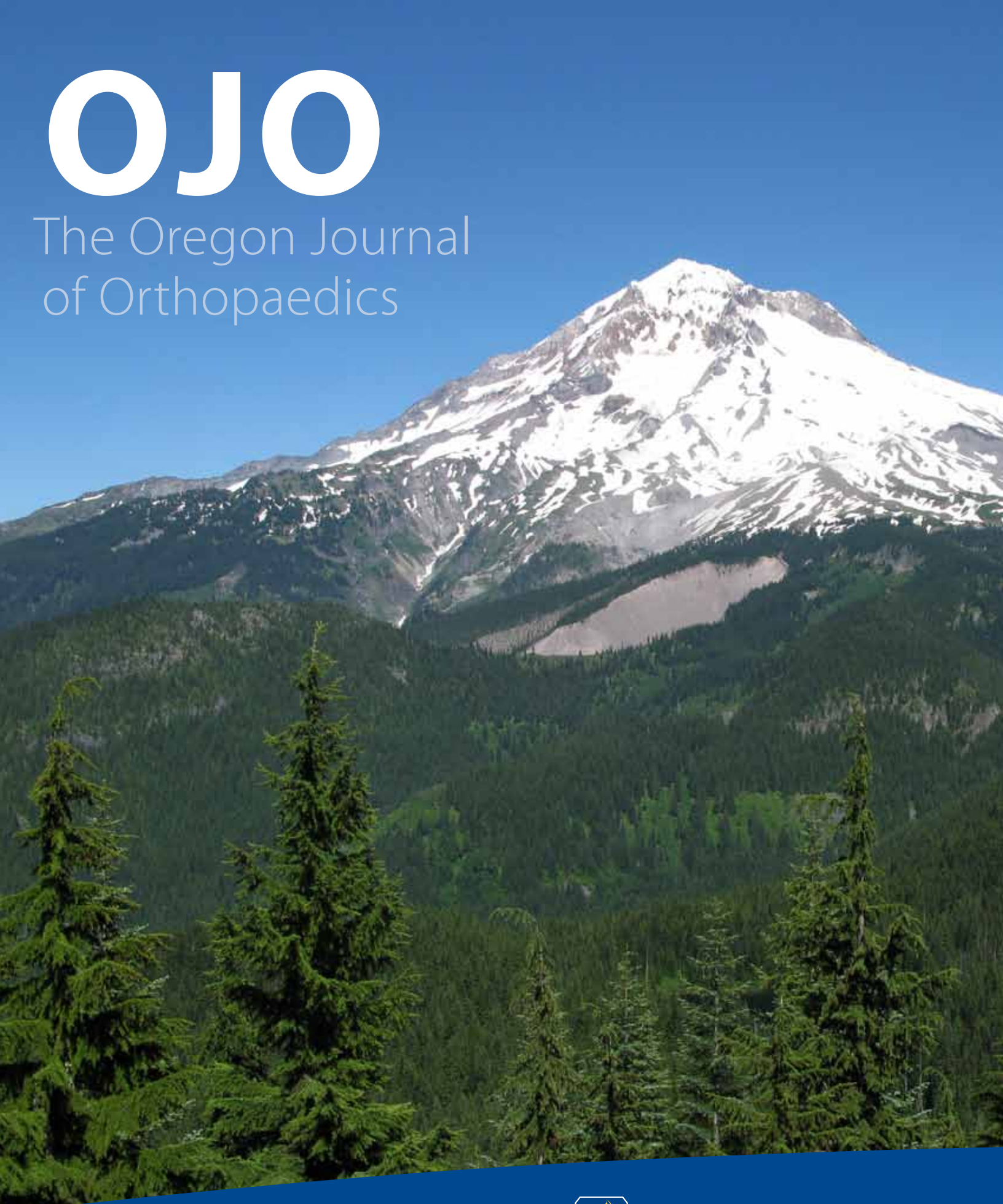
OJO

The Oregon Journal of Orthopaedics



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1. Ritter, MA. The Anatomical Graduate Component total knee replacement: a long-term evaluation with 20-year survival analysis. *Journal of Bone & Joint Surgery.* 91(6): 745–9, 2009.
2. Greene, M., *et al.* Multicenter RSA Evaluation of In Vivo Wear of Vitamin E Stabilized Highly Cross-linked Polyethylene. To be published at the 2012 AAOS Annual Meeting.
3. Greene, M., *et al.* Three Year RSA Evaluation of the Wear of Vitamin E Stabilized Highly Cross-linked Polyethylene, the Stability of Regenerex® Acetabular Shells and Femoral Components with 32mm Heads. AAOS, 2011.
4. Data on file at Biomet. Laboratory testing is not necessarily indicative of clinical performance.

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Faculty Editor: Amer Mirza, MD
Senior Editors: Rich Myers, MD; Brent Roster, MD
Junior Editors: Alex DeHaan, MD; John Seddon, MD (Credit: Cover Photo)

Letter from the Editors

Welcome to the inaugural issue of *The Oregon Journal of Orthopaedics* (OJO), brought to you by the Department of Orthopaedics & Rehabilitation at Oregon Health & Science University (OHSU) School of Medicine.

The idea for this journal was brought to us by Amer Mirza, MD, one of our traumatologists. We learned through talking with several faculty members that previous efforts directed towards establishing a journal published by the department were met with failure. However, we were undeterred, as we believed that we could make it a success this time around. That said, it took a fair amount of work to bring you this first issue. As many of you reading this probably remember, spare time can be hard to come by as an orthopaedic surgery resident; there are cases to perform, patients to care for on the ward, clinic responsibilities and educational conferences to attend every morning, not to mention reading and studying, all while attempting to maintain a semblance of balance with life outside the hospital. Thankfully, our proposal to get OJO going was met with great encouragement from both the School of Medicine and the Department of Orthopaedics & Rehabilitation. After many meetings, e-mails and brainstorming sessions, we were able to put this inaugural issue together. It goes without saying that we could not have done this without the contributions from the medical school, faculty, residents and fellows, and for that we would like to extend a huge thank you to all who have helped along the way.

Our goals for OJO are many: we are very proud of both our department and residency program here at OHSU, and as such, we wish to showcase some of the research efforts undertaken by the faculty, residents and fellows; a special section highlighting the senior projects of our graduating chiefs will be an annual feature. We will publish updates from programs within the Department of Orthopaedics & Rehabilitation, case reports and review articles on relevant topics. We will publish updates on the several lectureships held at OHSU and the Shriners Hospital for Children – Portland each year. Finally, we hope to use OJO to connect with both OHSU alumni as well as orthopaedic surgeons in the Pacific Northwest. In future issues, we would be delighted to include updates from beyond OHSU; please send us copies of your research, review articles and interesting case reports, as well as updates on the status of orthopaedics in your neck of the woods.

Again, thank you to all who helped make this first issue of *The Oregon Journal of Orthopaedics* a reality. We hope you find this issue both relevant and valuable.

Sincerely,

The Editors

Richard Myers, MD

Brent Roster, MD

Alex DeHaan, MD

John Seddon, MD

Letter from the Chair

Dear Alumni and Friends,

It gives me great pleasure to reach out and connect with you on the status of the Department of Orthopaedics & Rehabilitation at OHSU through this inaugural edition of *The Oregon Journal of Orthopaedics*. I believe that this journal is more than just a departmental medical journal. It will serve as a repository of departmental history and hopefully of the rich tradition of orthopaedics in Oregon. I also believe that it will better connect OHSU to the community of Oregon orthopaedists and to our alumni.

Although it is easy to recognize its value, previous attempts to launch the journal were not successful. It appeared that the efforts required seemed monumental and the resources available were inadequate. I came to a conclusion that a journal could not be done. However, what happened next was not something that I ever expected. It was our residents who came to me and proposed that we initiate a journal. They would be the editors and do the work. There was no encouragement or cajoling from myself or the faculty, which made me ponder the reasons why they wanted to do this. I realized that this is a reflection of their belief in their profession and their department. It is about all that we are supposed to be: a program that cares for the sick, shares knowledge and discovers new ideas. Without that belief and that care, this journal would not have happened. I am extremely proud to be a teacher to these talented and dedicated young men and women in our program.

It is a shared vision of excellence that allows the Department Orthopaedics & Rehabilitation to be a place of ideas, collegiality and care. I believe that those who read the journal will appreciate how this department has blossomed. I hope this journal serves as bridge to you — as you who have been a member of this department will always be a valued member.

Sincerely,

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

Letter from the Program Director

The OHSU Orthopaedic Residency program has grown in both size and stature over the past eight years. During this time period, we have grown from a residency program of 15 residents (three per year) to a total of 25 residents (five per year). Much of this expansion was shepherded by Robert Hart, MD, during his tenure as the Residency Program Director from 2006 to 2011.

Each day starts with a formal fracture rounds conference run by the trauma service from 6 to 6:30 a.m., often staffed by two to four attending physicians. A subspecialty didactic conference then follows from 6:30 to 7:30 a.m. five days a week. Our program annual in-training exam scores show the benefit of this focus on education, and our residents score in the 86th percentile of all programs nationally.

Each orthopaedic intern spends almost three months on the orthopaedic trauma service, covering the first call pager for all daytime consults. It remains a difficult task, but the residents have responded well to this "trial by fire." PGY-2 residents rotate through both the Portland VA Medical Center and the Shriners Hospital for Children – Portland in addition to multiple rotations at OHSU Hospital. We have changed the OHSU Orthopaedic Resident program from three general orthopaedic teams (red, blue and black) to the creation of standard subspecialty teams: trauma, adult reconstruction, sports medicine, oncology, spine, upper extremity, pediatrics and foot and ankle. Each resident rotates through most of these services twice during residency, once as a junior resident and once as a senior resident. The residents also — as they have for many years — rotate twice through Legacy Emanuel Medical Center. We are excited to begin a new alliance in July 2012 with having one PGY-4 resident rotate through Providence St. Vincent Hospital to gain exposure to a standard, community-level orthopaedic practice.

The application process for an orthopaedic residency slot grows more competitive each year. For the 2012 application cycle, we reviewed over 650 applications and interviewed almost 50 applicants for our five residency slots. We continue to receive more requests for fourth-year medical students who want to visit OHSU than we can accommodate during the academic year. Following nationwide statistics, the majority of our chief residents have gone on to excellent orthopaedic fellowships in the past three years.

I took over the reins of Residency Program Director in July 2011. Pamela Feidelson continues in her indispensible role as our Education Manager, keeping the ship upright on a daily basis. We are focused on improving the Educational Program for both residents and outside physicians. Nationally, the educational focus continues to be on communication and teaching residents the six core competencies. In the future, we expect to see residents being graded on completion of formal milestones that will be standardized nationally across many disciplines. In the coming year, we will be formalizing the OHSU Grand Rounds held each Monday morning, and intend to obtain CME credits for these conferences. We welcome attendance from everyone in our orthopeadic community.

Sincerely,

Darin Friess, MD
Program Director and Assistant Professor, OHSU Department of Orthopaedics & Rehabilitation

Adult Reconstruction

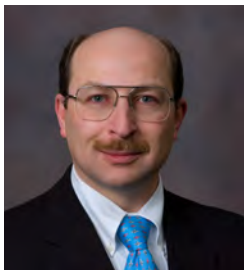
Kathryn Schabel, MD

Thomas Huff, MD

Foot & Ankle

Michael Kennedy, MD

General Orthopaedics



Alex Herzberg, MD

Infectious Disease

Penelope Barnes, MBBS, MRCP, FRCPath, PhD

Pediatrics

Matthew Halsey, MD

Physical Medicine & Rehabilitation

Hans Carlson, MD

Nels Carlson, MD

Podiatry

Trish Ann Marie Otto, DPM

Research

Jamie Fitzgerald, PhD

Brian Johnstone, PhD

Lynn Marshall, ScD

Spine

Alex Ching, MD

Robert Hart, MD

Jung Yoo, MD

Sports Medicine (Primary Care)

James Chesnutt, MD

Melissa Novak, DO

Ryan Petering, MD

Charles Webb, DO
Sports Medicine Fellowship Director

Sports Medicine (Operative)

Dennis Crawford, MD, PhD

Andrea Herzka, MD

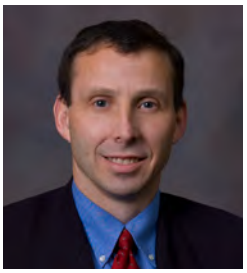
Trauma

Darin Friess, MD
Residency Program Director

Amer Mirza, MD

Orthopaedic Oncology

Yee-Cheen Doung, MD
Assistant Residency
Program Director

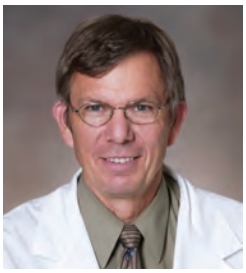


James Hayden, MD, PhD

Upper Extremity

Adam Mirarchi, MD
Co-Director of OHSU
Hand Fellowship

Robert Orfaly, MD



George Brown, MD

Jesse McCarron, MD
Chief of VA Orthopaedics

Ted Vigeland, MD

Michael Aiona, MD
Chief of Staff, Program Director

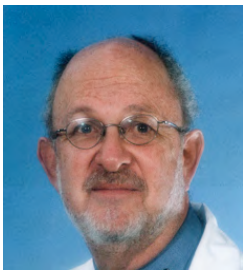
Jeremy Bauer, MD

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

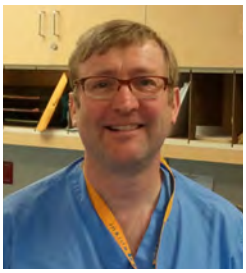
Legacy Emanuel Medical Center

Doug Beaman, MD
Foot & Ankle Specialist

Richard Gellman, MD
Orthopaedic Traumatologist
Foot & Ankle Specialist

Steve Madey, MD
Hand / Upper Extremity Specialist

Kaiser Permanente



Stephen Renwick, MD
Pediatrics

Ronald Turker, MD
Pediatrics

Sports Medicine (Primary Care)

Fellows 2011-12

Rachel Bengtzen, MD

David Bowden, MD, MPH

Spine

Fellows 2011-12

Ahmed Mohamed, MD

Paolo Punsalen, MD

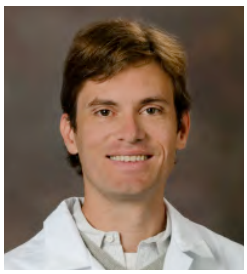
2012-13

Max Berdichevsky, MD

Marc Najjar, MD

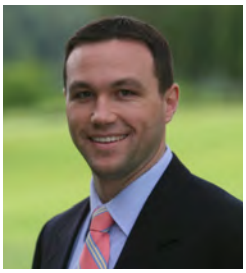
Hand

Fellow 2011-12



Adam Perry, MD

PGY-5 Class



Dawson Brown, MD

Hometown: Missoula, MT
Medical School: Oregon Health & Science University
Fellowship Plans: Sports Medicine - Southern California Orthopaedic Institute, Los Angeles, CA

Peter Fredericks, MD

Hometown: Scottsdale, AZ
Medical School: University of Arizona College of Medicine
Fellowship Plans: Trauma - OrthoIndy, Indianapolis, IN

Matthew "Mac" McElvany, MD

Hometown: Edmond, OK
Medical School: University of California, Davis
Fellowship Plans: Shoulder and Elbow - University of Washington, Seattle, WA

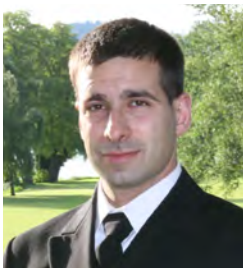
Luke Rust, MD

Hometown: Mount Vernon, WA
Medical School: Dartmouth Medical School
Fellowship Plans: Foot and Ankle - Orthopaedic Associates of Michigan, Grand Rapids, MI

PGY-4 Class

Adam Baker, MD

Hometown: Arkansas City, KS
Medical School: University of Missouri-Columbia
Fellowship Plans: Foot and Ankle - Campbell Clinic, Memphis, TN



Michael Kuhne, MD

Hometown: Plainview, NY
Medical School: The George Washington, University School of Medicine & Health Sciences
Fellowship Plans: Trauma - University of California, San Francisco

Laura Matsen-Ko, MD

Hometown: Seattle, WA
Medical School: Oregon Health & Science University
Fellowship Plans: Adult Reconstruction - Dr. Duwelius, Portland, OR

Jackie Munch, MD

Hometown: Las Vegas, NV
Medical School: University of Michigan Medical School
Fellowship Plans: Sports Medicine - Hospital for Special Surgery, New York, NY

Dan Wieking

Hometown: Walnut Creek, CA
Medical School: University of California, San Diego
Fellowship Plans: Foot and Ankle - Melbourne Orthopaedic Group, Melbourne, Australia

PGY-3 Class

Zach Domont, MD
Hometown: Chicago, IL
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Fellowship Plans: Sports Medicine - To be determined

Kevin Ko, MD
Hometown: Lancaster, PA
Medical School: University of Virginia School of Medicine
Fellowship Plans: Undecided

Trevor McIver, MD
Hometown: Washington, DC
Medical School: Georgetown University School of Medicine
Fellowship Plans: Spine - To be determined

