

*The Paul R. Lipscomb
Alumni Society Presents*



*Orthopaedic
Research
Symposium*

Thursday, June 14, 2012

with special guest speaker
David R. Eyre, PhD

*Graduate
Research
Symposium*

Friday, June 15, 2012

with special guest speaker
Gary G. Poehling, MD

Sponsored by
University of California, Davis Health System
Department of Orthopaedic Surgery

*Welcome to the
2012 Paul R. Lipscomb
Alumni Society
Graduate
Research Symposium*

This outstanding gathering is an opportunity for our department to highlight scientific and clinical research, and to reconnect with clinical faculty and alumni who have served our department over the years. Our special guest this year is Dr. Gary G. Poehling, Professor for the Orthopaedics Institute for Regenerative Medicine at Wake Forest Baptist Health.

Most importantly, this is an occasion to commemorate the graduation of thirteen exceptional men and women - four residents and nine fellows - into the ranks of orthopaedic surgery. While always a bittersweet occasion, this day validates the wonderful camaraderie and continuity of our field.

*Thank you for being part
of this memorable event.*

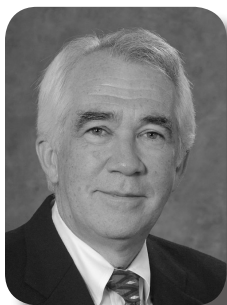
Orthopaedic Surgery Chairs



Paul R. Lipscomb, MD
Professor Emeritus
Chair 1969-1979



Michael W. Chapman, MD
Professor Emeritus
Chair 1979-1999



George T. Rab, MD
Professor
Chair 1999-2006



Paul E. Di Cesare, MD, FACS
Professor
Michael W. Chapman
Chair 2006-2011



Richard A. Marder, MD
Professor
Acting Chair 2011-present

Visiting Professors

- 1982 - Robert B. Winter, MD
1983 - Anthony Catterall, MD
1984 - Eugene E. Bleck, MD
1985 - Paul P. Griffin, MD
1986 - M. Mark Hoffer, MD
1987 - Robert B. Salter, MD
1988 - Colin F. Moseley, MD
1989 - James R. Gage, MD
1990 - James F. Kellam, MD
1991 - David S. Braddford, MD
1992 - Adrian E. Flatt, MD
1993 - Augusto Sarmiento, MD
1994 - M. Mark Hoffer, MD
1995 - James R. Andrews, MD
1996 - James R. Urbaniak, MD
1997 - Stuart L. Weinstein, MD
1998 - Robert A. Mann, MD
1999 - Joseph M. Lane, MD
2000 - Andrew J. Weiland, MD
2001 - Joel M. Matta, MD
2002 - Terry R. Trammell, MD
2003 - Kaye E. Wilkins, MD
2004 - Richard Gelberman, MD
2005 - Robert H. Hensinger, MD
2006 - James Heckman, MD
2007 - Thomas A. Einhorn, MD
2008 - Joseph A. Buckwalter, MD
2009 - Peter J. Stern, MD
2010 - Joseph Borrelli, Jr., MD
2011 - Keith Bridwell, MD
2012 - Gary G. Poehling, MD



Gary G. Poehling, MD

Professor for the Orthopaedic Institute
of Regenerative Medicine
Wake Forest Baptist Health

Dr. Gary Poehling was born and raised in La Crosse, Wisconsin. He received his Bachelor's degree in Biology from Marquette University in 1964 and his MD degree from Marquette University (School of Medicine of Wisconsin, Milwaukee) in 1968. Dr. Poehling's internship and residency were completed at Duke University Medical Center. He also served in the United States Air Force and it was during his stay in Tachikawa, Japan, that he had the opportunity to train under one of the first arthroscopists in the world, thus developing his interest in the specialty. He currently is Journal Editor for Arthroscopy, The Journal of Arthroscopic and Related Surgery. In addition to his expertise in arthroscopy, he obtained the Certificate of Added Qualification of Surgery of the Hand by the American Board of Orthopaedic Surgery in 1989. He joined the faculty at Bowman Gray School of Medicine (Wake Forest Baptist Health) in 1976 and

served as Chairman of the Department of Orthopaedic Surgery from 1989-2011.

Dr. Poehling has a long-standing interest in the development of new minimally invasive techniques and instrumentation. He has served on a design team for the development of unicompartamental knee prosthesis. He has worked on the development of a tissue engineered anterior cruciate ligament and most recently has been exploring the potential of the robot in orthopaedic surgery.

Faculty
University of California Davis
Health System

KYRIACOS A. ATHANASIOU, PhD, PhM
Distinguished Professor, Orthopaedic Research and
Biomedical Engineering

ROBERT H. ALLEN, MD
Associate Professor, Hand and Upper Extremity

BLAINE A. CHRISTIANSEN, PhD
Assistant Professor, Orthopaedic Research Laboratory

PAUL E. DI CESARE, MD, FACS
Professor, Adult Reconstructive Service

RAKESH DONTINENI, MD
Associate Clinical Professor, Oncology

TANIA A. FERGUSON, MD, MAS
Assistant Professor, Trauma Service

DAVID P. FYHRIE, PhD
Professor, Orthopaedic Research Laboratory

MAURO M. GIORDANI, MD
Associate Professor, Chief of Adult Reconstructive
Service

ERIC GIZA, MD
Associate Professor, Chief of Foot and Ankle Service

MUNISH C. GUPTA, MD
Professor, Chief of Adult and Pediatric Spine Service

DOMINIK R. HAUDENSCHILD, PhD
Assistant Professor, Orthopaedic Research Laboratory