Richard Myers, MD
Hometown: Philadelphia, PA
Medical School: Brown Medical School
Fellowship Plans: Trauma - To be determined

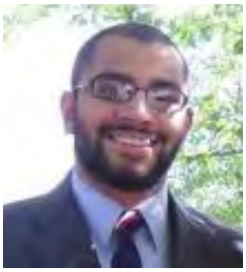
Brent Roster, MD
Hometown: Klamath Falls, OR
Medical School: SUNY Upstate Medical University at Syracuse
Fellowship Plans: Undecided

PGY-2 Class

Alex DeHaan, MD
Hometown: Portland, OR
Medical School: Boston University School of Medicine
Fellowship Plans: Undecided

Dustin Larson, MD
Hometown: Port Angeles, WA
Medical School: Oregon Health & Science University
Fellowship Plans: Broad interest, Undecided

Troy Miles, MD
Hometown: Chico, CA
Medical School: Albert Einstein College of Medicine of Yeshiva University
Fellowship Plans: Undecided



Vivek Natarajan, MD
Hometown: Marlboro, NJ
Medical School: Emory University School of Medicine
Fellowship Plans: Undecided

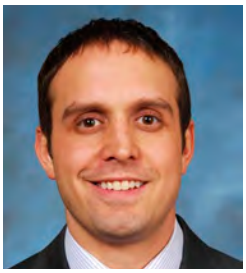
John Seddon, MD
Hometown: Eugene, OR
Medical School: Saint Louis University School of Medicine
Fellowship Plans: Undecided

PGY-1 Class

Jake Adams, MD
Hometown: Elkridge, UT
Medical School: University of Utah School of Medicine
Fellowship Plans: Undecided

Kirsten Jansen, MD
Hometown: Florissant, MO
Medical School: University of Missouri - Kansas City School of Medicine
Fellowship Plans: Undecided

Tom Kowalik, MD
Hometown: Seattle, WA
Medical School: Dartmouth Medical School
Fellowship Plans: Undecided



Jared Mahylis, MD
Hometown: Gillette, WY
Medical School: University of North Dakota Medicine and Health Sciences
Fellowship Plans: Undecided

Farbod Rastegar, MD
Hometown: San Diego, CA
Medical School: University of Chicago, The Pritzker School of Medicine
Fellowship Plans: Undecided

Faculty Profile

With retirement on the horizon, George Brown, MD, looks back on a remarkable career

Born in Oakland, CA in 1942, George moved with his parents to Olympia, WA at a very young age, where he spent the majority of his childhood. He was first introduced to medicine by his father, who practiced as a general surgeon. George attended college at the University of Puget Sound and was accepted to the University of Oregon Medical School (the precursor to OHSU) in 1965. In his first year of medical school, he met a classmate who would become his anatomy lab partner and long-time friend, Ted Vigeland, MD. They became very close as they studied anatomy during the week and carpooled together up to Tacoma on free weekends to visit their girlfriends. George and his girlfriend, Marcia, could not stand the long-distance relationship and got married the summer after his first year of medical school.

It was during medical school when George felt the first call to become an orthopaedist. Early in medical school, he was playing basketball and suffered a lumbar disc herniation. He lived with this for a year and a half before finally seeking advice from one of the attendings on his orthopaedic rotation, Rodney Beals, MD. After being counseled on different options, George elected to have this surgically treated. "Dr. Beals had a large influence on me during medical school," said George. "One of the things he told me was that orthopaedics is a field where the surgeon can make decisions that truly help people."

After medical school, George became a general surgery intern at Beth Israel Deaconess Hospital in Boston, MA. After his one-month rotation in Boston, he officially decided to go into orthopaedics. However, before he could apply to an orthopaedic residency program, he applied for a job with the US Public Health Service. He spent 1971 and 1972 with the Public Health Service in Tanana, AK, where he served as a general practitioner. He worked in a hospital with only 12 beds, yet provided services to a geographic area the size of Montana. He practiced multiple aspects of medicine including eye exams, dental work and obstetrics, along with various other surgical and orthopaedic procedures. "Marcia and I look back on those two years as the most fun and exciting part of our lives," George said.

In the fall of 1972, George went to the University of Iowa for four years of orthopaedic residency training. Three of those years were clinical, and one based mostly on basic science research and electron microscopy investigating properties of different tumors and bone. His senior resident project was on congenital pseudoarthrosis of the clavicle.

After completing his residency in 1976, George and his wife moved to Fairbanks, AK, where he built a single-person private practice through Fairbanks Memorial Hospital. He continued this practice for 18 years, and was typically on-call for the hospital nearly every night. Although he had an interest in orthopaedic trauma, he also enjoyed spine surgery and arthroscopy, which at the time were both becoming popularized with new instrumentation and techniques. It was also in Alaska where he and his wife raised four kids, with whom he would spend as much time with as possible when not in the hospital.

(continued)

Unfortunately, during this time Marcia was diagnosed with Raynaud's syndrome and became very sensitive to Alaska's cold weather. George always had an interest in teaching and began looking for a job at an academic institution where he could both practice medicine and teach residents in a warmer climate. He initially wanted to come back to Oregon and work at OHSU, but when he approached Dr. Beals about a potential job, he was told that "this was not a good time." However, an academic position at the University of New Mexico arose, as they were in need of a generalist with a keen interest in trauma. In 1994, George took the job and worked with the residency program in New Mexico and practiced there for nine years.

In 2003, he placed another phone call to OHSU about a potential job opportunity, as he and his wife were ready for a change in environment. After speaking with Dr. Beals and his good friend and faculty member at OHSU, Ted Vigeland, he was recruited as a generalist/traumatologist at OHSU. Since 2003, he has worked both at OHSU and the Portland VA Medical Center. In 2007, he transitioned over to the Portland VA Medical Center as full-time staff, where he focused his care on trauma, arthroplasty and foot/ankle work. He has been at the Portland VA Medical Center for nearly five years now and is planning on retirement sometime in the summer of 2012.

When reflecting on his career, two unique experiences stand out. In the 1980s, while working in Alaska, he became involved with Orthopaedics

Orthopaedics Overseas, Vietnam

Dr. Brown sailing, four months after a Total Hip Replacement

Overseas and was among the first orthopaedic surgeons to travel to Vietnam to provide health care to the underserved. He would travel to Vietnam for two to four weeks at a time, occasionally bringing his family as well. Looking back, he says it was a very rewarding experience to use his skills and help those truly in need. Another fond memory was his time spent working with Dr. Ignacio Ponsetti with the casting treatment of clubfoot. While in New Mexico, children throughout the southwestern region were referred to him to help correct their deformity, as he had great success with deformity correction.

George said the thing he will miss most during retirement is the time spent working with the residents. During this interview he remarked, "I only hope they learned as much from me as I learned from them." During retirement, George is looking forward to extra time for his hobbies, which include sailing, creating ceramic pottery, traveling and spending time with his wife and family.

From all of the residents past and present, thank you, Dr. Brown, for your teaching and leadership over all these years. You will be missed!

The Editors

Faculty Research/Clinical Spotlight

Digital Preoperative Templating for Total Hip Arthroplasty: The Basics

Kathryn Schabel, MD; Assistant Professor, OHSU Department of Orthopaedics & Rehabilitation

Preoperative templating has been demonstrated to improve the restoration of hip biomechanics during total hip arthroplasty. Accurate templates guide the bone resection levels and implant selections that will best restore leg length and femoral offset, thereby minimizing wear and instability.

Prior to the adoption of digital radiography, either analog film radiographs or printed digitally obtained radiographs were used for templating. Magnified acetate onlay templates were placed over the film. While studies have demonstrated the safety and accuracy of this technique, it has the disadvantage of being dependent on printed films and does not easily create a permanent record of the templating process.[1] The magnification of the acetate onlay templates was also a standardized estimate of the projection magnification of the pelvic radiographs, a value that is dependent on distance between the patient's hip and the film and varies with patient size.

Benefits of digital hip templating include avoiding resource expenditure associated with printing film, improved calibration and potential accuracy of templates, and creation of a permanent record of the templating process. Preoperative templating is an important tool to maximize operating room efficiency and assure that appropriate implants are available.

The accuracy of digital hip templating for total hip arthroplasty depends largely on the quality of radiographs and the placement of a calibration marker of known size at the time of preoperative pelvic radiography. The calibration marker is intended to be placed at the level of the hip in the sagittal plane and as close to the hip joint as possible. Both studies and practical experience have demonstrated a learning curve for radiology technicians in the placement of calibration markers.

An antero-posterior pelvic radiograph with neutral rotation and tilt and symmetric femoral rotation is required for accurate templating. A calibration marker of known size is placed lateral to the greater trochanter of the affected hip or between the patient's legs in a mid-sagittal position near the pubic symphysis *(fig 1)*. For templating, I prefer a 'hip-centered' AP pelvis to visualize more proximal femoral anatomy at the expense of the iliac wings and lower lumbar spine.

The first step in digital templating is calibrating the image *(fig 2)*. The second step is to determine the preoperative leg length discrepancy at the hip using a transischial line and measuring to a consistent point on the lesser tuberosities *(fig 3)*. The existence of a fixed pelvic obliquity, distal leg length inequality, and patient perceptions of limb lengths are all important to consider during the templating process.

The third step is to determine the center of rotation of the hip. This is determined by acetabulum component position. The lateral and the inferior aspect of the teardrop are commonly used landmarks for component placement[2] *(fig 4)*. The size of the acetabulum is determined by setting the template within the sclerotic subchondral bone.

Next, the femoral component is sized and positioned. The size should appropriately fill the metaphyseal bone *(fig 5)*. The vertical position of the stem is considered simultaneously with the varus-valgus position in the femur. The digital

(continued)

template provides several dots indicating the center of the femoral head for the various head-length options for that stem. The stem should be positioned so one of these options is overlying the center of rotation of the acetabular component template if there is no significant leg length difference. If this surgical plan is executed, the patient's hip biomechanics will be restored.

Femoral offset restoration is accomplished with either a standard or higher offset (lateralized) stem. A more varus hip, with a lower neck-shaft angle and center of rotation more caudal than the tip of the greater trochanter, will typically require a lower neck cut and higher offset stem type. A more valgus hip, with a higher neck-shaft angle and center of rotation cranial to the tip of the greater trochanter will typically require a longer neck cut and a less offset stem. It is important to note that excessive hip external rotation or femoral anteversion may be mistaken as a valgus neck-shaft angle and need to be recognized.

The affected hip is usually several millimeters shorter than the well-hip, and restoring the leg length is accomplished by placing the template so that the femoral stem 'dot' that restores the femoral offset is located vertical to the center of rotation by the same number of millimeters that the limp is short. When this surgical plan is executed and the hip is reduced, the templated dot is now the center of the femoral head and becomes the center of rotation. Similarly, selecting a femoral head length represented by a 'dot' that is located medial or lateral to the acetabular center of rotation will create a respective increase or decrease in femoral offset if that surgical plan is executed *(fig 5)*.

The corresponding neck cut for the appropriate stem position is then measured *(fig 6)*. The next step is to make a brief notation on the template for quick intraoperative reference *(fig 7)*. Figure 8 depicts an affected leg template as well as a well-hip template. Well-hip templating is especially useful with extreme deformity such as advanced osteonecrosis of the femoral head or post-traumatic hips. Notice the values are not exact, but very close and likely within measurement error.

The final step in templating for total hip arthroplasty is to critically evaluate your post-operative films *(fig 9)*. An AP pelvis with neutral rotation and leg position should be obtained in the early post-operative period. Critical evaluation of this example reveals an acetabulum component that is slightly over-medialized. (A neck length one size longer than was templated was used.) The femoral stem is also in slight varus. Critical comparison of pre-operative templates and post-operative facilitates surgeon improvement.

Several other sophisticated tools are available with digital templating software, including tools that help measure metaphysis size and femoral offset and may prove beneficial to implant selection and templating efficiency.

Basic templating steps

1. Calibration
2. Determine leg length difference
3. Define center of rotation
4. Femoral component size and position
5. Measure neck cut
6. Identify head length

References

1. MD, P.G., *The Accuracy of Digital Templating in Uncemented Total Hip Arthroplasty*. JOA, 2010. 25(No. 4): p. 529-532.
2. MD, J.V.B., *Digital Templating in Total Hip Arthroplasty*. JBJS, 2004. 86-A(Supplement 2): p. 118-122.

(see figures next page)

Digital Preoperative Templating for Total Hip Arthroplasty: figures

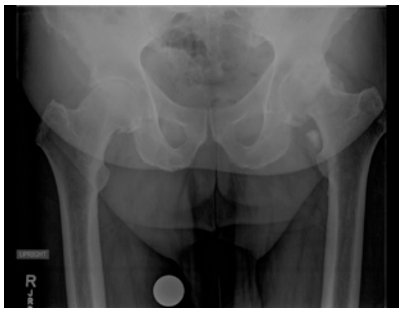


Figure 1: Pre-op X-ray

Figure 2: Step 1

Figure 3: Step 2

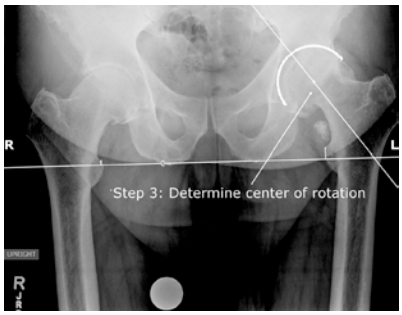


Figure 4: Step 3

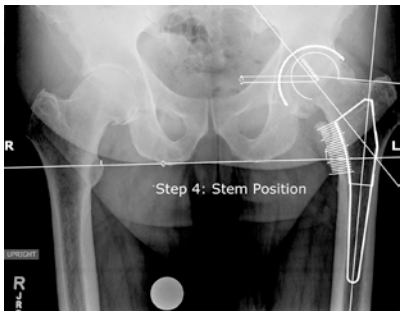


Figure 5: Step 4

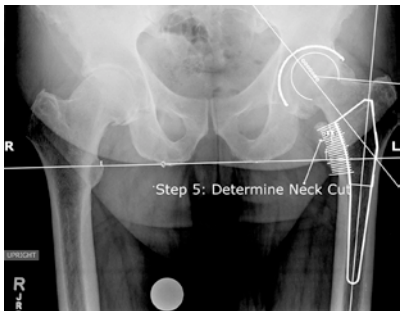


Figure 6: Step 5

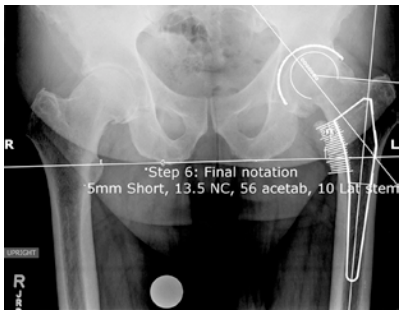


Figure 7: Step 6

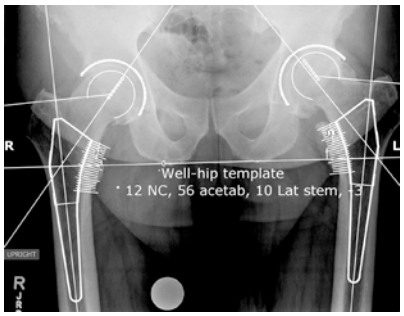


Figure 8: Step 7

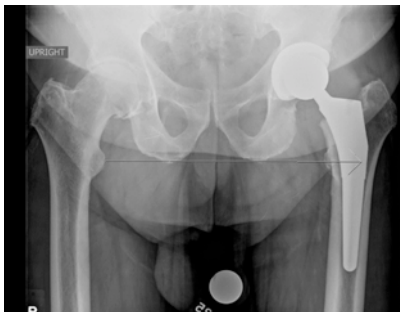


Figure 9: Postoperative

Faculty Research/Clinical Spotlight

Microvascular Surgery Training Lab for Orthopaedic Residents

Adam Mirarchi, MD; Assistant Professor, OHSU Department of Orthopaedics & Rehabilitation

Orthopaedic surgery comprises a wide array of skills that need to be acquired during a five-year residency. Issues related to anatomy, muscle tendon and structure, stability and fixation techniques abound.

In my own experience, however, one of the things that may be overlooked is hand and microvascular surgery. Often the first exposure that residents have to hand surgery is dealing with flexor tenosynovitis or fingertip lacerations in the emergency department. A second exposure may be in the operating room in the middle of the night watching the attending replant a finger. The first situation tends to paint a jaded view of what hand surgery is, and the second is far too advanced for the resident to be able to engage in meaningful participation. Simply put, a complex case is not the appropriate learning environment to begin to understand microsurgical technique.

With that in mind, it is my pleasure to introduce the Microvascular Surgery Training Lab for Orthopaedic Residents. My goal in creating this lab was to give orthopaedic residents an experience in the fundamentals of microvascular surgery before they see it in a real clinical situation. With this lab, residents can learn the basics of microsurgery in a hands-on fashion in a controlled and low stress environment. It gives them a greater understanding of microsurgery, allows them to hone their operative skills, and also helps them to decide if they would like to use some of these techniques in their future practice.

This is a rat lab that takes place on Monday mornings while the junior (3rd year) resident is on the hand/upper extremity service. It is a typically a two-hour session with the resident and myself under the microscope as I provide one-on-one instruction. There are usually about 10 sessions per rotation. The residents are given an instruction manual and then guided stepwise through the curriculum. They learn microsurgical tool handling, basic suture techniques, end-to-end arterial anastomosis, end-to-end venous anastomosis and (time-permitting) interposition graft and end-to-side techniques.

The lab is funded by a generous educational grant from the American Orthopeaedic Association/Orthopedic Medical Grants Association (AOA/OMeGA). We were able to secure over $12,000 to purchase all the necessary equipment, suture material and the anesthesia machines necessary to run this lab. The lab has been up and running since July of 2011 and we have had four residents complete the curriculum to date. I personally enjoy the lab, as it allows me to teach the microsurgical techniques that I have gained, but it also allows me to keep my skills up to date. I am hopeful that the residents who do this lab enjoy it and learn from it as well. I understand that not all residents will want to pursue hand surgery as a career, but the training they receive in soft tissue handling can apply in all areas of surgery and is essential in good surgical technique. I look forward to running this lab for many years to come.

I would like to sincerely thank Kevin Ko, MD, for his assistance in securing the OMeGA grant. His hard work was essential in acquiring the necessary funds to make this lab a reality. Additionally, I would like to thank my research assistant Alyssa Lorzano, who runs the lab on a weekly basis. Without these people, the lab would simply not happen.

Faculty Research/Clinical Spotlight

Update from the Fitzgerald Laboratory

Jamie Fitzgerald, PhD; Assistant Professor, OHSU Department of Orthopaedics & Rehabilitation

The Fitzgerald laboratory conducts basic research in several areas of musculoskeletal biology, with a focus on cartilage and muscle. We recently discovered several new collagen genes and are investigating the role of these in severe congenital muscular dystrophy. Newer projects focus on mutation identification in families with unusual musculoskeletal disorders. In NASA-funded studies, we are investigating whether the absence of significant biomechanical forces in spaceflight causes articular cartilage breakdown.

Orthopaedic Trauma Program

Darin Friess, MD
Assistant Professor, OHSU Department of Orthopaedics & Rehabilitation

Amer Mirza, MD
Assistant Professor, OHSU Department of Orthopaedics & Rehabilitation

Leslie Cline, MS, PA-C
Instructor, OHSU Department of Orthopaedics & Rehabilitation

The OHSU trauma program has grown to be an integral part of musculoskeletal care and resident education over the past five years. Each year, OHSU continues to grow by about 3 to 5 percent in its trauma volume, covering Level 1 through Level 3 trauma activations, and additional isolated extremity injuries. Although the orthopaedic call days are still covered equally by all OHSU faculty, approximately 85 percent of all trauma cases are treated either operatively or non-operatively by the trauma staff. We run an "Orthopaedic Trauma" operating room five days a week from 7:30 a.m. to 6 p.m., with an additional room on Fridays. This allows for the majority of fracture cases to run during prime-time operating room hours. Our trauma staff consists of Amer Mirza, MD, and Darin Friess, MD, the co-directors of the orthopaedic trauma service. Each surgeon covers two days a week of the trauma room. We receive excellent assistance from Leslie Cline, PA, who manages both acute triage and much of our non-operative fracture care. The remainder of the Orthopaedic Trauma rooms are covered by Drs. Orfaly and Mirarchi, with a focus on upper extremity trauma.

On the academic side, our research efforts continue to grow. We currently maintain 22 IRB-approved projects. These include participation in multicenter trials examining outcomes of pelvic ring fractures and scapula fractures, and prospective trials comparing plate versus nail fixation in the distal femur and proximal tibia. Articles we recently published deal with a protocol for treating open calcaneus fractures and the epidemiology of atypical femur fractures. Over the next two years we hope to start conducting more studies on outcome measures. As the population ages, we have continued to focus on better methods for treating geriatric fractures. This includes running a Case Presentation Symposium at the Orthopaedic Trauma Association 2011 Annual Meeting on "Geriatric Hip Fractures: When the table doesn't work." Within the past three years, both Drs. Friess and Mirza have been recipients of the OHSU Resident Teaching Award. The trauma program is covered by one chief resident, two PGY-2 residents and an orthopaedic intern. We run a weekly teaching conference in addition to daily fracture rounds. The residents consistently give the service high marks for its educational value.

We continue to maintain a special interest in both non-unions and infected fractures. This includes working very closely with our infectious disease team. We are developing a standardized treatment protocol for non-unions with a particular eye toward management of infected non-unions. Essentially, we work hard to take care

(continued)

of patients even after the initial injury treatment has not proceeded as planned. We attempt to do so in a fashion that provides the appropriate management so that patients are returned to optimal mobility.

Perhaps the greatest change in our orthopaedic trauma program over the past few years is our desire to easily accept any and all trauma patients and to facilitate transfer of care as necessary. We work with the OHSU Transfer Center, which can be reached at 503 494-7000, to provide access to specialty injury care as necessary. We continue to work on improving methods of reporting back to referring physicians. Dr. Mirza maintains a special interest in treating pelvic ring injuries, with a focus on minimally invasive methods as possible. Dr. Friess has been further developing limb salvage techniques, including management with a Taylor Spatial Frame, as necessary. Both surgeons maintain an interest in all acetabular fractures, periarticular fractures, and complex fractures of the long bones of the upper and lower extremity. Although we are happy to assume patient care at any point in their treatment program, we prefer to have patients transferred to OHSU the day of injury prior to any surgical interventions. Recent literature has supported the benefits of early transfer to a Trauma Center, and we do our best to provide these benefits to our patients.

Pediatric Orthopaedic Surgery

Matthew Halsey, MD
Assistant Professor, OHSU Department
of Orthopaedics & Rehabilitation

The Pediatric Orthopaedic Surgery program at OHSU continues to grow under the guidance of Matthew Halsey, MD. In the past year, there were more than 3,000 patient visits and more than 300 surgeries performed. The program is highly capable of helping patients with most pediatric orthopaedic problems, including scoliosis and other spinal deformities; congenital deformities, including hip dysplasia; upper extremity disorders and clubfoot; traumatic injuries, fractures and dislocations; neuromuscular disorders including cerebral palsy and spina bifida; pediatric sports injuries; and benign and malignant neoplasms.

Dr. Halsey has a special interest in scoliosis and pediatric and adolescent spine deformity. The program evaluates and treats patients with adolescent idiopathic scoliosis (AIS), early-onset scoliosis, neuromuscular scoliosis, syndromic scoliosis, spondylolysis and spondylolisthesis, as well as kyphosis. We have introduced the use of the ScoliScore test at OHSU to help identify those patients who are at minimal or high-risk of progressive AIS. The test analyzes the patient's genetic make-up to assign this level of risk. In the operating room a number of techniques to treat early-onset scoliosis and neuromuscular scoliosis are being used, including casting, using the Mehta technique, and the Vertical Expandable Prosthetic Titanium Rib (VEPTR). Growing rod constructs may also be used. Finally, the program is exploring, with Alex Ching, MD, the use of vertebral staples or tethers for the treatment of early onset scoliosis that does not fuse the spine.

Another special interest of the program is the utilization of surgical hip dislocation and epiphyseal realignment for the treatment of Slipped Capital Femoral Epiphysis (SCFE). Under the direction of both Dr. Halsey and Thomas Huff, MD, patients with moderate to severe slips are offered the option of undergoing this innovative technique to vastly improve the alignment of the proximal femoral epiphysis. When successful the treatment can substantially decrease the risk of developing femoral-acetabular impingement and osteoarthritis. OHSU is currently the only location in Oregon and southwest Washington where this technique is being used for this serious problem.

Finally, during the past year, the Pediatric Orthopaedic Surgery program has established a Pediatric Upper Extremity Clinic that is manned by Adam Mirarchi, MD, and Joel Solomon, MD. These two surgeons bring a wealth of knowledge and experience to the assessment and treatment of congenital hand deformities, brachial plexus birth injury and complex trauma and shoulder problems. To our knowledge this is the only such clinic available outside of the Shriners Hospital for Children – Portland.

Physical Medicine and Rehabilitation

Static magnetic field therapy for carpal tunnel syndrome: a feasibility study.
Colbert AP; Markov MS; Carlson N, MD; Gregory WL; Carlson H, MD; Elmer PJ.
Archives of Physical Medicine and Rehabilitation. 2010 Jul;91(7):1098-104.

OBJECTIVES
To assess the feasibility of conducting trials of static magnetic field (SMF) therapy for carpal tunnel syndrome (CTS), to collect preliminary data on the effectiveness of 2 SMF dosages, and to explore the influence of an SMF on median nerve conduction.

DESIGN
Randomized, double-blind, sham-controlled trial with a 6-week intervention and a 12-week follow-up.

SETTING
University hospital outpatient clinics.

PARTICIPANTS
Women and men (N=60), ages 21 to 65 years, with an electrophysiologically confirmed CTS diagnosis recruited from the general population.

INTERVENTIONS
Participants wore nightly either neodymium magnets that delivered either 15 or 45 mTesla (mT) to the contents of the carpal canal or a nonmagnetic disk.

MAIN OUTCOME MEASURES
Symptom Severity Scale (SSS) and Function Severity Scale (FSS) of the Boston Carpal Tunnel Questionnaire (BCTQ) and 4 median nerve parameters: sensory distal latency, sensory nerve action potential amplitude, motor distal latency and compound motor action potential amplitude.

RESULTS
Fifty-eight of 60 randomized participants completed the study. There were no significant between-group differences for change in the primary endpoint SSS or for FSS or median nerve conduction parameters. For the SSS and the FSS, each group showed a reduction at 6 weeks indicating improvement in symptoms.

CONCLUSIONS
This study showed the feasibility and safety of testing SMF therapy for CTS. There were no between-group differences observed for the BCTQ or median nerve parameters after 6 weeks of SMF therapy. Significant within-group, symptomatic improvements of the same magnitude were experienced by participants in both active and sham magnet groups. Future studies are needed to optimize SMF dosimetry and resolve issues related to the use of sham controls in SMF trials.

An overview of the management of persistent musculoskeletal pain. Carlson H, MD; Carlson N, MD. *Therapeutic Advances in Musculoskeletal Disease.* 2011; 3(2): 91-9.

ABSTRACT

Musculoskeletal pain is a common reason for patients to seek care from health care providers. These conditions are predominantly nontraumatic injuries with a broad differential diagnosis and often without a specific diagnosis despite thorough history and examination. The management of these conditions is often discouraging for patients with continued chronic symptoms despite numerous diagnostic workups and treatment options. Effective communication with respect to the patient's goals is the key to a good outcome. The combination of an accurate diagnosis, an informed, motivated patient and a comprehensive review of the potential treatment options is beneficial for long-term success.

Basic Science

Heritability of articular cartilage regeneration and its association with ear-wound healing.
Farooq MR; Hashimoto S; Johnson EE; Janiszak KL; Fitzgerald J, PhD; Heber-Katz E; Cheverud JM; Sandell LJ. *Arthritis and Rheumatism*, published online Jan 24, 2012.

OBJECTIVE

Emerging evidence suggests that genetic components contribute significantly to cartilage degeneration in osteoarthritis pathophysiology but little evidence is available on genetics of cartilage regeneration. Therefore, we investigated cartilage regeneration in genetic murine models using common inbred strains and a set of recombinant inbred lines generated from LG/J (healer of ear-wounds) and SM/J (non-healer) inbred strains.

METHODS

An acute full-thickness cartilage injury was introduced through microsurgery in the trochlear groove of 8-weeks old mice (N=265). Knee joints were sagittally sectioned and stained with toluidine blue to evaluate regeneration. For ear-wound phenotype, a bilateral 2-mm through-and-through puncture was made (N=229) at 6-weeks and healing outcomes measured after 30-days. Broad-sense heritability and genetic correlations were calculated for both phenotypes.

RESULTS

Time-course studies from recombinant inbred lines show no significant regeneration until 16-weeks post-surgery; at that time, the strains can be segregated into three categories: good, intermediate and poor healers. Heritability (H^2) showed that both cartilage regeneration (H^2 =26%; p=0.006) and ear-wound closure (H^2 =53%; p<0.00001) are significantly heritable. The genetic correlations between the two healing phenotypes for common inbred strains (r=0.92) and recombinant inbred lines (r=0.86) were found to be extremely high.

CONCLUSION

We report that i) articular cartilage regeneration is heritable, ii) the differences between the lines being due to genetic differences and iii) a strong genetic correlation between the two phenotypes exists indicating that they plausibly share a common genetic basis. We, therefore, surmise that LG/J by SM/J intercross can be used to dissect the genetic basis of variation in cartilage regeneration.

Removal of broken hardware. Hak DJ; McElvany M , MD. *The Journal of the American Academy of Orthopaedic Surgeon*. 2008;16(2):113-20.

ABSTRACT

Despite advances in metallurgy, fatigue failure of hardware is common when a fracture fails to heal. Revision procedures can be difficult, usually requiring removal of intact or broken hardware. Several different methods may need to be attempted to successfully remove intact or broken hardware. Broken intramedullary nail cross-locking screws may be advanced out by impacting with a Steinmann pin. Broken open-section (Küntscher type) intramedullary nails may be removed using a hook. Closed-section cannulated intramedullary nails require additional techniques, such as the use of guidewires or commercially available extraction tools. Removal of broken solid nails requires use of a commercial ratchet grip extractor or a bone window to directly impact the broken segment. Screw extractors, trephines, and extraction bolts are useful for removing stripped or broken screws. Cold-welded screws and plates can complicate removal of locked implants and require the use of carbide drills or high-speed metal cutting tools. Hardware removal can be a time-consuming process, and no single technique is uniformly successful.

Spine

Relationship of donor variables and graft dimension on biomechanical performance of femoral ring allograft. Hart RA, MD; Daniels A; Bahney T; Tesar J; Sales JR; Bay B. *Journal of Orthopaedic Research*, 29(12):1840-1845, 2011.

ABSTRACT

Structural femoral ring allograft is commonly used in interbody spinal arthrodesis. Fractures of implanted femoral ring allograft have been reported. Data to guide donor screening and tissue processing by allograft tissue banks for factors that affect graft strength are incomplete. Fresh frozen human femora from 34 cadaveric donors were sectioned into ten 20-mm thick specimens. Bone mineral density (BMD), donor age, and graft dimensions were recorded for each specimen. Three hundred twenty-seven specimens were tested in quasi-static axial compression. Linear regression models compared load to failure with BMD, sex-specific donor age, minimum/maximum cortical wall thickness, and minimum/maximum outer ring diameter. Correlations between minimum and maximum cortical wall thickness and load to failure were significant ($r = 0.73$, $p < 0.001$ and $r = 0.74$, $p < 0.001$, respectively). BMD showed a weaker negative correlation with load to failure ($r = -0.11$, $p = 0.05$). Correlations between load to failure and minimum and maximum outer ring diameter and age ($r = 0.06$, $p = 0.31$) were not significant. We found that the minimum and maximum cortical wall thicknesses of femoral ring allograft are strongly correlated with the axial compressive load to failure of the graft. Other tested parameters did not prove to be effective predictors of resistance to axial loading.

Predictors and prevalence of patients undergoing additional kyphoplasty procedures after an initial kyphoplasty procedure. Tatsumi RL; Ching AC, MD; Byrd GD; Hiratzka JR; Threlkeld JE; Hart RA, MD. *The Spine Journal*. 2010 Nov;10(11):979-86.

BACKGROUND CONTEXT

Vertebral cement augmentation, including kyphoplasty, has been shown to be a successful treatment for pain relief for vertebral compression fracture (VCF). Patients can sustain additional symptomatic VCFs that may require additional surgical intervention.

PURPOSE

To examine the prevalence and predictors of patients who sustain additional symptomatic VCFs that were treated with kyphoplasty.

STUDY DESIGN

A retrospective review of patients who previously underwent kyphoplasty for VCFs and had additional VCFs that were treated with kyphoplasty.

PATIENT SAMPLE

A total of 256 patients underwent kyphoplasty for VCFs from 2000 to 2007 at a single medical center.

OUTCOME MEASURES

The outcome measure of interest was the need for an additional kyphoplasty procedure for a symptomatic VCF.

METHODS

Risk factors such as age, sex, smoking status, and steroid use were assessed, as well as bisphosphonate use. Sagittal spinal alignment via Cobb angles for thoracic, thoracolumbar, and lumbar regions was assessed.

RESULTS

About 22.2% of the patients had an additional symptomatic VCF that was treated with a kyphoplasty procedure. Steroid use was the only significant risk factor for predicting patients with additional symptomatic VCFs who underwent additional kyphoplasty. The average time to the second VCF was 33 days. Adjacent-level VCFs were most common in the thoracic and thoracolumbar spine. Bisphosphonate use was not shown to be protective of preventing additional VCFs during this follow-up period.

CONCLUSION

This is the first single-center review of a large cohort of patients who underwent additional-level kyphoplasty for symptomatic VCFs after an index kyphoplasty procedure. Our results suggest that patients with a VCF who use chronic oral steroids should be carefully monitored for the presence of additional symptomatic VCFs that may need surgical intervention. Patients with prior thoracic VCFs who have additional back pain should be reevaluated for a possible adjacent-level fracture.