ERIC O. KLINEBERG, MD
Assistant Professor, Adult and Pediatric Spine Service

CASSANDRA A. LEE, MD
Assistant Professor, Sports Medicine

MARK A. LEE, MD
Associate Professor, Trauma Service

RICHARD A. MARDER, MD
Professor and Acting Chair, Chief of Sports Medicine

GAVIN C.T. PEREIRA, MBBS, FRCS
Assistant Professor, Adult Reconstructive Service

DEBRA J. POPEJOY, MD

Assistant Professor, Pediatric Orthopaedics

GEORGE T. RAB, MD

Professor, Pediatric Orthopaedics

A. HARI REDDI, PhD

Distinguished Professor, Lawrence J. Ellison
Chair of Molecular Biology, Acting Director of the
Orthopaedic Research Laboratories, Acting Vice Chair

ROLANDO F. ROBERTO, MD

Associate Professor, Adult and Pediatric Spine
Surgery

PETER B. SALAMON, MD

Clinical Professor, Pediatric Orthopaedics

ROBERT M. SZABO, MD, MPH

Professor, Chief of Hand, Upper Extremity and
Microvascular Surgery

JAMES M. VAN DEN BOGAERDE, MD

Assistant Professor, Sports Medicine

PHILIP R. WOLINSKY, MD

Professor, Chief of Trauma Service

JASPER H.N. YIK, PhD

Assistant Professor, Orthopaedic Research Laboratory

BRAD J. YOO, MD

Assistant Professor, Trauma Service

Faculty
Shriners Hospital for Children
Northern California

ANDREA S. BAUER, MD

Assistant Professor, Pediatric Orthopaedics

JENNETTE L. BOAKES, MD

Clinical Professor, Pediatric Orthopaedics

JON R. DAVIDS, MD

Associate Professor, Pediatric Orthopaedics

MICHELLE A. JAMES, MD

Clinical Professor, Chief of Orthopaedics Pediatric
Service

JOEL A. LERMAN, MD

Associate Clinical Professor, Pediatric Orthopaedics

Program

Thursday, June 14, 2012
Orthopaedic Research Symposium
Shriners Hospital Auditorium

- 7:30 AM Continental Breakfast
- 8:00 AM WELCOME: Richard A. Marder, MD
Professor and Acting Department
Chair
- 8:10 AM INTRODUCTION OF GUEST
LECTURER: A. Hari Reddi, PhD
Distinguished Professor, Lawrence J.
Ellison Chair of Molecular Biology,
Acting Lab Director and Acting Vice
Chair
- 8:15 AM ELIZABETH C. AND MICHAEL W.
CHAPMAN LECTURER:
David R. Eyre, PhD
University of Washington
Department of Orthopaedics and
Sports Medicine
- "Cartilage Collagens in Health and
Disease"*
- 9:15 AM KORET FOUNDATION
LECTURER: J. Kent Leach, PhD,
Associate Professor, Department
of Biomedical Engineering and
Department of Orthopaedic Surgery
- "Tissue Engineering of Bone"*
- 9:45 AM KORET FOUNDATION
LECTURER: Jerry C. Hu, PhD,
Principle Development Engineer,
Department of
Biomedical Engineering
- "Self Assembly of Articular Cartilage
for Tissue Engineering "*

10:15 AM Coffee Break

10:30 AM Mark A. Lee, MD
Associate Professor

*"Fracture Healing: Morphogens
and Mechanics"*

10:55 AM DENNY AND JEANENE
DICKENSON RESIDENT
RESEARCH FELLOW:
Sukanta Maitra, MD

*"Facet Joints: Initial
Characterization"*

11:10 AM Michael R. Hardisty
PhD Candidate

*"Stress-Induced Whitening Occurs
in Demineralized Bone Matrix"*

11:25 AM Sean M. McNary
PhD Candidate

*"Articular Cartilage SZP and
Cytoskeleton"*

11:40 AM Kazunari Ishida, MD, PhD
Post-Doctoral Fellow

"COMP-BMP Interactions"

12:00 PM Adjournment

Program

Friday, June 15, 2012

Resident and Fellow Research Presentations
Medical Education Building, Lecture Hall 1222

- 7:00 AM Continental Breakfast
- 7:15 AM Welcome - Richard A. Marder, MD
Professor and Acting Department
Chair
- 7:20 AM Introduction of Guest Speaker -
Robert M. Szabo, MD, MPH
- 7:25 AM Visiting Professor:
Gary G. Poehling, MD
*"Arthroscopy and My Early
Experiences in Wrist"*
- 8:25 AM Susan S. Tseng, MD
*"The Prevention of Atrophic
Nonunion with Bone Marrow-
Derived or Adipose-Derived
Mesenchymal Stem Cells"*
- 8:40 AM Tomasz T. Antkowiak, MD
*"Cartilage Lesions in the Hip:
Diagnostic Effectiveness of Magnetic
Resonance Arthrography"*
- 8:55 AM Christian S. Bromfield, MD
*"When Does Anterior External
Fixation (AEF) Enhance Construct
Stability in Zone II Sacral Fractures?
A Biomechanical Evaluation"*
- 9:10 AM Edward C. Shin, MD
*"Comparison of Arthroscopic Versus
Open Suture Anchor Repair of the
Lateral Ligament Ankle Complex: A
Cadaver Study"*
- 9:25 AM Tyler J. Nathe, MD
*"New NCAA Bat Standard is
Associated with an Increased
Incidence of Hamate Fractures"*