Short segment coronal plane deformity after two-level lumbar total disc replacement.
Ching AC, MD; Birkenmaier C; Hart RA, MD. *Spine*. 2010 Jan 1;35(1):44-50.

STUDY DESIGN
Case series of 2-level lumbar disc arthroplasties treated by the authors.

OBJECTIVE
Identify a potentially significant failure rate of 2-level disc arthroplasty due to coronal plane instability.

SUMMARY OF BACKGROUND DATA
Arthrodesis remains the standard for surgical treatment of degenerative disc disease, despite concerns about adjacent level degeneration and persistent postoperative pain in some patients. Total disc arthroplasty has been proposed as a way to reduce these problems. Intermediate follow-up of 1-level procedures demonstrates promising safety and improved pain scores. Some surgeons are expanding the surgical indications to more challenging settings, including multilevel disease.

METHODS
We report here our experience with 4 cases of failed 2-level disc arthroplasty.

RESULTS
We have seen 4 patients with failed 2-level lumbar arthroplasty, of those 2 performed in Germany and 2 performed in our state by 2 different experienced spine surgeons. The 2 local cases represent 29% (2/7) of all 2-level CHARITE arthroplasties performed within our state. All 4 patients presented within 11 to 13 months of implantation with increased back pain and radicular symptoms. The mechanism of failure was coronal instability due to small deviations of the prostheses from a midline position in all 4 cases.

CONCLUSION
Disc arthroplasty appears to be a safe and effective treatment for 1-level lumbar degenerative disc disease. Although promising biomechanical reports of 2-level models are emerging, we are concerned by the rate of failures of 2-level arthroplasty that we are seeing. It appears that the potential for coronal plane instability increases as the number of levels increases. Given the costs and risks associated with these procedures, we feel that this issue deserves the attention of the spine surgery community despite the limited numbers in this report.

Perioperative complications of combined anterior and posterior cervical decompression and fusion crossing the cervico-thoracic junction. Hart RA, MD; Tatsumi RL; Hiratzka JR; Yoo JU, MD. *Spine*. 2008 Dec 15;33(26):2887-91.

STUDY DESIGN
Retrospective review.

OBJECTIVE
To determine the perioperative complications for patients undergoing single stage, multilevel, anterior, and posterior cervical fusions crossing the cervico-thoracic junction.

SUMMARY OF BACKGROUND DATA
Cervical spinal stenosis with kyphosis involving 3 or more disc levels is often treated via combined anterior decompression and posterior instrumented fusion. When long cervical fusions end at C7, many surgeons extend the posterior fusion across the cervico-thoracic junction to reduce the potential for adjacent segment breakdown. Perioperative complications associated with these procedures have not previously been described.

METHODS
A retrospective review of perioperative complications occurring in patients undergoing combined anterior decompression and posterior instrumented arthrodesis crossing the cervico-thoracic junction. The effect of operative time, blood loss, and fluid replacement on the need for extended intubation was tested with a Fisher exact test.

RESULTS
Thirteen patients fit the inclusion criteria. Nine patients experienced at least 1 complication (69%, 9/13) during the perioperative period, comprising 16 minor and 5 major complications. The most common complications were dysphagia (46%, 6/19) and airway edema requiring extended intubation (38%, 5/13).

CONCLUSION
Complications are frequent following these procedures, although the majority were minor and resolved without lasting effect. Airway edema requiring prolonged intubation or reintubation was frequent. With the numbers available, we were unable to show a relationship between the need for extended intubation and variables including operative time, blood loss, or volume of fluid replacement.

Back pain, neurogenic symptoms, and physical function in relation to spondylolisthesis among elderly men. Denard PJ; Holton KF; Miller J; Fink HA; Kado DM; Marshall LM, ScD; Yoo JU, MD; Osteoporotic Fractures in Men (MrOS) Study Group. *Spine Journal*. 2010 Oct;10(10):865-73.

BACKGROUND CONTEXT

Degenerative spondylolisthesis is a presumed cause of back pain. Previous studies of spondylolisthesis and back pain included only women or combined results for men and women. Comparisons of the frequency of back pain, neurogenic symptoms, and functional limitations specifically among elderly men with and without spondylolisthesis are needed.

PURPOSE

To determine associations of prevalent spondylolisthesis with back pain symptoms, neurogenic symptoms, and functional limitations among elderly men.

STUDY DESIGN/SETTING

Cross-sectional epidemiologic study conducted within the Osteoporotic Fractures in Men (MrOS) cohort. The MrOS cohort is composed of 5,995 community-dwelling men aged 65 years or older who were recruited at six US academic medical centers. Extensive self-reported data and lumbar spine radiographs were obtained for all MrOS participants at baseline.

PATIENT SAMPLE

For this study, 300 men were selected at random specifically for the evaluation of spondylolisthesis on the baseline spine radiographs.

OUTCOME MEASURES

Standardized questionnaires were used to assess self-reported back pain, leg pain (radiculopathy), lower extremity numbness (paresthesias), and lower extremity weakness occurring in the past 12 months and to ascertain current difficulty with activities of daily living.

METHODS

In the present study, radiographic spondylolisthesis was classified as forward slip of ≥5%. Prevalence of back pain, neurogenic symptoms, and difficulty with activities of daily living was compared between men with and without spondylolisthesis using chi-square or Fisher exact tests.

RESULTS

Spondylolisthesis was present among 92 (31%) men. Among men with and without spondylolisthesis, back pain (63% vs. 67%, p=.46) and moderate/severe back pain (41% vs. 38%, p=.76) were reported with similar frequency. Men with spondylolisthesis more often reported radiculopathy (33% vs. 22%, p=.06), paresthesias (18% vs. 11%, p=.10), and weakness (18% vs. 9%, p=.02) in the lower extremities, as well as difficulty walking two to three blocks (21% vs. 11%, p=.03), doing their own shopping (8% vs. 2%, p=.04), and getting in/out of a car (14% vs. 6%, p=.03), compared with men without spondylolisthesis.

CONCLUSIONS

Among elderly men, spondylolisthesis was associated with neurogenic symptoms and lower extremity functional limitations; however, spondylolisthesis was not associated with a higher likelihood of back pain in this population.

Lumbar spondylolisthesis among elderly men: prevalence, correlates, and progression.
Denard PJ; Holton KF; Miller J; Fink HA; Kado DM; Yoo JU, MD; Marshall LM, ScD; Osteoporotic Fractures in Men (MrOS) Study Group. *Spine*. 2010 May 1;35(10):1072-8.

STUDY DESIGN
Prospective cohort study.

OBJECTIVE
Estimate the prevalence of spondylolisthesis and determine the factors associated with higher or lower prevalence among men aged 65 years or older.

SUMMARY OF BACKGROUND DATA
Spondylolisthesis prevalence is reported to increase with age and to be higher among women than men. Among women aged > or =65 years, prevalence was estimated to be 29%, but no estimates among men of this age have been reported. METHODS.: Lateral lumbar spine radiographs were obtained at baseline and a follow-up visit in the Osteoporotic Fractures in Men (MrOS) study, a cohort of community dwelling men ages > or =65 years. Average time between radiographs was 4.6 (+/-0.4) years. For the present study, 300 men were sampled at random at baseline. Of these, 295 had a usable baseline radiograph; 190 surviving participants had a follow-up radiograph. Spondylolisthesis was defined as a forward slip > or =5%. Progression was defined as a 5% increase in slip severity on the follow-up radiograph. Associations of spondylolisthesis prevalence with baseline characteristics were estimated with age-adjusted prevalence ratios and 95% confidence intervals from log binomial regression models.

RESULTS
The mean (SD) age of the men studied was 74 (+/-6) years. Prevalence of lumbar spondylolisthesis was 31%. Spondylolisthesis was observed at the L3/4, L4/5, and L5/S1 levels. In 96% with spondylolisthesis, only one vertebral level was involved. The degree of slip ranged from 5% to 28%, and nearly all listhesis was classified as Meyerding grade I. During follow-up, 12% of men with prevalent spondylolisthesis had progression; 12% without baseline spondylolisthesis had new onset. Prevalence did not vary by height, BMI, smoking history, diabetes, or heart disease. However, men with spondylolisthesis more often reported higher levels of physical activity or walking daily for exercise than men without spondylolisthesis.

CONCLUSION
Spondylolisthesis may be more common among older men than previously recognized.

Use of bone morphogenetic proteins in spinal fusion surgery for older adults with lumbar stenosis: trends, complications, repeat surgery, and charges. Deyo RA; Ching A, MD; Matsen L; Martin BI; Kreuter W; Jarvik JG; Angier H; Mirza SK. *Spine.* 2012 Feb 1;37(3):222-30.

STUDY DESIGN
Retrospective cohort study of Medicare claims.

OBJECTIVE
Examine trends and patterns in the use of bone morphogenetic proteins (BMP) in surgery for lumbar stenosis; compare complications, reoperation rates, and charges for patients undergoing lumbar fusion with and without BMP.

SUMMARY OF BACKGROUND DATA
Small, randomized trials have demonstrated higher rates of solid fusion with BMP than with allograft bone alone, with few complications and, in some studies, reduced rates of revision surgery. However, complication and reoperation rates from large population-based cohorts in routine care are unavailable.

METHODS
We identified patients with a primary diagnosis of lumbar stenosis who had fusion surgery in 2003 or 2004 (n = 16,822). We identified factors associated with BMP use: major medical complications during the index hospitalization, rates of rehospitalization within 30 days, and rates of reoperation within 4 years of follow-up (through 2008).

RESULTS
Use of BMP increased rapidly, from 5.5% of fusion cases in 2003 to 28.1% of fusion cases in 2008. BMP use was greater among patients with previous surgery and among those having complex fusion procedures (combined anterior and posterior approach, or greater than 2 disc levels). Major medical complications, wound complications, and 30-day rehospitalization rates were nearly identical with or without BMP. Reoperation rates were also very similar, even after stratifying by previous surgery or surgical complexity, and after adjusting for demographic and clinical features. On average, adjusted hospital charges for operations involving BMP were about $15,000 more than hospital charges for fusions without BMP, though reimbursement under Medicare's Diagnosis-Related Group system averaged only about $850 more. Significantly fewer patients receiving BMP were discharged to a skilled nursing facility (15.9% vs. 19.0%, $P < 0.001$).

CONCLUSION
In this older population having fusion surgery for lumbar stenosis, uptake of BMP was rapid, and greatest among patients with prior surgery or having complex fusion procedures. BMP appeared safe in the perioperative period, with no increase in major medical complications. Use of BMP was associated with greater hospital charges but fewer nursing home discharges, and was not associated with reduced likelihood of reoperation.

Dropped-head syndrome resulting from injury to the central spinal cord at the upper cervical level. Rust CL; Ching AC, MD; Hart RA. *Journal of Bone and Joint Surgery - British Volume*. 2011 Apr;93(4):503-6.

ABSTRACT

There are many causes of paraspinal muscle weakness which give rise to the dropped-head syndrome. In the upper cervical spine the central portion of the spinal cord innervates the cervical paraspinal muscles. Dropped-head syndrome resulting from injury to the central spinal cord at this level has not previously been described. We report two patients who were treated acutely for this condition. Both presented with weakness in the upper limbs and paraspinal cervical musculature after a fracture of C2. Despite improvement in the strength of the upper limbs, the paraspinal muscle weakness persisted in both patients. One ultimately underwent cervicothoracic fusion to treat her dropped-head syndrome.

While the cause of the dropped-head syndrome cannot be definitively ascribed to the injuries to the spinal cord, this pattern is consistent with the known patho-anatomical mechanisms of both injury to the central spinal cord and dropped-head syndrome.

Upper Extremity

Concurrent Little Leaguer's elbow and shoulder in a 15-year-old baseball pitcher and football quarterback. Domes CM; Petering RC, MD; Chesnutt JC, MD; Mirarchi. *Orthopedics*. 2012 Jan 16;35(1):e97-e100.

ABSTRACT

Little Leaguer's elbow and Little Leaguer's shoulder are overuse pathologies seen in overhead-throwing athletes. No instance of simultaneously occurring pathologies has been published. A 15-year-old baseball pitcher and football quarterback developed pain in his throwing shoulder and elbow during spring baseball, which partially resolved with several months of rest. During fall football practice, he felt a pop and pain over his medial throwing elbow. Five days after the initial injury, medial elbow tenderness, mild swelling, and decreased range of motion were noted. Radiographs revealed a Salter I avulsion fracture of the medial humeral epicondyle (Little Leaguer's elbow) and a periosteal reaction along the lateral aspect of the humeral metadiaphysis with slight widening (Little Leaguer's shoulder). Surgical fixation of the medial epicondyle fracture and nonoperative treatment of the shoulder pathology were performed. Two-year follow-up radiographs showed a healed medial epicondylar fracture and resolution of the periosteal reaction of the humeral metadiaphysis. The patient returned to full activity and was starting quarterback for his football team. Biomechanical forces specific to overhead-throwing activities are associated with the development of Little Leaguer's elbow and shoulder. Treatments of both pathologies remain controversial, with either initial operative vs nonoperative care. In this patient, a good outcome was achieved with surgical fixation of the elbow fracture and conservative management of the shoulder pathology. Educating coaches and parents on proper throwing technique and pitching limits should be the first step in reducing the occurrence of either pathology in this population.

Cadaveric biomechanical analysis of the distal radioulnar joint: influence of wrist isolation on accurate measurement and the effect of ulnar styloid fracture on stability. Mirarchi AJ, MD; Hoyen HA; Knutson J; Lewis S. *The Journal of Hand Surgery*. 2008 May-Jun;33(5):683-90.

PURPOSE

Distal radioulnar joint (DRUJ) instability can be tested using biomechanical cadaveric models, but inadequate isolation of the DRUJ during instability testing may introduce measurement error. The first goal of this investigation was to develop an effective model for isolating the DRUJ during biomechanical cadaveric testing. The second goal was to use this model to measure the effect of ulnar styloid fracture and subsequent repair on DRUJ kinematics in cadaveric specimens.

METHODS

Five fresh cadaveric arms were tested using a Biodex System 3 device. The humerus was clamped firmly, the forearm rotated freely, and the hand/carpus was attached to the Biodex device. Three methods of DRUJ isolation were tested. In method 1, the specimen was firmly clamped at the midshaft humerus and the hand/carpus was clamped. In method 2, the distal radius was additionally fixed to the carpal clamp to reduce carpal motion. In method 3, proximal fixation of the olecranon to an elbow rest was added. Testing was done before ulnar styloid osteotomy (group 1), after osteotomy through dorsal capsulotomy (group 2), and after styloid fragment repair with a screw (group 3). Twelve pronation-supination cycles were performed while work of rotation, maximum pronation torque, and maximum supination torque for each method and group were recorded.

RESULTS

Analysis of clamping methods showed work of rotation, maximum pronation torque, and maximum supination torque for method 3 were greater than those for methods 1 and 2. Analysis of groups showed the following statistically significant trends for work of rotation: group 1 >>> group 3 > group 2. Maximum supination torque similarly showed statistically significant differences: group 1 >>> group 3 > group 2. Maximum pronation torque showed a similar trend: group 1 >>> group 3 > group 2. However, in contrast with work of rotation and maximum supination torque, group 3 maximum pronation torque was not statistically different from that of group 2.

CONCLUSIONS

Increased work of rotation represents decreased joint laxity. Maximum supination torque and maximum pronation torque assess soft tissue restraints at joint end points. Method 3 showed the greatest values in these variables, indicating reduced elbow and carpal motion and better DRUJ isolation. Work of rotation and maximum supination torque in group 3 were increased from those of group 2 but not restored to group 1 values. Styloid fixation restores some soft tissue tension but laxity persists. Maximum pronation torque in group 3 was not increased significantly from that of group 2, perhaps from dorsal capsulotomy causing soft tissue injury and laxity not corrected with fixation. The influence of ulnar styloid fracture on dynamic DRUJ kinematics can be demonstrated in this model.

Trauma

Immediate weight bearing after ORIF of supracondylar femur fractures in an elderly population

Darin Friess, MD; Amer Mirza, MD; Andrew Stith, BS

PURPOSE

Supracondylar femur fractures in geriatric patients repaired with locking plates have traditionally been managed post-operatively with delayed weight bearing for up to 12 weeks. The purpose of this study is to prospectively observe the rate of fixation failure in distal femur fractures treated with immediate weight bearing.

METHODS

Thus far 9 patients have enrolled in the ongoing study. Patients had an average age of 81 years; 12.5% smoked tobacco, 50% were overweight; and 37.5% walked with assistance (cane or walker) prior to fracture. Synthes distal femur steel LISS plates with 13 proximal shaft screw holes were utilized. Prospective data on fracture characteristics, healing, SF-12 and Knee Society outcomes scores are being collected.

RESULTS

100% of patients treated thus far with immediate weight bearing achieved successful union within 12 weeks. At 6 weeks post-operatively all patients were able to bear full weight with a walker and one patient was using a cane. Average metaphyseal locking screws filled 6/7 (92.9%) holes with 4/13 (30.8%) holes filled in the femoral shaft. No patients had hardware failure. One patient exhibited a 3° varus collapse.

CONCLUSION

Immediate weight bearing after ORIF of supracondylar femur fractures with a locking plate in selected geriatric patients can lead to successful union of the fracture without hardware failure and may be an acceptable alternative to delayed weight bearing.

Early results of percutaneous lumbopelvic fixation of vertically unstable pelvic ring injuries

Amer Mirza, MD; Kate Watson, BS; Natalie Zusman, BA; Alex Ching, MD

PURPOSE

Evaluate the early results of a percutaneous approach for lumbopelvic fixation in vertically unstable pelvic ring injuries.

METHODS

A retrospective review of patients undergoing percutaneous lumbopelvic fixation at a Level 1 trauma institution was performed. Patient records were reviewed for fracture classification, operative time, estimated blood loss, implant failure, loss of reduction, postoperative infection, neurologic deficit, and wound dehiscence.

RESULTS

Ten consecutive patients were in the study group. Over the study period, 140 (93%) patients underwent repair of pelvic ring injuries without lumbopelvic fixation. Six patients had associated thoracolumbar injuries. Patients were followed for an average of 4.7 months. The average operative time for lumbopelvic instrumentation was 122.3 minutes. The average estimated blood loss was 190.3 ml. There were 2 (20%) adverse events in our study population. One patient developed a deep wound infection. This patient had bilateral internal iliac artery embolization prior to lumbopelvic fixation. One patient had hardware failure. There were no cases of loss of reduction.

CONCLUSIONS

Triangular osteosynthesis can be achieved for vertically unstable pelvic ring injuries with a combination of percutaneous lumbopelvic fixation and iliosacral screw insertion. This allows a safe minimally invasive approach for the treatment of these challenging injuries.

Locked plating versus intramedullary nailing of periprosthetic femur fractures after TKA

John G Horneff, MD; John Alan Scolaro, MD; S. Mehdi Jafari, MD; Amer J Mirza, MD; Javad Parvizi, MD; Samir Mehta, MD

PURPOSE

Evaluate and compare treatment outcomes of Periprosthetic Distal femur fractures around total knee arthroplasty (TKA) managed with intramedullary nails versus locking lateral plates.

METHODS

A multi-center retrospective review was performed. 68 post-TKA periprosthetic fractures were identified and met inclusion criteria. Outcome variables were incidence revision surgery, time to full weight bearing, and time to fracture union. Radiographs were reviewed at 6, 12, 24 and 36 weeks to assess fracture union. Statistical analysis was performed using Fisher's exact test.

RESULTS

Locked plating patients had longer operative times (161minutes vs. 111 minutes; p=0.01) and greater need for blood transfusion (p=0.01). At 24 weeks post-operatively, locked plating showed a greater percentage of radiographically united patients (24/28; 85.7%) than intramedullary nailing (25/40; 62.5%) (p=0.05). This difference was more pronounced at 36 weeks postoperatively (26/28; 92.9% vs 26/40; 65%) (p=0.01). Mean time to full weight-bearing was similar for both groups (11.6 weeks vs. 10.9 weeks). Intramedullary nail treatment trended towards increased revision rates compared to locking plates (18 vs 6; p=0.07).

CONCLUSION

Patients treated with locked plating had a greater union rate and fewer revision surgeries than patients managed with an intramedullary device in periprosthetic femur fractures after TKA.

Complications associated with the use of the Reamer-Irrigator-Aspirator device

Amer J Mirza, MD; Jayme Hiratzka, MD; Darin M Friess, MD; Tahnee Groat, MPH; Thomas J Ellis, MD

PURPOSE

Evaluate operative time, blood loss and adverse events associated with the early use of the Reamer-Irrigator-Aspirator device.

METHODS

A retrospective review of patients undergoing a RIA procedure at one Level 1 trauma center was performed. Patient records were reviewed for occurrence of adverse events. Operative time and blood loss was compared in femoral nailing procedures with the use of RIA versus standard reamers. Unpaired t-tests were calculated with a level of significance $P < 0.05$.

RESULTS

Thirty-one patients underwent an RIA procedure and composed our study population. 17 (55%) patients had the RIA device used for autologous bone graft harvest. 14 patients had the RIA device used during intramedullary nailing procedure for femoral shaft fractures. There were 7 adverse events (23%). Two patients had an iatrogenic perforation of the femoral cortex. Operative times and intraoperative blood loss was compared with the use of the RIA versus traditional reamers during femoral shaft intramedullary nailing procedures. The results are summarized in Table 1.

CONCLUSION

In our study population, there was a 23% incidence of adverse events associated with the use of the RIA device.

Table 1

REAMER TYPE	OPERATIVE TIME (MIN)	ESTIMATED BLOOD LOSS (ML)
RIA (n=14)	206	416
Non-Ria (n=10)	175	280
	p=0.23	p=0.30

Analysis of the demographic and technical factors associated with iliac cortical perforation during iliosacral screw insertion

J. Stuart Melvin, MD; Nicholas Pulos, BA; Keith Baldwin, MD, MPH, MSPT; Amer J. Mirza, MD; Michael J. Gardner, MD; Samir Mehta, MD

PURPOSE

Iliosacral screws are a common fixation method for posterior pelvic ring injuries. Perforation of the outer cortex of the ilium during screw insertion is observed. This complication may compromise fixation stability. This investigation sought to identify risk factors associated cortical perforation during iliosacral screw insertion.

METHODS

142 consecutive patients who had undergone iliosacral screw fixation of the posterior pelvic ring were retrospectively identified from 3 Level 1 trauma centers. Postoperative CT scans of the pelvis were evaluated for outer iliac cortex perforation.

RESULTS

236 iliosacral screws with washers were inserted for an average of 1.66 screws per patient. 28 screws (11.9%) in 26 patients (18.3%) perforated the outer cortex of the ilium. Patients with screw perforation were older (52.61 years vs. 38.6 years; p=0.0002) and more likely to be diabetic (p=0.0071). Perforated screws were more often fully threaded (p=0.0315). Patients with a perforated cortex had significantly more screws inserted (1.92 vs 1.60; p=0.037).

CONCLUSION

Factors associated with increased risk of cortical perforation include poor bone quality, number of screws inserted, and insertion of fully threaded screws.

Immediate weight bearing on comminuted tibial shaft fractures

Amer Mirza, MD; Dawson Brown, MD; Patrick Denard, MD; Tahnee Groat, MPH, MD; Thomas Ellis, MD

PURPOSE

Evaluate outcomes for immediate weight-bearing following intramedullary nailing stabilization of AO/OTA 42B & 42C comminuted tibial shaft fractures.

METHODS

Retrospective review of patients at a Level 1 trauma center was performed. Patients were identified using billing database query with CPT codes. Fractures were classified using the AO/OTA classification system. Inclusion criteria were: (1) Type 42-B & 42-C type fractures, (2) Skeletal maturity, (3) Minimum 12 weeks follow-up. Exclusion criteria included associated injury precluding full weight bearing. Time to fracture callus formation, time to fracture union, hardware failure, and need for secondary procedures was assessed. Fischer exact tests were calculated with a level of significance of $P < 0.05$.

RESULTS

30 fractures met inclusion criteria for analysis. There were 15 patients in each study group (WBAT vs. NWB). There were 19 (63%) AO/OTA type 42B fractures and 11 (37%) type 42C fractures. There were twenty-one (73%) open fractures. Table 1 summarizes our results.

CONCLUSION

In our study population, immediate weight bearing of comminuted tibial shaft fractures with less than 50% cortical contact did not significantly increase the incidence of hardware failure, nonunion, or time to fracture union.

Table 1

	FRACTURE CALLOUS (WKS)	FRACTURE UNION TIME (WKS)	NONUNION	HARDWARE FAILURE (N)
Full Weight Bearing (n=15)	9.3	27.7	2 (13%)	1
Non Weight Bearing (n=15)	8.9	19.1	3 (20%)	0
Statistical Significance	p=0.79	p=0.17	p=0.1284	

Management of lower extremity fasciotomy incisions: Should we VAC?

Minh Nguyen, MD; Thomas Ellis, MD; Tahnee Groat, MPH, Amer Mirza, MD

PURPOSE

Study the effect of wound vacuum-assisted closure device (VAC KCI San Antonio, Texas) on incidence of split-thickness skin grafting (STSG) of fasciotomy wounds in the lower extremity.

DESIGN

Retrospective cohort review

SETTING

Two Level 1 trauma medical centers

PATIENTS

Patients were identified by CPT (Current Procedural Terminology) billing inquiry of lower-extremity fasciotomy between 2006 and 2011.

RESULTS

38 patients had a VAC dressing applied after lower extremity fasciotomy. Average time to closure or coverage was 9.5 days (1-60 days, SD = 13.7). There were three late infections. Sixteen patients (42%) in the VAC group required STSG with the remaining 22 (58%) undergoing DPC (P = 0.0169). 35 patients did not have a VAC dressing applied after fasciotomy and required delayed coverage or closure. Average time to closure or coverage was 6.9 days (1-31 days, SD = 6). 7 (20%) required STSG. 28 (80%) underwent DPC (P = 0.0037). There were no late infections.

CONCLUSIONS

Use of the VAC device in lower extremity fasciotomies increased the incidence of STSG in comparison to fasciotomy wounds that were managed without a VAC device.

Table 1: Fasciotomy Outcomes With And Without Wound VAC Therapy

TREATMENT	WOUND VAC	NO VAC	TOTAL
Split Thickness Skin Graft	16	7	23
Delayed Primary Closure	22	28	50
Total	38	35	73
% of treatment group requiring STSG	42%	20%	
Statistical significance between the treatment groups for the outcome of requiring STSG	p=0.0485		

Percutaneous plating of the distal femur: Risk of injury to the perforating branches of the profunda femoris artery

Adam Baker, MD; Brent Roster, MD; Amer Mirza, MD

PURPOSE

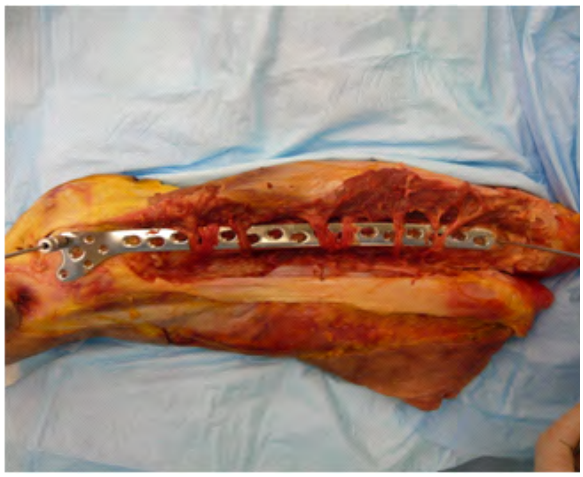
Map the anatomic course of the perforating branches of the profunda femoris artery to determine the risk of injury during percutaneous plate insertion along the lateral femoral shaft.

METHODS

37 adult fresh frozen cadaveric lower extremity specimens were instrumented with precontoured distal femoral periarticular plates. The specimens were dissected and the location, diameter, number, and course of the deep perforating arteries and their branches were noted with respect to the lateral femoral cortex and distance from the articular surface of the lateral femoral condyle.

CONCLUSION

The deep perforating branches of the profunda femoris are at risk of injury during sub-muscular minimally invasive plating techniques for stabilization of distal femoral fractures. Our study demonstrated a consistent number and pattern of perforating branches of the profunda femoris artery. We noted an average of 80% injury rate to the perforating arteries or one of their branches. An understanding of the anatomical course of the profunda femoris perforating arteries can be used during minimally invasive plating techniques of the distal femur.



Do fixed angle iliosacral screws provide more rigid fixation than iliosacral screws alone in vertical transforaminal sacral fractures? A biomechanical analysis

Dan Wieking, MD; Amer Mirza, MD

DESCRIPTION

This project is investigating the rigidity of a more constrained hardware construct for fixation of this subset of pelvic fractures, which have a high rate of displacement and malunion with conventional surgical treatment. 12 synthetic pelvic models with transforaminal osteotomies will be divided into two groups. In one group, the osteotomy will be stabilized with standard iliosacral screws and in the other group, the osteotomy will be stabilized with polyaxial screws, the heads of which are connected via a cobalt chrome rod. Displacement and angular change about the construct will be measured during mechanical axial loading and compared between groups.

Outcomes associated with Salvage Hip Arthroplasty (SHA) after a failed proximal femur fixation device

Alex DeHaan, MD; Tahnee Groat, MPH; Darin Friess, MD; Amer Mirza, MD

OBJECTIVE

To report outcome trends between the type of device used for the primary fixation of a proximal femur fracture and the salvage procedure for patients undergoing Salvage Hip Arthroplasty (SHA) after failure of previous fixation.

METHODS

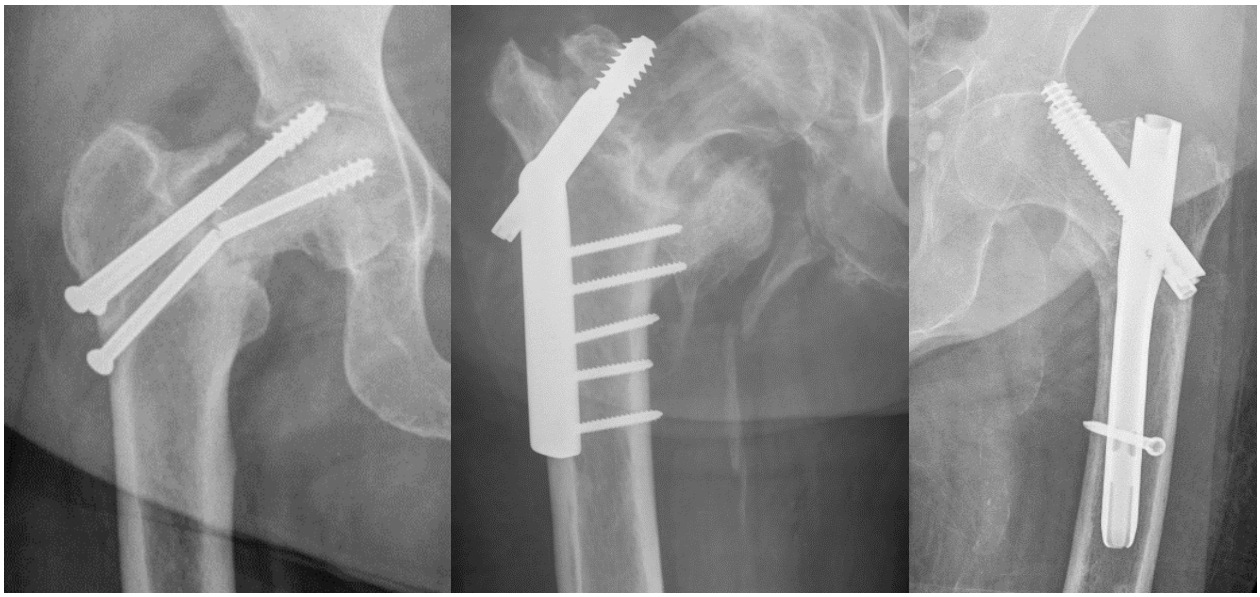
A six year retrospective review identified 11 failed cases with cancellous screws (CS), 14 with sliding hip screws (SHS), and 11 with intramedullary nails (IMN). 27 revisions were converted into a total hip arthroplasty (THA) and 9 to a hemi-arthroplasty (HA).

RESULTS

The CS group had a statistically shorter operative time and hospital length of stay ($p<0.05$), along with a trend toward decreased blood loss, transfusion requirements, and less complex implants. The IMN group tended to have higher transfusion requirements and a longer hospital stay than SHSs ($p>0.05$). Statistical analysis showed no significance for complication or failure rates based on the index fixation device, but the failure rate for salvage HA was statistically significant (THA 7%, HA 44%; $p=0.025$).

Accepted to the American Orthopaedic Association 125th National Meeting, June 2012

Presented at North Pacific Orthopaedic Society 2011 meeting



Basic Science/Outcomes Research

The impact of patient outcome survey completion on clinic time

Amer Mirza, MD; Tahnee Groat, MPH; Darin Friess, MD; Thomas Ellis, MD

PURPOSE

Evaluate the time impact of patient outcome survey collection on patient clinic appointment length.

METHODS

Over a 2-month period patient cycle time was recorded at an outpatient orthopaedic clinic. Patient clinic cycle time was defined as the time interval from patient check in to check out at the front desk after their visit with a provider. There were three study groups: 1. No Surveys (NS), 2. Paper Surveys (PS), 3. Electronic Surveys (ES). Electronic surveys were completed on touch screen tablets. Patients were asked to complete an SF-36 survey along with a demographic questionnaire entailing 50 questions. ANOVA was performed with a level of significance of $p<0.05$.

RESULTS

128 patient encounters (67%) were included for analysis. Table 1 shows the results of our analysis. The average patient cycle time differed among all three groups and was statistically significant ($p=0.046$).

CONCLUSIONS

Our results indicate that routine administration and collection of patient reported outcomes questionnaires will increase patient clinic time. We also found that electronic surveys are more time-efficient than paper based surveys.