- 9:40 AM Marc R. Fajardo, MD
"The Incidence of Carpal Tunnel Release: Trends and Implications within the United States Ambulatory Care Setting"
- 9:55 AM Margaret K. Grissell, MD
"Quality of Pediatric Orthopaedic Information on the Internet"
- 10:10 AM BREAK (PHOTOS)
- 10:30 AM Visiting Professor:
Gary G. Poehling, MD
"UKA: How Wide Can We Open the Door for Our Patients?"
- 11:00 AM Nicholas H. Pirnia, MD
"Clinical and Radiographic Outcomes of Treatment for Severe Pediatric Spinal Deformities"
- 11:15 AM Ioannis A. Avramis, MD
"Neutral and Mild Kyphosis Do Not Predict Failure After Laminoplasty for Cervical Spondylotic Myelopathy"
- 11:30 AM Robert J. Steffner, MD
"Time to Antibiotics for Open Fractures"
- 11:45 AM David A. Forsh, MD
"The Financial Burden of Indigent Care at a Level I Trauma Center: When the County Doesn't Pay Anymore"
- 12:00 PM Gillian L.S. Soles, MD
"Radiographic and Clinical Outcomes of Intramedullary Nailing of Tibia Fractures: Does Approach Matter?"
- 12:15 PM Pranav P. Rathi, MD
"Factors Affecting Length of Stay After Primary Total Hip Arthroplasty at a University-based Teaching Medical Center"
- 12:30 PM Adjournment



**Tomasz T.
Antkowiak, MD**
*Administrative
Chief*

Education

BS: Biology, McGill University,
Montreal, Quebec, 2001

MS: Neurobiology, McGill University,
Montreal, Quebec, 2003

MD: Albany Medical College, Albany,
NY, 2007

Next Step

Sports Medicine Fellowship - Southern
California Orthopaedic Institute

Career Objective

I look forward to serving the community. I will strive for clinical and technical excellence while providing patients with an attentive and warm interpersonal experience. I hope to participate in the education of future orthopaedic surgeons and to advance orthopaedic knowledge through research and innovation.

Spouse

Lyndsay Jean Antkowiak

Children

Luc Hunter Antkowiak

Personal Statement

I can't recall exactly when I decided to become a physician. It was sometime in the early 90's. I was 10 or 12, and pretty clueless. Twenty years later that goal is nearly complete. A lot has changed. I grew up, married the love of my life, and had a beautiful baby boy. It's hard to express how thrilled I am to have reached

this professional milestone, but the thrill still pales in comparison to the rewards and joy that I've experienced along the way. To those starting the process... work hard, play hard, be positive and make a real effort to enjoy the daily experiences that lead to your professional growth

Undergrad, grad school and medical school provided a solid foundation, but it is this residency that has molded me into a physician and surgeon. It's the knowledge passed down by residents who came before me and the teaching from attendings who devote themselves to resident education (you know who you are) that will truly shape my career. I thank you all for your dedication, trust and camaraderie. Dr. Lee and Dr. Ferguson, you were both instrumental in my decision to attend this residency. I couldn't be any happier with that decision. A special thanks for your mentorship and for keeping it fun.

Parents sacrifice a great deal for their children (I have one now, so I kinda get it). My parents left their native Poland; sacrificing friendships, family and careers to provide a better life for their three kids. Mom and Dad, I am forever grateful to you both. You have given so very much. I would not be here without your love and support. Monika and Peter, you are my closest friends. Thank you for always being there and for all the good times!

I am the luckiest man alive to have met and married the girl of my dreams. Lyndsay, you have been there for me every step of the way. Through thick and thin. You are an amazing mother and wife. You keep our lives running, and you do it with great style and grace. You are generous, kind and thoughtful. Thank you for your endless support. Luc, you've made life even more incredible. I love you both!

Cartilage Lesions in the Hip: Diagnostic Effectiveness of Magnetic Resonance Arthrography

Tomasz T. Antkowiak, MD; Philip Yen, MD; Walter Mak, MD; Thaddeus Laird, MD; Sunny Kim, PhD; John Meehan, MD; Amir Jamali, MD

Objective: Arthroscopy is being used with increasing frequency for the treatment of intra-articular hip pathology. Accurate preoperative diagnosis is of paramount importance for surgical planning and success. In this study, we set out to assess the effectiveness of magnetic resonance arthrography (MRA) in identifying the presence and severity of articular cartilage lesions in the acetabulum and the femoral head.

Methods: Fifty-one consecutive patients had hip arthroscopy for treatment of persistent hip pain after failed conservative management. Pre operative MRA was performed in all patients to assess for acetabular labral tears, cartilage injury and other intra-articular pathology. All MRAs were independently reviewed by two musculoskeletal radiologists who were blinded to patient identifiers. MRAs were evaluated for the presence and severity (depth) of acetabular and femoral head cartilage lesions. Arthroscopy video was retrospectively analyzed by a blinded orthopaedic surgeon. Of the 51 cases, 12 were removed from the study due to deficient video recordings. Thirty-nine videos were analyzed for presence and severity of acetabular and femoral head cartilage lesions. Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were calculated for pre operative MRA based on the gold standard arthroscopy findings.

Results: MRA detected cartilage abnormalities in 30 of the 39 hips

examined (77%). Of these lesions, 20 (51%) were classified by at least one radiologist as major (>50% depth) and 10 (33%) as minor (<50% depth). Arthroscopy data showed cartilage lesions in 29 of the 39 cases (74%). Of these, 20 (69%) were classified as major and 9 (31%) as minor. Of the 29 arthroscopically confirmed cases of cartilage injury, all 29 (100%) had lesions on the acetabular surface and 10 cases (35%) had concomitant femoral head lesions. MRA had a sensitivity of 83%, specificity of 68%, PPV 72% and NPV 71% for the presence or absence of any grade cartilage lesion. Cartilage lesions were then subdivided into major and minor groups. For the presence or absence of major cartilage lesions MRA had a sensitivity of 57%, specificity of 91%, PPV 65% and NPV 83%. For the presence or absence of minor lesions, MRA had a sensitivity of 42%, specificity of 78%, PPV 27% and NPV 85%. There were 15 patients with cartilage delamination detected by arthroscopy (jello or wave sign). Of these 15 cases, 11 (73%) were read as negative by one radiologist and 6 (40%) by the other.

Conclusions: MRA is a minimally invasive test that is relatively sensitive (83%) and specific (68%) for detection of cartilage injury in the hip. The test is not particularly sensitive at identifying major (57%) versus minor lesions (42%). MRA results were more consistent with arthroscopy findings on the femoral head (sensitivity 95%, specificity 71%) versus the acetabular cartilage (sensitivity 70%, specificity 65%). Cartilage delamination is difficult to diagnose clinically and radiographically. On average, 57% of patients with arthroscopically confirmed cartilage delamination had a negative MRA. Pre operative MRA is a useful adjunct for detection of intra-articular cartilage injury in the hip. It should be used in conjunction with history, physical exam findings, and plain radiographs in selecting the appropriate management for patients with intra-articular sources of hip pain.



**Christian S.
Bromfield, MD**
*Administrative
Chief*

Education

Undergraduate: University of Michigan, 1998

MD: University of Southern California, 2007

Next Step

Orthopaedic Trauma Fellowship, St. Louis University, then back to Sacramento as an orthopaedic traumatologist with Kaiser South Sacramento.

Career Objective

To continue to improve at what I do throughout my career, which I hope will include an academic component of teaching and research. Above all, to take great care of my patients and “make it perfect” as I was taught here.

Spouse

Katherine Bromfield

Children

Lila Faith Bromfield

Dane Christian Bromfield

Eden Lee Bromfield

Personal Statement

I can't believe it has been five years. My time at UC Davis has been the best and most challenging of my life. I'm so thankful and have been so fortunate for the opportunity to train with the mentors

and colleagues whom I have met along the way. I feel like I have grown up in so many ways as a person, a husband, a father and a physician.

There are so many people to thank for their help in getting me here. I first have to thank my parents for their constant, unwavering support, love and encouragement over the years as I have pursued my goals. None of this would have been possible without you.

To my co-residents, especially Eddie, Tom and Susan, you are the best. I have learned a lot from all of you. Everyone should have a chance to train with people like you. I also need to thank all of the attending faculty at UC Davis for their patience and wisdom. I will take lessons learned from each of you into my practice for the years to come. I especially want to thank the trauma staff for inspiring me to pursue a career in orthopaedic trauma and for investing their time and effort in my training. Thanks as well to the clinic, OR and nursing staff at Davis for showing me the ropes and for the countless times you helped me over the years.

Above all, none of this would be possible without you Kate. It has been a long five years and you've worked harder than I did. I only have to look at Lila, Dane and Eden to be reminded of what a wonderful person you are and how happy I am that you agreed to come on this journey with me. It's almost over, I promise.

When Does Anterior External Fixation (AEF) Enhance Construct Stability in Zone II Sacral Fractures? A Biomechanical Evaluation

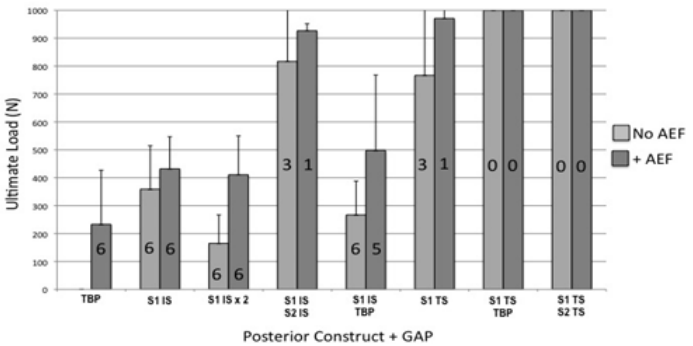
Christian S. Bromfield, MD; Erik McDonald, BS; Michael Leslie, DO; Jenni M. Buckley, PhD; Mark A. Lee, MD; Tania A. Ferguson, MD

Purpose: This study was designed to evaluate the biomechanical contribution of anterior external fixation (AEF) to various posterior fixation constructs in both a “reduced” and a “comminuted” (gap) zone II sacral fracture model. Our null hypothesis was that AEF does not increase load to failure over that observed with the posterior fixation alone.

Methods: We simulated a transforaminal sacral fracture with ipsilateral rami fractures (AO/OTA 61-C1.3) in fourth generation composite epoxy coated full pelvic models (N=6). We tested eight posterior fixation constructs: 1) Tension band plate (TBP), 2) Single iliosacral (IS) screw at S1, 3) Two IS screws at S1, 4) IS screws at S1 and S2, 5) IS screw at S1+TBP, 6) Trans-sacral (TS) screw at S1, 7) TS screw at S1+TBP, and 8) TS screws S1 and S2. Each construct was tested with and without AEF (at AIFS), and with and without posterior fracture gap (simulating a situation in which there is no posterior cortical contact). Load to failure was tested in a single leg stance model, and displacement was measured by tracking relative motion of the involved hemi-pelvis with a 3D motion tracking camera.

Results: The TBP construct was unable to withstand load without an AEF with or without posterior gap. In the setting of posterior cortical contact, addition of AEF contributed to ultimate load-to-

failure only in the setting of single level IS fixation (S1 IS, S1 ISx2). The contribution of AEF in the presence of a posterior gap varied by construct. Failures prior to achieving 1000N load occurred in all constructs except transsacral fixation (S1TS). AEF enhanced the stability of single level (S1 only) fixation constructs. When two-level (S1&S2) fixation was achieved via IS, TS, or TBP AEF did not significantly increase the sustainable load.