Table 1: Patient Survey Groups

STUDY GROUP	SAMPLE SIZE	AVG CYCLE TIME (MINS)
No Survey	42	83.2 (SD 36.5)
Paper Survey	34	116.3 (SD 116.3)
Electronic Survey	52	107 (SD 36.2)

Side effects and outcomes of Daptomycin used as salvage therapy for bone and joint infections

Alex DeHaan, MD; Kim Felder, PA-C; Lynn Marshall, ScD; Darin Friess, MD; Penelope Barnes, MBBS PhD

OBJECTIVE

To identify side effects and clinical outcomes of Daptomycin salvage therapy with 1 to 3 year follow-up for the treatment of joint, spine, and long bone infections.

METHODS

A retrospective review from 2007-2010 analyzed patient demographics, location of infection, previous treatments, associated microbe, antibiotic dosing and side effects. Daptomycin dosing was once daily, between 4 – 6 mg/kg. Outcomes were defined as "Infection Controlled" (off all antibiotics, on suppressive oral antibiotics, or new infection) or "Infection Not Controlled" (recurrent infection with the same organism, or death associated with initial infection).

RESULTS

83% of patients had controlled infection at 1-3 years follow-up. Importantly, 19/21 patients with retained hardware had their infection controlled. Infection for >6 months and >2 surgical debridements prior to Daptomycin administration predicted failure. However, 31% of patients had to stop therapy earlier than prescribed, with 15% having elevated CPK levels and/or clinical myopathy.

Presented at the Infectious Diseases Society of America 2011 National Meeting

Presented at the American Academy of Orthopaedic Surgeons 2012 National Meeting

Improved diagnostic accuracy of skin flora in prosthetic joint infections using prolonged bacterial incubation and multiple cultures

Alex DeHaan, MD; Michael Kuhne, MD; Kimberly Felder, PA-C; Yee Doung, MD; Thomas Huff, MD; Alex Herzberg, MD; Adam Mirarchi, MD; Robert Orfaly, MD; James Hayden, MD, PhD; Kathryn Schabel, MD; Penelope Barnes, MBBS, PhD

OBJECTIVE

To examine the clinical impact of introducing a technique of multiple cultures combined with prolonged anaerobic bacterial incubation for prosthetic joint revision.

METHODS

We initiated a technique of collecting ≥ 5 peri-prosthetic joint tissue biopsies, each held 10 days for anaerobic incubation. Infection with skin flora was defined as ≥ 3 of 5 biopsies that grew the same organism, while those with only 1 or 2 positive cultures were treated as contaminant. The clinical impact of this technique on 36 patients was reviewed 6 to 12 months post-operatively.

RESULTS

8 cases were identified as contaminant and clinically ignored, of which 5 had no recurrence, 1 had recurrent infection, and 2 were lost to follow-up. 4 cases grew the organism from ≥3 biopsies and were managed as infection (2/4 from prolonged incubation). The technique therefore appropriately altered management in 9/36 cases (5 contaminant cases avoided antibiotics & 4 infections were identified and treated).

Presented at Infectious Diseases Society of America 2011 National Meeting

Sports Medicine

NeoCart®, an autologous cartilage tissue implant, compared to microfracture for treatment of distal femoral cartilage lesions. An FDA phase II prospective, randomized clinical trial after two years. Dennis C. Crawford, MD, PhD, Thomas M. DeBerardino, MD, Claude T. Moorman III, MD, Dean C. Taylor, MD, Chunbong Benjamin Ma, MD James C. Chesnutt, MD, Bradley J. Nelson, MD, Riley J. Williams III, MD

BACKGROUND

NeoCart, an autologous cartilage tissue implant (ACTI), is compared to microfracture (MF) in a multi-site prospective randomized trial.

METHODS

Thirty patients were randomized to ACTI or microfracture, at arthroscopic confirmation of grade III ICRS lesion(s). Microfracture or cartilage biopsy was performed if NeoCart was to be implanted 6-8 weeks after index arthroscopy.

RESULTS

Six, twelve, and twenty-four month data is reported with a mean of 26 months (±2) for all patients (21ACTI:9MF). Improvement for ACTI v. baseline was significant ($p<0.05$) for all measures at 6, 12 and 24 months. ACTI treatment improvement was statistically greater than MF for KOOS pain at 6, 12 and 24 months; KOOS symptoms at 6 months; and IKDC, KOOS sports and VAS pain at 12 and 24 months.

CONCLUSIONS

This randomized study suggests NeoCart is similarly safe to microfracture surgery and is associated with greater clinical efficacy two years after treatment.

Presented to the AOSSM annual meeting 2011, AAOS annual meeting 2012 and accepted for publication in the *Journal of Bone and Joint Surgery*, American edition

Knee function in patients with meniscus cartilage injury: reproducibility of performance-based assessments

Micah Naimark, BS; Gary Kegel, MD; Stephanie Lavigne, BS; Zach Christopherson, BS; Lynn Marshall, ScD; Dennis Crawford, MD, PhD

INTRODUCTION

We developed a standardized set of objective measures of knee function and assessed its reproducibility among patients with meniscus cartilage injury.

METHODS

We selected eight activities that require knee movements essential for everyday living. Fifty patients diagnosed with isolated meniscus tears performed the set of activities on two preoperative visits, one week apart. Objective and subjective measures were collected at each visit.

RESULTS

The repeat measures were all highly correlated with the first measure. Correlations of 0.7 were observed for active ROM, sit-to-stand, stair ascent, stair descent, step-ups and step-downs. Correlations were higher for star lunges (0.8) and treadmill travel (0.9). Patients tended to perform better on the second test. For example, the average absolute differences were 2.8°±7.3° (p=0.01) for active ROM.

DISCUSSION

These performance based knee function measures demonstrated good reliability among patients with isolated meniscal tears. Knee function tests may be useful for monitoring outcomes of patients undergoing isolated meniscal repair.

Presented at the 2011 OARSI World Congress on Osteoarthritis, San Diego, CA

Responsiveness of performance-based knee function tests in patients following arthroscopic menisectomy

Micah Naimark, BS; Gary Kegel, MD; Thomas O'Donnell, DPT; Stephanie Lavigne, BS; Lynn Marshall, ScD; Chelsea Heveran, BS; Dennis C. Crawford, MD, PhD

PURPOSE

Meniscus injury and subsequent treatment is a major risk factor for knee osteoarthritis. This study examines the responsiveness of the performance-based tests following arthroscopic menisectomy.

METHODS

Nine performance-based knee function tests were designed to evaluate knee movements essential to everyday living. 35 patients undergoing arthroscopic partial menisectomy completed the test twice, 1 week preoperatively and 6 weeks postoperatively. Objective outcomes and subjective patient reported outcomes were compared.

RESULTS

All performance-based knee function tests improved significantly ($p<0.05$) 6 weeks after partial menisectomy. The greatest improvement in performance was observed with stair descent (13%) and sit-to-stand (15%) activities. Pain scores improved 32%, Symptoms 32%, Activities of Daily Living 22%, Sports and Recreation 48%, and Quality of Life 65%.

CONCLUSION

This study demonstrates that all nine performance-based knee function tests are responsive to patients undergoing partial menisectomy. Performance-based tests could provide information about knee function that is unique and complementary to questionnaire data.

Poster Abstract for the 2012 OARSI World Congress on Osteoarthritis in Barcelona, Spain

Osseous augmentation for bony bankart lesions: Best fit based on the radius of curvature

Alex DeHaan, MD; Jackie Munch, MD; Dennis Crawford, MD, PhD

OBJECTIVE

To examine the radius of curvature of several potential osseous and osteochondral donor sites, in order to determine the most congruous fit for the glenoid and humeral head.

METHODS

Twenty-seven cadavers were dissected in order to measure nine different anatomic locations: glenoid, humeral head, lateral coracoid, inferior coracoid, distal tibia, medial tibial plateau, distal radius, radial head, and iliac crest. The radius of curvature was measured using Mose circles.

RESULTS

The glenoid and humeral head measurements were 27.8 +/- 4.0mm and 23.1 +/- 2.9mm from superior to inferior, and 26.4 +/- 2.9mm and 20.8 +/- 1.9mm when measured anterior to posterior, respectively. Closest fit to the glenoid was the inferior coracoid (23.6 +/- 2.7mm), distal tibia (25.1 +/- 1.9mm), and medial tibial plateau (25.0 +/- 3.9). Measurements of the iliac crest were >35mm in all cadavers. The lateral coracoid, distal radius, and radial head were also deemed incongruent.

Submitted to Western Orthopaedic Association 2012 Annual Meeting

Spine

Traditional thresholds for retropharyngeal soft tissue swelling are poorly sensitive for the detection of cervical spine injury on computed tomography in adult trauma patients

JR Hiratzka; JU Yoo, MD; JW Ko; NL Zusman; SL Hiratzka; AC Ching, MD

ABSTRACT

We conducted a retrospective cohort study of 541 trauma patients with injuries at any level of the spine evaluated with a CT scan, and subdivided our cohort into three groups: non-cervical spine injuries (control), injuries requiring collar or observation, and injuries treated with halo or surgery. Retropharygneal soft tissue measurements were made at the cranial and caudal endplates of C2 and C6 on sagittal and axial CTs, and sensitivity and specificity was calculated. Sensitivity for detection of injury was universally poor for all measurement groups, ranging from 14% to 21% at one standard deviation from the mean. The specificity was high (86% to 90%). There was no significant difference between axial and sagittal measurements for either sensitivity or specificity. Soft tissue swelling as a sentinel sign of cervical spine injury demonstrates consistently high specificity and low sensitivity, precisely the opposite of what would be desired in a screening test.

Presented at Cervical Spine Research Society 2011 Annual Meeting, Phoenix, AZ; Abstract #55

Changing demographic characteristics of second cervical vertebral fractures among the elderly US population

NL Zusman; AC Ching, MD; JU Yoo, MD

ABSTRACT

We examined the influence of age and geography on the incidence of second cervical vertebral fractures from 2005 to 2008 within the elderly Medicare population using data from PearlDiver Patient Records Database® and the Center for Medicare and Medicaid Service's Statistical Supplement. The annual incidence of C2 fractures in the ≥65 population increased from 1.58 in 2005 to 1.91 in 2008, which represents an 18.88% change as compared with the population growth of 5.77%. The average incidence per 10,000 p-y increased with increasing-age group: 65-74 years (0.67), 75-84 (2.06), and > 84 (5.00). The greatest observed rate of increase was in the > 84 age group (26.13%). Rates varied based on geographic subregion, ranging from 1.09 (Pacific West) to 2.17 (West North Central). The overall and age-differentiated incidence of C2 fractures increased from 2005 to 2008, rising alarmingly faster than the population growth during the same period.

Presented at Cervical Spine Research Society 2011 Annual Meeting, Phoenix, AZ; Abstract #56

Comparison of sagittal CT and lateral X-ray measurements of the prevertebral soft tissues in adult trauma patients

JR Hiratzka; JU Yoo, MD; SL Hiratzka; NL Zusman; AG Bumb; MA Yagapen; ND Kalbfleisch; AC Ching, MD

ABSTRACT

We conducted a prospective cross-sectional study of 100 trauma patients admitted with cervical spine injuries. Anterior-posterior soft tissue measurements were taken at the cranial and caudal endplates of C2-C6 in order to evaluate the relation between soft tissue on computed tomography (CT) and x-ray imaging, and assess whether standard x-ray thresholds can be used to interpret CT images. Prevertebral soft tissue CT and X-ray measurements correlate strongly. At C2's caudal end, the mean x-ray measurement was 4.8 + 1.9 mm compared with 5.0 + 2.0 mm on CT scan (r=0.48; p=<0.0001). At C6's caudal end, x-ray measurement was 12.4 + 3.1 mm compared with 12.9 + 2.9 mm on CT scan (r=0.80, p=<0.0001). In regards to the standard x-ray thresholds, 6mm at C2 was one standard deviation from the mean for both CT and x-ray measurements, while 20 mm at C6 was approximately three standard deviations from the mean.

Manuscript in preparation

Early prevalence of post-traumatic stress disorder in spinal trauma patients

AC Ching, MD; LM Marshall, ScD; RA Hart; NL Zusman; BD Darnall; BT Ragel; AN Nemecek; K Lanning; KM Watson; JU Yoo, MD

ABSTRACT

We prospectively studied 120 patients with traumatic spinal injuries at hospital admission, 3, 6, and 12 months to assess the relation between PTSD associated symptoms and global health scores. PTSD symptoms were defined as PTSD Check List – Civilian (PCL-C) score of ≥35 or an Impact of Events Scale-Revised (IES-R) score of ≥27. Patients' global heath was evaluated through the Short Form 12 Mental and Physical Component Scores. The prevalence of PTSD symptoms was 58% in our population, and was highly correlated to poor mental, but not physical, health scores at 3 months ($r = 0.77$, $p<0.01$ and $r = 0.27$). Depressed patients at entry were approximately 2.5 times more likely to develop symptoms than not depressed patients (50% versus 26% at 3 months, $p=0.10$, 79% versus 32% at 6 months, $p<0.01$, 63% versus 25% at 1 year, $p=0.03$). Females were 40% more likely to have symptoms than males (71% versus 51%, $p=0.05$).

Presented at Scoliosis Research Society 2012 Annual Meeting, Chicago, IL; Abstract #1355359

Soft tissue shadow on lateral cervical spine radiograph does not predict development or severity of chronic dysphagia

F Khaki; NL Zusman; AN Nemecek; AC Ching, MD; JU Yoo, MD

ABSTRACT

We performed a longitudinal radiographic study of prevertebral soft tissue swelling (STS) and its relation to chronic dysphagia in 67 patients treated with anterior cervical surgery. Patients who were ≥6 months postoperative with lateral cervical radiographs at preoperative, immediate postoperative, 6 week and 3 months were asked to complete the Bazaz-Yoo Scale, which measures the presence and severity of dysphagia. STS was measured at the lower endplates of C2 and C6. STS was greatest in immediate postoperative period measuring 10.9 ± 4.7 mm at C2 and 18.9 ± 5.5 mm at C6 from preoperative measurements of 4.5 ± 1.7 mm and 14.5 ± 3.7 mm, respectively. By 6 weeks, these measurements returned to baseline levels. The prevalence of dysphagia was 73% (21% mild, 39% moderate, and 13% severe). There were no significant differences in the measurements between patients with and without dysphagia, or between mild, moderate and severe dysphagia patients.

Submitted to Western Orthopaedic Society 2012 Annual Meeting, Portland, OR

Complication rates for spinal fusion are associated with a number of perioperative factors, but their influences are dependent on ASA classification

JL Munch, MD; NL Zusman; TC Philipp; RS Ryland; AC Ching, MD; JU Yoo, MD

INTRODUCTION

We reviewed patients undergoing elective thoracic/lumbar fusion to establish the prevalence of major medical complications and associated risk factors.

METHODS

Our retrospective study examined the clinical course of 709 patients undergoing spine fusion surgeries. We evaluated the rate of major medical complications within the 30-day postoperative period with respect to ASA score, age, sex, operative time, number of levels, EBL, fluids, and intra-operative vital signs.

RESULTS

Operative time, total levels, EBL and fluids were only important for ASA 3-4 patients. They did not influence complication rates for ASA 1-2 patients. There was no statistically significant difference in the rates for sex, mean arterial pressure or heart rate. However, lower intra-operative body temperature was associated with a lower rate for ASA 3-4 patients.

CONCLUSION

ASA score is a strong predictor of risk following elective thoracic/lumbar arthrodesis, and all other factors must be evaluated as dependent on ASA score.

Submitted to Western Orthopaedic Association 2012 Annual Meeting

Submitted to North American Spine Society 2012 Annual Meeting

The relationship between the number of levels fused and perioperative complications in elective thoracolumbar fusions

JL Munch, MD; NL Zusman; CD Bell; EG Lieberman; S Smith; AC Ching, MD; RA Hart; JU Yoo, MD

INTRODUCTION

We determined the risk of developing major medical complications (MMC) and major surgical complications (MSC) and their relationship to the number of segments fused in elective thoracic/lumbar arthrodesis.

METHOD

This retrospective cohort study reviewed MMC and MSC rates within 30-day postoperative period with respect to ASA score and the number of segments fused.

RESULTS AND CONCLUSION

The MSC rate rose linearly with longer segments. The MMC rate for ASA 1-2 remained constant. However, the inflection point for increase MMC for ASA 3-4 group was after the single level fusion. Thus, when stratified for risk of MMC, the concept of "multi-level fusion" may apply to patients with ASA 3/4 undergoing greater than a single level fusion.

Submitted to North American Spine Society 2012 Annual Meeting

Submitted to Research Society 2012 Annual Meeting

Wolff-Parkinson White syndrome in a collegiate soccer player

Rachel Bengtzen, MD
Sports Medicine Primary Care Fellow

Charles Webb, DO
Associate Professor,
Department of Family Medicine

Every year, young athletes die from sudden cardiac death, and identifying athletes at risk is a persistent challenge. Most often the etiology is structural heart disease (such as hypertrophic cardiomyopathy or anomalous coronary artery) but it is also caused by cardiac dysrhythmias. Wolff-Parkinson White (WPW) is a rare congenital dysrhythmia known since the 1930s to cause sudden cardiac death.[1] In up to 4.5% of cases, sudden cardiac death may be the initial presentation of WPW. However, if identified early and managed appropriately, patients with WPW can return to full activity. Here we present the case of a female collegiate soccer player who was diagnosed with WPW after initial presentation during training. The patient provided consent for submitting her case for publication.

CASE REPORT

A 20-year-old female collegiate soccer player presented with shortness of breath, chest tightness, palpitations, lightheadedness, and near syncope during a session of strenuous conditioning. She had not been feeling "right" since the previous day, experiencing decreased appetite, looser stools, and fatigue. She had also experienced a similar episode of near-syncope several days prior during a game in 90°F weather. She had no history of recent fever, cough, or dysuria nor any recent long plane flights or car rides, or lower extremity swelling or calf pain. The athletic trainer consulted the team physician. At approximately 10 minutes after cessation of exercise her heart rate was 140 bpm, sinus rhythm; however, she was symptomatically feeling better. After resting and hydrating, 25 minutes after exercise cessation, she had a persistent tachycardia at 105 bpm, sinus rhythm. At this time, the patient was sent to the emergency department.

Upon presentation to the emergency department, the patient was asymptomatic. Physical examination revealed a normal temperature, a blood pressure of 134/84, a heart rate of 66, a respiratory rate of 18, and normal oxygen saturation. The cardiovascular examination was normal (normal rate, regular rhythm, normal S1/S2 and no rubs/murmur on dynamic exam), as were the pulmonary, abdominal, musculoskeletal, skin, and neurological examinations. Her prior medical history was relatively benign, positive only for exercise-induced asthma, last treated 4 years prior. There was no family history of cardiac disease, arrhythmias, or sudden death. She had a healthy identical twin sister.

Differential diagnoses included cardiac dysrhythmia, cardiac structural abnormality, or other process such as pulmonary embolism, pneumothorax, poor PO intake, poor level of conditioning, pregnancy, urinary tract infection or hypoglycemia. The patient received an electrocardiogram (ECG). It read as normal sinus rhythm, rate 60, and normal QT corrected interval, however with a shortened PR interval and a small delta wave in v2-v6, findings consistent with WPW *(fig 1)*. The subsequent echocardiogram was normal with no sign of structural disease.

(continued)

To further delineate her cardiac dysrhythmia, the patient then underwent an outpatient electrophysiology (EP) study, and her asymptomatic twin sister had screening ECG, which was normal. Provocative EP testing in our patient showed ventricular pre-excitation consistent with WPW syndrome. The patient was found to have two accessory pathways as the underlying cause: one was ablated, while the other did not activate with programmed stimulation. Due to risk of injuring the atrioventricular (AV) node and causing heart block, this pathway was left untouched.

The patient recovered well, and had no trouble on subsequent exercise stress testing to maximal heart rate. She then had a successful soccer season. During the off-season she had a brief episode of recurrent symptoms during circuit training. A Holter monitor study revealed a tachycardia to 194 bpm, persisting 10 min after cessation of exercise during another episode. A repeated EP study found that she had atrioventricular nodal reentrant tachycardia, and an ablation was performed. Subsequently, she has again had a successful return to play.

DISCUSSION

WPW is rare, present in approximately 0.3% of the population. It is a congenital abnormality that manifests atypical conductive tissue between the atria and ventricles, which allows pre-excitation of the ventricles before the impulse is conducted through the AV node. This accessory pathway lends to characteristic ECG changes *(fig 1)*. The WPW syndrome describes patients with evidence of this pattern on ECG as well as symptoms caused by the arrhythmia. The supraventricular tachycardia episodes are well tolerated in most patients, but the potential for hemodynamic changes causing syncope, degeneration into other arrhythmias, and sudden death prevents participation in sports and similar activities. Fortunately, once identified and if appropriately treated, these patients have an excellent prognosis and can return to full activity.

The mechanism of sudden cardiac death in WPW patients is thought to be progression of supraventricular tachycardia into atrial fibrillation, when rapid conduction bypasses the AV node through the accessory pathway, which can then degenerate into ventricular fibrillation.[1,2] A ventricular fibrillation arrest may be the presenting scenario in patients with WPW syndrome. Thus, a pre-established emergency activation plan for sideline providers, with an accessible automated external defibrillator (AED) to give early defibrillation, is necessary to improve survival.

Medical history and physical examination can provide clues, but there are no pathognomonic findings for WPW. As illustrated by the patient in our case, red flags warranting further cardiac workup include presenting symptoms of palpitations, decreased exercise tolerance, or hemodynamic symptoms (presyncope with lightheadedness, dizziness, dyspnea, or frank syncope). Symptoms precipitated by exertion are particularly concerning. Physical examination features may be those that accompany symptomatic dysrhythmias, including persistent tachycardia after cessation of exercise, hypotension, pathologic heart murmurs, ill appearance (for example, pale/diaphoretic), or volume overload (crackles on lung exam or jugular venous distension). ECG morphology is classically as depicted *(fig1)*. However it can vary widely due to variety in location and type of accessory pathways. Echocardiogram can be normal.

Bethesda guidelines address management of symptomatic WPW patients. They mandate that athletes who demonstrate a WPW pattern on ECG and a history of palpitations, near-syncope, or syncope refrain from exercise participation and pursue electrophysiological (EP) testing.[3] EP studies are diagnostic and therapeutic in that they can define accessory pathways and treat such pathways with radiofrequency ablation.

(continued)

In contrast, the management of asymptomatic athletes with incidental ECG findings of WPW pattern is an ongoing debate. A military study found that a third of these patients under the age of 40 eventually became symptomatic.[1] Sudden cardiac death in athletes with this pre-excitation is rare, but occurs most commonly in those with accessory pathways with short refractory periods. This suggests it is advisable to have even asymptomatic athletes with WPW undergo EP studies to determine the nature of their accessory pathways.[1,4]

Team physicians caring for WPW patient post-ablation should be aware of the athlete's condition and what was found and treated in EP studies. It may be prudent to consult with the athlete's cardiologist and perform stress treadmill testing before allowing the athlete to return to play. Recurrent symptoms in these athletes should raise concern for arrhythmia, and further evaluation, including Holter monitoring and possibly repeat EP testing, should be pursued.

In summary, patients with exertional symptoms of palpitations, lightheadedness, shortness of breath or chest pain may have life-threatening underlying cardiac dysrhythmias, structural pathology or another underlying cardiopulmonary process putting them at risk for sudden cardiac death. EP testing for those with WPW syndrome is mandatory, and it is prudent for asymptomatic patients with incidentally identified WPW (particularly in younger athletes). WPW syndrome patients have an excellent prognosis if identified and appropriately treated. Finally, initial presentation of WPW may occur in a ventricular fibrillation arrest, and having an AED and emergency action plan in place could be life-saving.

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3. 36th Bethesda Conference. Eligibility recommendations for competitive athletes with cardiovascular abnormalities. J Am Coll Cardiol. 2005;45:1313-75.
4. Brembilla-Perrot B, Tatar C, Suty-Selton C. Risk factors of adverse presentation as the first arrhythmia in Wolff-Parkinson-White syndrome. Pacing Clin Electrophysiol. 2010;33:1074-81.

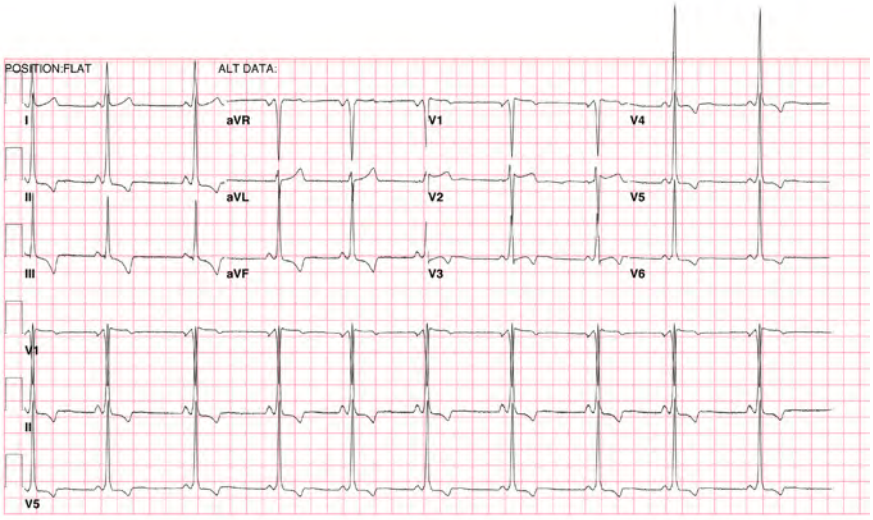


Figure 1. Patient's ECG depicting a characteristic WPW pattern: shortened PR interval, and slurring and slow rise of the QRS upstroke (delta wave), secondary repolarization changes reflected as ST-T wave changes.

Dawson Brown, MD

Temporal assessment of osteochondral allograft (OCA) transplants to the distal femur using delayed gadolinium-enhanced MRI of cartilage (dGEMRIC) and zonal T2 mapping MRI at 1 and 2 years

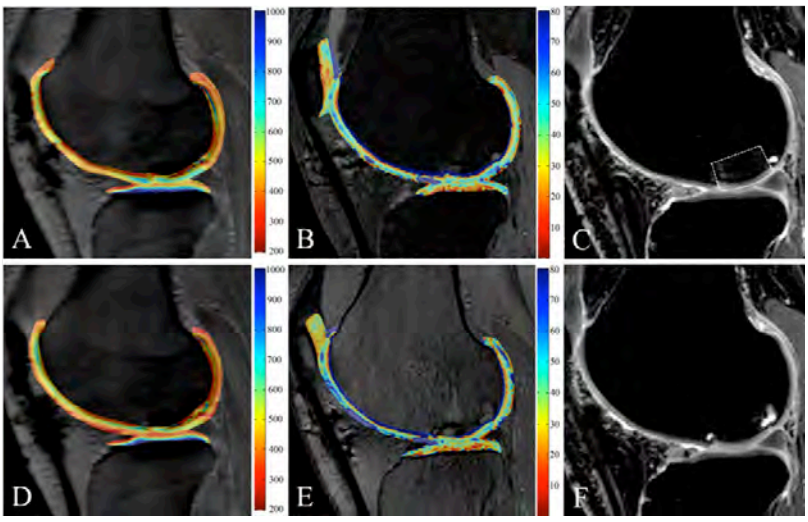
Dawson Brown, MD; Mike Durkan BS, CNMT; Urick Szumowski, PhD; Dennis Crawford, MD, PhD

ABSTRACT

T2 mapping and dGEMRIC were used to evaluate Fresh OCA transplants over two years. Eight patients with focal grade 4 ICRS articular cartilage defects of the femoral condyle were treated with single cylindrical OCA grafts. They were prospectively evaluated with dGEMRIC and T2 mapping at one and two years. The KOOS and IKDC subjective scores were obtained at baseline, one, and two years. 6/8 patients had an increase in the ΔR1δ from one to two years. At 1 and 2 years no correlations were apparent between the dGEMRIC ΔR1 δ and the IKDC score and the KOOS score. Prolonged T2 values were seen in the superficial zone at 1 and 2 years. No correlation was observed between patient reported outcomes and the ΔR1δ. The relative proteoglycan content of OCA transplants decreases from 1 to 2 years. T2 mapping showed the superficial zone of OCA cartilage undergoes degeneration.

Podium presentation, International Cartilage Repair Society (ICRS) 2012 Annual Meeting

Manuscript in preparation for American Journal of Sports Medicine



Post-Gadolinium dGEMRIC colormap at one year (A) and two years (D) and corresponding T2 colormap at one year (B) and two years (E) of a single osteochondral allograft transplanted to the distal femora. The 3D-WATSf image from one year (C) and two years (F) was used for morphological reference when drawing regions of interest (dotted white line - OCA). Values displayed are in milliseconds. Higher T1 (Gd) values (blue) represent decreased concentration the contrast agent $Gd(DTPA)^{2-}$ and therefore relatively increased concentration of proteoglycans.

Peter Fredericks, MD

Comparison of two different spinal instrumentation techniques in the treatment of pediatric neuromuscular scoliosis

OBJECTIVES

To measure both perioperative and radiographic parameters in two differently instrumented cohorts.

DESIGN

Retrospective cohort chart and radiograph review
Setting: Shriners Hospital for Children – Portland

METHODS

44 total patients with neuromuscular scoliosis that underwent posterior spinal fusion with instrumentation were identified. One cohort group consisted of 22 patients that underwent traditional unit rod spinal instrumentation with Luque segmental instrumentation and Galveston pelvic fixation. The second group had modified pelvic fixation with iliac locking screws. Chart and radiograph review was performed.

RESULTS

Blood loss and total hospital stay (number of days) was less in the modified pelvic fixation group ($p<0.05$) while operative time and ICU stay (number of days) was not. Radiographically, there was no statistically significant difference between the two groups at final follow up.

Modified technique with iliac screws

Traditional technique bent Galveston rod

Matthew McElvany, MD

Intraarticular placement of distal femoral traction pins: A cadaveric study

OBJECTIVES

This study investigated the risk of intra-articular placement of Kirschner wires through the distal femur.

METHODS

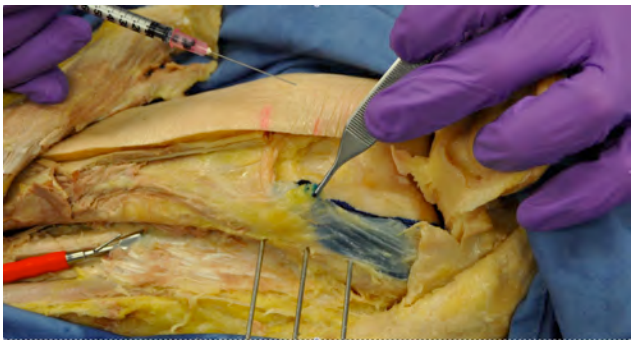
Wires were placed in the distal femurs of 15 embalmed cadavers at the level of the adductor tubercle (AT), the superior pole of the patella (SPP), and 2cm proximal to this (SPP+2). Lateral fluoroscopic images with intra-articular contrast and subsequent dissection were used to assess the pin position from the joint and the orientation of the superficial femoral artery.

RESULTS

Intra-articular pin placement was higher at the AT (29%) than the SPP+2 (0%) level. Distances from the AT, SPP, and SPP+2 to the superficial femoral artery were 7.4 cm, 5.7 cm, and 3.8 cm, respectively ($p<0.001$).

CONCLUSIONS

This study revealed a higher rate of capsular penetration by pins inserted at the level of the adductor tubercle versus the SPP+2 level. Additionally, major vascular injury with trans-medullary placement at all levels investigated appears minimal.



Luke Rust, MD

Risk factors for recurrent hip subluxation after bilateral varus derotational osteotomies in gmfcs levels III-V with long-term follow-up

CL Rust, MD; M Sussman, MD

BACKGROUND

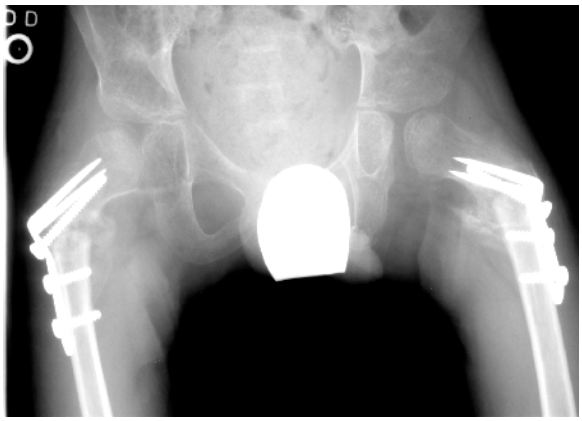
Hip displacement in cerebral palsy is common and related to severity of disease. Untreated hip displacement has been shown to result in poor outcomes. Despite surgical correction, a proportion of patients experience recurrence of hip displacement. The purpose of this study was to determine risk factors for recurrent hip displacement after bilateral varus derotation osteotomy (BVDO).

METHODS

A retrospective chart and radiographic review was completed for patients with cerebral palsy undergoing BVDO from 1984 to 2004. Preoperative, postoperative and follow-up pelvis radiographs were analyzed.

RESULTS

26 patients underwent BVDO and there were 8 cases of recurrence. Patients who were less than 7 years of age at surgery were more likely to experience recurrence (p=0.04). 6/26 patients were considered to have successful surgery. Patients who experienced an unsuccessful surgery had larger acetabular indices (p=0.02).



Presented at North Pacific Orthopaedic Society annual meeting, 2011

Presented at Shriners Hospital for Children – Portland Dillehunt Memorial Lecture, 2011

Publication pending, *Journal of Pediatric Orthopaedics*

Beals Annual 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 OHSU, 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, dedicated 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 (the 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 and served as Head of the Division of Orthopaedics 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 helped author 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. Through his remarkable career, Dr. Beals represented and personified excellence in medicine and orthopaedic surgery.