Conclusions: When used as supplemental fixation, AEF displayed a biomechanical advantage in load to failure when posterior fixation was limited to single-level sacral fixation. The contribution was greatest in the setting of a posterior gap. Trans-sacral fixation at S1 alone decreased the importance of AEF. With two levels of posterior fixation (s1 and s2), AEF made no significant contribution to construct stability. Clinically, this indicates that AEF should be added when safe posterior fixation is limited to S1 IS screws or a TBP alone, but does not improve stability when fixation at both S1 and S2 can be achieved.



**Edward C.
Shin, MD**
Resident

Education

BS: Physiological Sciences, University of California, Los Angeles

MD: University of California, Davis

Next Step

Fellowship-San Francisco

Personal Statement

I try to avoid cliché when I can but in this case it is not possible. I would not be here without the support and sacrifice of so many. It is the little things that go a long way. Here are just a few:

“If it were easy, everyone would do it.” In his classic manner, my father uttered these words from across the room without looking up from his newspaper after I complained to my sister of endless call nights and miserable work conditions. Only because this came from the hardest working, most honest and generous man, did I realize I should stop complaining and understand the privilege I have to be an orthopaedic surgeon. I’ve embraced the opportunity every day since but I haven’t quite mastered the complaining part yet.

Thank you to my mother for her daily prayers, daily phone calls and the weekend dinners she spent many Fridays preparing, knowing I was coming to visit. If you ate the food, you would understand how important this was in

re-energizing me on the weekends. I am the luckiest son.

To my little sister, Suemee, the reformed brat, who is now a sophisticated (kind of) restaurant entrepreneur. Thanks for giving me street credit my whole life and letting me call it "our restaurant".

To my girlfriend/wife.... Hopefully I'll have something to write here for my next graduation.

To my co-residents: Love you guys, Susie, Holly and Dora! Too many broken elevator stories, call night fiascos and wrong site surgeries (just kidding) to recount but it was more fun than I could have imagined. Christian, Tom, Susie. I am truly proud to be part of this graduating class. I learned every day from your examples of leadership, integrity, work ethic and friendship.

Margaret MacNitt, you may be the most important reason why any of us are allowed to graduate. Thank you for your kindness in keeping us in line.

Finally, to our staff. Sometimes it is difficult to understand the methods of the coach. Yet, in reflecting upon the past five years, I can only say that I am ready to move on from residency confidently both because of your dedication to our education and for providing us with an example to follow throughout our career. Thank you!

Comparison of Arthroscopic Versus Open Suture Anchor Repair of the Lateral Ligament Ankle Complex: A Cadaver Study

Eric Giza MD, Jorge Acevedo MD,
Peter Mangone MD, Kirstina Olsen MD,
Stephanie Wong BS,
Edward C. Shin MD

Introduction: Ankle inversion injury is a very common occurrence, amounting to many ankle injuries per day in the United States. The operative treatment of mechanical ankle instability is indicated for patients who have had multiple sprains and have continued episodes of instability, despite bracing and rehabilitation. Open repair of the lateral ankle ligaments involves exposure of the attenuated ligaments and advancement back to their anatomic insertions on the fibula using bone tunnels or suture implants. The objective of this study is to compare the biomechanical strength of open fixation to lateral ligament stabilization using a novel arthroscopic surgical technique.

Methods: Power analysis identified the need for at least seven matched pairs of cadaver ankle specimens. One specimen from the pair underwent open fixation and the other specimen had arthroscopic lateral ligament stabilization performed. The calcaneofibular ligament (CFL) and anterior talofibular ligament (ATFL) were excised from their origin on the fibula. In the first group, a #2 fiberwire suture was placed into the CFL and a separate suture into the ATFL in a running Krackow fashion with a total of two locking loops. For the open repair technique, Arthrex® 3.0mm Biosuturetak anchors (Arthrex Inc., Naples, FL) were used to reattach the ligaments to their anatomic insertions.¹ In the second group,

identical suture anchors were used to repair the lateral ligament complex and inferior extensor retinaculum via an arthroscopic technique as previously described by Acevedo and Mangone.² All surgical repairs were performed by board-certified, fellowship-trained Foot and Ankle Orthopaedic Surgeons.

The ligaments were tested to failure. Torque to failure, degrees to failure, initial stiffness, and stiffness were measured. A matched pair analysis was performed. An a priori power analysis of 0.8 demonstrated that seven pairs needed to show a difference of 30% with a 15% standard error at a significance level of $\alpha=0.05$.

Results: The mean torque at failure was 18.3 Nm for the open group and 15.6 Nm for the arthroscopic group (p -value=0.47). Degrees to failure in the arthroscopic group was 38.4 degrees compared to 46.6 degrees in the open group (p -value=0.10). Initial stiffness in the arthroscopic group was 0.43 Nm/degree as compared to 0.30 Nm/degree in the open group (p -value=0.11). Stiffness was 0.57 Nm/degree in the arthroscopic group and 0.50 Nm/degree in the open repair group (p -value=0.71). There was no statistically significant difference between the arthroscopic and open repair groups for all measures in this study.

Conclusion: There is no statistical difference in the torque at failure and stiffness of a traditional open repair as compared to an arthroscopic anatomic repair of the lateral ligaments of the ankle. These results demonstrate that an arthroscopic technique can be considered for lateral ligament stabilization in patients with mild to moderate mechanical instability.



**Susan S.
Tseng, MD**
Resident

Education

BS: Biological Sciences, Stanford University

MD: Boston University

Next Step

Pediatric Orthopaedics Fellowship,
Seattle Childrens' Hospital

Career Objective

To be a good orthopaedic surgeon and provide the best possible care for my patients

Personal Statement

I feel fortunate to have received my orthopaedic residency training here at the UC Davis Medical Center, Shriners Hospital, and Kaiser South Sacramento and am grateful to so many people who have helped me along the way.

I am indebted to my parents and sister for all their years of encouragement, sacrifice, and constant support. Without them, I could not have done this.

I am grateful to the exceptional faculty and mentors who have guided me over my years here. Thank you for your patience, support and dedication to teaching. Your unique individual contributions to my development as an orthopaedic surgeon will stay with me through the rest of my career.

Thank you to the residents and fellows, past and present, for their camaraderie, hard work, and inspiration. I have

learned so much (and laughed much) through your guidance and efforts.

I would also like to thank the nurses, cast techs, clinic and OR staff for all the help and kindness you have given me to become a better doctor and person.

Thank you, Margaret and Dr. Roberto, for being our resident advocates and doing all that you do to keep us happy.

It has been a privilege to work with all of you. I will miss you all.

The Prevention of Atrophic Nonunion with Bone Marrow-Derived or Adipose-Derived Mesenchymal Stem Cells

Susan S. Tseng MD, A. Hari Reddi PhD,
Mark A. Lee MD

INTRODUCTION: Fracture nonunions remain a significant problem in orthopaedic trauma surgery. In vivo studies on the use of mesenchymal stem cells (MSCs) for bone healing have mostly been performed in critical defect models. These physical defect models differ from ones in which impaired bone regeneration results from a defect in cell precursors, osteoinductive factors or vascularity. An atrophic nonunion model in a rat has been established that simulates the condition in which there is periosteal disruption without a bone defect. Although it is known that mesenchymal stem cells are a prerequisite to fracture repair, it is unclear whether the administration of stem cells alone, without an exogenous osteogenic factor, can prevent an atrophic nonunion from occurring. It is also unknown if the healing rates would vary with different

sources of stem cells or in combination with BMPs. The purpose of this study was to compare the efficacy of bone marrow-derived mesenchymal stem cells (BMSCs), adipose-derived mesenchymal stem cells (ASCs), and rhBMP-7 in preventing atrophic nonunion in a rat model.

METHODS: Stem Cell Acquisition: Bone marrow stem cells were harvested from the tibias and femurs of syngeneic three-month-old male Fisher 344 rats. Adipose stem cells were derived from their inguinal fat pads. Cells were cultured and expanded in MEM media. First and second passage cells were used for implantation.

Animal Model: In three month old male Fisher 344 rats, a three-point bending drop weight apparatus was used to make a transverse femur fracture that was stabilized with an intramedullary 1.25mm Kirschner wire. The fracture site was exposed through a small lateral incision and the periosteum cauterized circumferentially for 2 mm on each side of the fracture.

Experimental Groups: The groups included 1) a nonunion control where only the collagen carrier was added, 2) a fracture only control where no cauterization was done, and the test groups where 3) BMSCs, 4) ASCs, 5) rhBMP-7, or 6) ASCs in combination with rhBMP-7 was applied to the fracture on a collagen carrier.

Cell or BMP Administration: Five to ten million BMSCs or ASCs were transplanted to the fracture site in rat tail tendon collagen buffer or on a collagen sponge immediately after cauterization

and irrigation. For the groups involving BMP, 30 g or 100 g of rhBMP-7 was incorporated with the carrier

RESULTS: Assessment of Fracture Healing: Serial radiographs were taken at 0, 2, 4, 6 and 8 weeks after the fracture was produced. Radiographic fracture union was determined by the presence of bridging callus on two opposite cortices. The fracture union rates at 8 weeks were 50% (7/14, $p=0.30$) for the BMSC group, 50% (8/16, $p=0.28$) for the ASC group, 71% (12/17, $p=0.04$) for the ASC + rhBMP-7 group, and 100% (18/18, $p=0.0001$) for the rhBMP-7 group. The nonunion control group had a 33% (5/15) healing rate. In the fracture only group 83% (10/12, $p=0.014$) healed.

Histological Assessment: Animals were sacrificed at 8 weeks after the administration of treatment. Three to four rats from each group were utilized for histological evaluation. The experimental femurs were harvested and fixed in 4% paraformaldehyde in 0.1 M phosphate buffer. The femurs were then defatted in ethanol, decalcified with 10% formic acid in citrate, and embedded in paraffin. Paraffin sections were cut and stained with toluidine blue for histological evaluation. Sections were analyzed for degree of fracture healing and amount of cartilage, bone and fibrous tissue/callus.

Biomechanical Assessment: The remaining specimens from each group were harvested along with the unaffected femur from the contralateral side to undergo biomechanical testing. Specimens were mounted in a Frankel-Burstein axial torsion-testing machine. Rotational displacement was measured with a precision potentiometer and torque was measured with a torque cell.

Specimens were tested in torsion at a rate of 50/min until failure or through an arc of 45. Rotational displacement and torque data was collected at 60 Hz using a digital data acquisition system. Maximum torque to failure was measured directly from the data and torsional stiffness was calculated from a regression of the linear portion of the torque versus angular displacement curve. The contralateral intact femur was also tested to calculate normalized values of maximum torque to failure (percent maximum torque) and stiffness (percent stiffness) to reduce the influence of individual animal differences. Although all experimental groups had greater torque to failure and stiffness than the nonunion group, the adipose derived stem cell group had the lowest values. The bone marrow derived stem cell group and BMP groups had higher values, although it was the fracture only group that had the greatest values.

CONCLUSION: BMSCs and ASCs were inconsistent in their ability to prevent a rat atrophic nonunion, and were not found to be statistically significant compared to the nonunion control. None of the groups involving stem cells were as successful at preventing the nonunion as the rhBMP-7 only group which had a 100% union rate at 8 weeks. Even the ASC+rhBMP-7 group had a lower union rate than the rhBMP-7 only group. Therefore, none of the groups involving stem cells were as successful at preventing the nonunion as the rhBMP-7 only group which had a 100% union rate at 8 weeks. Further studies of stem cell optimization are needed for consistent bone repair in a clinical setting.