Visiting Professor, May 2011

Javad Parvizi, MD

Total Joint Arthroplasty

Rothman Institute of Orthopaedics

Visiting Professor, May 2012

Marc Swiontkowski, MD

Orthopaedic Traumatologist

University of Minnesota

OHSU Orthopaedic Spine Professorship Update

The OHSU orthopaedic spine program has had a good year. First and foremost, congratulations to Dr. Hart for his promotion to Professor. Well deserved!

Dr. Jayme Hiratzka, one of our alumni, presented his resident research project at the Cervical Spine Research Society this past December. His abstract was selected to be invited for possible publication in the societal issue of Spine. Congratulations to Dr. Hiratzka!

Our visiting spine professorship has come along nicely. In October 2011, Frank Schwab, Chief of the NYU/Hospital for Joint Diseases Deformity Service, gave two fantastic talks on sagittal alignment in adult deformity surgery. On October 29, 2012 Alan Hilibrand, one of my mentors from Thomas Jefferson, will be our next professor. If you would like an invitation to our annual visiting spine professorship, please contact me at *chinga@ohsu.edu* to be added to our distribution list.

The spine surgery fellowship continues to mature. Our current fellows, Dr. Ahmed Mohamed and Dr. Paolo Punsalan, are doing a great job. As with the residency, every year the applicant pool seems to get better and better.

Alexander Ching, MD
Assistant Professor, OHSU Department of Orthopaedics & Rehabilitation

2011 Visiting Professor, October 2011
Frank Schwab, MD
NYU Hospital for Joint Diseases

2012 Visiting Professor, October 2012
Allan Hilibrand, MD
Thomas Jefferson University

Visiting Professorship in Upper Extremity Surgery

2011 Visiting Professor, October 2011

Charles A Rockwood Jr, MD

Professor and Chairman Emeritus
Director of Shoulder Service
University of Texas Health Science Center at San Antonio

Shriners Hospital for Children – Portland Update: Memorial Lectureship Background

HISTORY OF THE BEATTIE LECTURE SERIES

Mr. Byron J. Beattie became acquainted with Dr. "Frenchy" Eldon Chuinard, while Dr. Chuinard was the Chief of Staff at the Shriners Hospitals for Children – Portland. Mr. Beattie was the owner and operator of a printing plant based in Portland, OR. Mr. Beattie was so impressed with the importance of the Shriners' educational mission that he created an endowment fund to support our local educational activities. The first seminar was held in 1985, and the event continues through today.

2010 Beattie Visiting Professor
Benjamin Alman, MD

HISTORY OF THE DILLEHUNT LECTURE SERIES

With his devotion to children, Dr. Richard Dillehunt was instrumental in the establishment of the Shriners Hospitals for Children – Portland. He served as the first Chief Surgeon.

Dr. Dillehunt moved to Oregon from Illinois in 1911. He became Professor of Anatomy at the University of Oregon Medical School in 1912 and Assistant to the Dean, Dr. K.A.J. Mackenzie. Dr. Dillehunt was appointed Dean of the School of Medicine in 1920 with the passing of Dr. Mackenzie, retaining that position until his retirement in 1943. With his keen interest in medical education, he played a prominent role in the development of the medical school on the hill.

His legacy continues through the Dillehunt Memorial Lectureship, inviting distinguished Pediatric Orthopaedic Surgeons from throughout the world. This annual educational meeting, funded by the Shriners Hospital Education Trust Fund, is a memorial to his dedication and contribution to orthopaedic surgery.

2011 Dillehunt Visiting Professor
William MacKenzie, MD

2011 Dillehunt Visiting Professor
Hank Chambers, MD

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
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

YEAR	FELLOWSHIP*
2011	
Matthew Harrison	Foot & Ankle 1) Roger Mann MD - Oakland Bone and Joint Specialists; 2) Matthew Tomlinson MD - Middlemore Hospital, Auckland NZ
Jayme Hiratzka	Spine Surgery - University of Utah
Jackson Jones	Total Joint Arthoplasty - Brigham and Women's Hospital
2010	
Adam Cabalo	Spine Surgery - Spine Care Medical Group, Daly City, CA
Patrick Denard	Shoulder Arthroscopy - San Antonio, TX & Lyon, France
Gregory Byrd	Harvard Hand and Microvascular Fellowship, Beth Israel Deaconess Medical Center, Boston, MA
Gary Kegel	St. Luke's Hand Fellowship, New York, NY
Matthew Bradley	
2009	
Abner Ward	Hand Fellowship - Stony Brook Medical Center
Stephan Pro	Santa Monica Orthopaedic and Sports Medicine Group
Khalid Shirzad	Duke University Medical Center - Foot and Ankle Fellowship
2008	
Kate Deisseroth	
Andy Kranenburg	San Francisco Spine Institute, San Francisco, CA
Kenna Larson	Hand Fellowship - University of New Mexico, Albuquerque, NM
2007	
William Magee (Billy)	Arthroscopy/Sports Medicine - Park Nicollet Methodist Hospital, Minneapolis, MN
J. Rafe Sales	San Francisco Spine Institute
Joseph Schenck	
Robert Tatsumi	The Spine Institute -Santa Monica, CA
2006	
Catherine Humphrey	Orthopaedic Trauma - Vanderbilt University Medical Center, Nashville, TN
Amer Mirza	Trauma - Harborview Medical Center, Seattle, WA
Mark Wagner	
2005	
Patrick Dawson	Upper Extremity and Sports Medicine - Congress Medical Associates, Pasadena, CA
Suresh Kasaraneni	
Chris Untch	
Corey Vande Zandschulp	Trauma - OrthoIndy, Methodist Hospital, Indianapolis, IN

YEAR	FELLOWSHIP*
2004	
Ben Kam	
Britton Polzin (Frome)	

2003	
Jennifer Miller	Sports Medicine - Congress Medical Associates, Pasadena, CA
Jeb Reid	
Eric Shepherd	Orthopaedic Trauma - UC Davis Medical Center, Davis, CA Orthopaedic Trauma - Auckland City Hospital, NZ

2002	
Michael Binnette	Spine Fellowship - University of Washington, Seattle, WA
Kevin Kahn	Trauma - Universitatsspital, Zurich Switzerland Trauma - Vanderbilt Orthopaedic Institute, Nashville, TN
Tammy Simpson	Sports Medicine - UCSF, San Francisco, CA Orthopaedic Traumatology - Hennepin Medical Center, Minneapolis, MN

2001	
Mike Gustavel	San Diego Sports Medicine and Orthopaedic Center, San Diego, CA
James Hayden	Musculoskeletal Oncology - Massachusetts General Hospital, Boston, MA
Todd Ulmer	Sports Medicine - University of Washington, Seattle, WA

2000	
Mark Metzger	
Lorenzo Pacelli	Hand & Microvascular Surgery -Hand Center San Antonio, San Antonio, TX
Edward Perez	Trauma - R. Adams Cowley Shock Trauma Center, Baltimore, MD

1999	
Tony Colorito	Sports Medicine - Cincinnati Sports Medicine and Orthopedic Center, Cincinnati, OH
J. Michael Kioschos	Shoulder and Elbow Surgery - Florida Orthopaedic Institute, Tampa, FL
Jill Rider	

1998	
Dory Curtis	
Darrin Eakins	Sports Medicine - Royal N Shore Hospital, Sydney, Australia
Ron Wobig	

1997	
Dennis Davin	
Kevin Lee	
Ron Teed	

YEAR	FELLOWSHIP*
1996	
Knute Buehler	Lower Extremity Reconstruction - Scripps Clinic and Research Foundation, San Diego, CA
Tom Croy	
Marc Davidson	The Hughston Clinic, Columbus, GA
1995	
Douglas Bagge	
Bob Foster	Hand and Microvascular Surgery - University of Minnesota, Minneapolis, MN
Greg Voit	Hand and Microvascular Surgery - University of New Mexico Health Sciences Center, Albuquerque, NM
1994	
R. Jeffrey Grondel	Sports Medicine and Shoulder - Mississippi Orthopaedic and Sports Medicine Clinic Trauma - Legacy Emanuel Medical Center, Portland, OR
Allen Hershey	Lower Extremity Reconstruction - Scripps Clinic and Research Foundation, San Diego, CA
Brian Padrta	Foot and Ankle - University of South Florida, Tampa, FL
Mark Rangitsch	
1993	
Blaine Markee	
K. Dean Olson	
Andrew Schmidt	Reconstruction, Shoulder Surgery, Trauma - Hennepin County Medical Center, Minneapolis, MN
1992	
Ed Pino	Sports Medicine, Cincinnati Sports Medicine, Cincinnati, OH
Stephen Tower	
Michael Van Allen	
1991	
Ronald Bowman	
William Dickinson	
Richard Rubinstein	
1990	
Greg Bigler	Sports Medicine and Arthroscopy, Harvard Medical School, Massachusetts General Hospital, Boston, MA
Adrian Ryan	
T. Scott Woll	Foot and Ankle- University of Washington, Seattle, WA

YEAR	FELLOWSHIP*
1989	
James Hazel	
Asa Stockton	
Keith Ure	Joint Replacement - Joint Replacement Institute
Robert Zirschky	
1988	
John DiPaola	
Jeffrey Flemming	University of Texas
Morris Hughes	
Michael Wyman	
1987	
Dale Bramlet	University of Rochester Medical Center, Rochester, NY
Scott Jones	
Stefan Tarlow	Knee Surgery - Dr. Jan Gillquist/ Sport Medicine - Dr. James Andrews
1986	
Mark Buehler	Duke University, Durham, NC
Wendell Ferguson	Providence Medical Center, Portland, OR
Paul Switlyk	Shoulder Fellowship - University of Western Ontario, London, ON
1985	
Stan Neitling	
Daniel Ovadia	
1984	
Steven Bruce	
Kenneth Hermens	
Wendy Hughes	
1983	
Michael Grundy	
Paul Mills	
John Schwartz	
1982	
Julie Isaacson	
James Livermore	
John Toohey	

YEAR	FELLOWSHIP*
1981	
Christopher Blake	
Samuel Tabet	Fellowship - Oregon Health & Science University, Portland, OR
Wayne Nadamoto	

1980	
Len C. Ceder	
Jon Hoppert	
Robert Jordan	

1979	
Brian Laycoe	
Donald Peterson	
James Robbins	Cincinnati Sports Medicine & Orthopaedic Center, Cincinnati, OH

*Fellowship information available from 1979 onward

YEAR
1978
Lyle Mason
Edgar Ragsdale
E. David Shaw

1977
David Noall
K. Byron Skubi
Ted Vigeland

1976
W. Curtis Kaesche
Walter Smith
Stephen Thomas

1975
John Hayhurst
Kelsey Peterson, Jr.
Ned Schroeder

YEAR
1974
Thomas Hutchinson
Robert Porter, Jr.
Fred Surbaugh

1973
James Baldwin
David Haaland
Craig MacCloskey

1972
Michael Hmura
Grant Lawson
Michael Marble

1971
Charles Bird
Robert Chuinard
Jim Dineen
Ilmar Soot

YEAR
1970
Art Hauge
Edwin Kayser
Gerald Lisac
Ira Yount

1969
Thomas Fagan
Michael Graham
George Ingham
Scott Struckman

1968
James Kunzman
James Nelson
Frederick Wade

1967
Michael Baskin
John Gilsdorf
John Thompson

YEAR
1966
Charles Bonnett
McGregor Church
Don D'Amico
Fred Grewe
Howard Johnson
1965
Arthur Eckhardt
John Hazel
Richard Mercer
1964
Robert Corrigan
Richard Zimmerman
1963
Donn McIntosh
Michael Rask
1962
Phaen Gambee
Norman Logan
Keith Taylor
1961
Rodney Beals
Thomas Edwards
George Keyes
Ralph Peterson
1960
Charles Fagan
Calvin Kiest, Jr.
Bud Yost
1959
Raymond Case

YEAR
1958
Richard Gardner
William Guyer
1957
H. Freeman Fitch
Richard Gilbert
1956
William Hummel
Jack Watkins
1955
Edward Attix
Max Bocek
1954
Howard Popnoe
Dale Popp
1953
Donald Smith
1952
Melvin Makower
1951
Phillip Fagan
Bob Maris
James Weed
1949
Howard Cherry
Boyd Holbrook
R.J. Hopkins
1948
Robert Anderson
George Cottrell
Carl Holm
Ralph Thompson

YEAR
1947
Edward LeBold
1946
Donald Platner
Faulkner Short
1945
Joseph Gill
1942
Rodney Begg
Harold Davis
1940
L.S. Porter
1938
Arthur Compton
1935
E.G. Chuinard
1931
Harry Leavitt
1929
D.G. Leavitt
1928
C. Leslie Mitchell
1925
John LeCocq
1924
Leo S. Lucas

Special Thanks and Comments

We would like to give a special thanks to our Education Manager, Pamela Feidelson, for all that she does for our department. She continuously keeps the department organized and has been a tremendous help with the creation of this inaugural journal.

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 alumnus 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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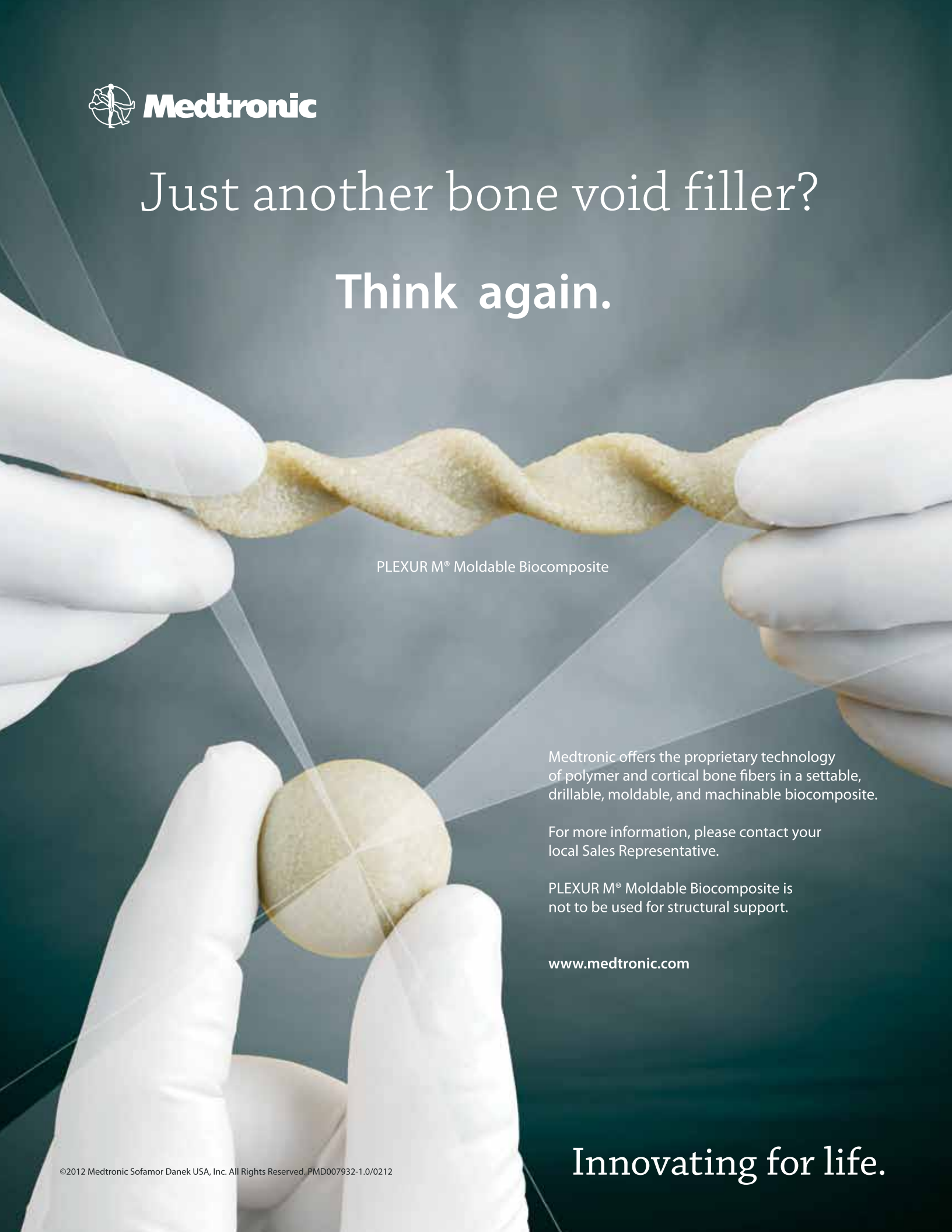
References: 1. *J Bone Joint Surg Br.* 1999;81-B:907-914. **2.** Bobyn JD, et al. Characterization of a new porous tantalum biomaterial for reconstructive orthopaedics. Scientific Exhibit, Proc AAOS, Anaheim, Calif, 1999. **3.** *J Bone Joint Surg Br.* 2006;88-B:304-309. **4.** *J Musculoskel Res.* 1999;3:245-251. **5.** Medlin DJ, et al. Metallurgical characterization of a porous tantalum biomaterial (Trabecular Metal™) for orthopaedic implant applications. Presentation, Materials & Processes for Medical Devices Conference, Anaheim, Calif, 2003.



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