**Ioannis A.
Avramis, MD**
Spine Fellow

Education

Undergrad: UCLA

MD: UC Davis School of Medicine

Orthopaedic Surgery Residency:
LAC+USC

Next Step

Minimally Invasive Spine Institute
Dallas, TX

Spouse

Joslin Avramis

Children

Alexa and Dylan

Personal Statement

I would like to thank everyone at UC Davis not only for their education, but support and advice in the academic and personal realm. It was a pleasure to return to Sacramento and UC Davis after my residency at USC; I was able to renew friendships and make many more. I am looking forward to staying in the area for my career and maintaining my relationships with my mentors at UC Davis. I am most thankful for the support and love of my family, especially my wife, Joslin, who has continually supported and encouraged me throughout my residency and fellowship.

Neutral and Mild Kyphosis Do Not Predict Failure After Laminoplasty for Cervical Spondylotic Myelopathy

Ioannis A. Avramis MD, Nicholas H. Pirnia MD, Rolando F. Roberto MD, Munish C. Gupta MD, Eric O. Klineberg MD

INTRODUCTION: Expansive cervical laminoplasty began in Japan for the surgical treatment of cervical spondylotic myelopathy and has been adapted for western treatment of cervical spondylosis. The goal is to decompress the spinal cord, and prevent kyphosis from laminectomy alone, but preserve motion not possible with fusion. Despite careful pre-surgical planning, post-operative kyphosis may develop for a variety of reasons including surgical technique, and patient factors. It has been suggested that preoperative kyphotic or neutral cervical alignment is a risk for poor surgical outcome and neurologic recovery. Pre-operative radiographic evaluation for kyphosis is a critical aspect of pre-surgical planning. Although, laminoplasty in severely kyphotic spine should be avoided, there is little guidance for the straight or minimally kyphotic spine. Our hypothesis: neutral or slightly kyphotic ($<5^\circ$), does not correlate with late kyphotic collapse or need for revision surgery.

METHODS: A retrospective review of patients who underwent laminoplasty from 2003 to January 2011 at UC-Davis Medical Center in Sacramento, CA. Inclusion criteria: Age > 18 , pre-operative and post-operative radiographs, laminectomy alone (no previous/simultaneous fusion. Cervical parameters measured: cervical lordosis (C2-C7), mean lordosis (midpoint of

flexion and extension radiographs) as well as evaluation with the straight line method (Gwinn et al.). Patient demographics: age, smoking history and pre/post-operative Nurick scores were determined. We defined three pre-operative groups: kyphotic (-15° to -6°), neutral (-5° to 5°), and lordotic (6° to 15°). Laminoplasty failure was defined as kyphosis that led to reoperation or planned reoperation for increasing deformity and/or myelopathy.

RESULTS: 63 patients with an average age of 57.9 years (30 females, 33 males) met inclusion criteria. Preoperatively 7 of 63 cervical spines were kyphotic (K), 17 of 63 were neutral (N), and 39 of 63 were lordotic (L). There were no differences in the pre-op Nurick grades between groups. All groups improved their Nurick grade from pre-op to post-op (K 0.6, N 0.9, L 0.7 Nurick grades), with no statistical difference in final follow-up Nurick grades. Fifteen patients failed the straight line test (7 K, 5 N, 3 L), and 16 had a ($<-6^{\circ}$) kyphotic median lordosis (5 K, 8 N, 3 L). Thirteen (86.7%) of patients that failed straight line test did well with laminoplasty (mean post-op kyphosis -7.3°), as did 15 (92.9%) of patients with kyphotic median lordosis (mean post-op kyphosis -5.3°).

There were 2 kyphotic failures that were operated for both increasing myelopathy and kyphosis. Both of the failures failed the straight line test; however, they each had a preoperative lordosis of 0° and 8° , and a median lordosis of -7.5° and 7° respectively. Final kyphosis prior to revision surgery was -14° and -47° , with pre-op Nurick scores of 3 and 2 and post-op Nurick scores of 3 and 5 respectively. Both of the failures occurred in female smokers, with 2 or more co-morbidities.

CONCLUSIONS: Laminoplasty is an effective method for providing decompression for multi level cervical spondylosis. For neutral or slightly kyphotic spines the failure rate is extremely low, 1 of 17 (6%), and no failures were noted in our moderate kyphosis group. In fact, in our two failures, neither patient had pre-operative kyphosis (<5°). Laminoplasty appears to be safe and effective in patients with neutral or mild cervical kyphosis; however, they may require additional preoperative counseling, and close post operative follow-up to detect late kyphosis. Further research into determining what factors are critical for the development of progressive kyphosis and myelopathy after laminoplasty needs to be considered.

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**Marc R.
Fajardo, MD**
Hand Fellow

Education

College: Tulane University

MD: The Chicago Medical School

Residency: Orthopaedic Surgery, NYU
Hospital for Joint Diseases

Next Step

Private/Academic Practice in Chicago, IL

Spouse

Yoon Young Choi

Children

J.R. Fajardo

Personal Statement

Thank you to all the staff, residents, fellows, and faculty for a memorable year. A special thanks to Dr. Szabo, Dr. James, and Dr. Allen for their mentorship and guidance.

The Incidence of Carpal Tunnel Release: Trends and Implications within the United States Ambulatory Care Setting

Marc R. Fajardo, MD; Sunny Kim, PhD;
Robert M. Szabo, MD, MPH

Purpose: To investigate the changes and trends of carpal tunnel release (CTR) surgery within an ambulatory setting over the past decade in the United States, as well as its implications.

Methods: The National Survey of Ambulatory Surgery (NSAS), last carried out in 1996, was conducted again in 2006 by the Centers for Disease Control (CDC) and Prevention. We performed a design-based statistical analysis of cases with procedure coding indicative of carpal tunnel release.

Results: The number of CTR procedures increased by 38% between 1996 and 2006. In 1996, CTR performed in freestanding ambulatory surgery centers was 16% but the proportion increased to 49% in 2006. By 2006, 99% of CTR were performed in an ambulatory setting. There was a significant increase in women aged 50-59 undergoing CTR.

Conclusions: The minimal invasiveness of CTR, combined with the advent of ambulatory care facilities, has made CTR a predominantly outpatient procedure. Compared with other studies, our study demonstrated a higher incidence of CTR within the United States. Elderly women, in particular, with CTS were found to be three times more likely to be treated surgically than other age groups. Further study is needed to better define factors influencing CTR indications and outcomes.



**David A.
Forsh, MD**
Trauma Fellow

Education

Undergraduate: Xavier University of Louisiana

MD: Medical University of South Carolina

Residency: Mount Sinai Hospital, New York

Next Step

Assistant Professor & Chief of
Orthopaedic Trauma

Department of Orthopaedic Surgery,
Mount Sinai Hospital, New York, NY

Career Objective

To provide competent, compassionate, and equal care to all patients. In doing so, it is my goal to help advance the field of Orthopaedic Trauma and develop a solid foundation in my practice that may influence and further educate other health care professionals.

Personal Statement

It has been a great year! I would like to thank my mentors for a wonderful experience. I anticipated having a memorable year, but I never imagined that it would be this enriching. It's been said that the mediocre teacher tells. The good teacher explains. The superior teacher demonstrates. But the great teacher inspires... I have truly been inspired by you all over the course of my fellowship. I am humbled and grateful to have had the opportunity to train at

UCDMC with you. I look forward to keeping in touch with you all as I begin a new chapter in my life. Many regards.

The Financial Burden of Indigent Care at a Level I Trauma Center: When the County Doesn't Pay Anymore

David A. Forsh, MD, Philip R. Wolinsky, MD & Sheldon Coleman, MD

INTRODUCTION: We examined the financial ramifications on the Department of Orthopaedic Surgery and orthopaedic trauma surgeons after the decision by our county medical system to stop payments to our institution for the medical treatment of county indigent patients. The University of California at Davis (UCDMC) is the only level I trauma/ tertiary care center located within Sacramento County in the state of California. Prior to mid 2009, Sacramento County insurance eligible patients treated at our institution had their healthcare paid for by the county of Sacramento. After mid 2009 the county made a decision to no longer reimburse our institution for any care provided at UCDMC for patients with Sacramento County insurance.

METHODS: A retrospective review was carried out on all of the 656 Sacramento county patients treated at our institution by the four orthopaedic trauma surgeons over a 4 year period that included the 2 years prior to the loss of county payments as well as the 2 years following the loss of payment. The data collected included: demographics, the admitting service, injuries treated, length of stay, and orthopaedic surgeon billing and reimbursement. We also classified the urgency of care that was rendered into

one of 3 categories: emergent, urgent or elective.

RESULTS: The orthopaedic trauma surgeons billed and were reimbursed approximately \$1.2 million during the 2-year period when the county still paid. During the 2 years following the loss of county payments the department billed approximately \$870,000 and was reimbursed zero dollars.

DISCUSSION/CONCLUSION: Despite the lack of payment from Sacramento County, UCDMC continues to provide care to the county's indigent population as the Tertiary care/ Trauma Center located within the county. This lack of payment for care may have significant long-term economic ramifications for the Orthopaedic Trauma Surgeons, the Orthopaedic Surgery Department, as well as our institution. The vast majority of the patients who were treated without reimbursement required "emergent" or "urgent" interdisciplinary care, and cannot, and will not be turned away from our institution. The financial burdens of healthcare of under or uninsured patients may preferentially fall on the "safety net" level I trauma/ tertiary care centers and the physicians who predominately take care of patients with urgent and emergent injuries. This burden may be unsustainable in the future.



**Margaret K.
Grisell, MD**
Pediatric Fellow

Education

MD: Indiana University School of
Medicine, Indianapolis, IN

Residency: Saint Louis University
Hospital, Saint Louis, MO

Next Step

Associate Professor, Department of
Orthopaedic Surgery, Saint
Louis University, Saint Louis, MO

Spouse

Mark Caviness

Children

Rookie, Patrick

Personal Statement

I would like to thank everyone at the Shriners Hospital for Children Northern California and at the UC Davis Department of Orthopaedic Surgery for their guidance, patience, and support this year. I would like to especially thank the Pediatric Orthopaedic Surgery attendings for their time and effort put forth in my training. I have learned more than I thought possible this year. I hope to take this knowledge back to Saint Louis to my patients, as well as to the students and residents. Thank you.

Quality of Pediatric Orthopaedic Information on the Internet

Margaret Grisell, MD, Andrea Bauer, MD, Carolyn Yang, MD, Brenton Winship

Purpose: The majority of Americans have access to the Internet and patients rely on the Internet for disease information. However, there are few guarantees to the reliability and accuracy of this information. The purpose of this study was to examine the quality and content of information on the Internet for ten common pediatric orthopaedic diagnoses.

Methods: We identified ten common diagnoses in pediatric orthopaedics based on admissions to our tertiary care children's hospital: brachial plexus injury, cerebral palsy, clubfoot, developmental dysplasia of the hip, leg length discrepancy, osteochondroma, polydactyly, scoliosis, spina bifida, and syndactyly. We used the two most frequently visited search engines to identify the top ten websites for each disease, excluding websites that were not easily accessible or not pertinent. We judged the websites in two ways: the quality-based Health On the Net Foundation (HON) criteria and custom content-based grading sheets. The custom grading sheets focused on the essential information for patients' knowledge of each diagnosis based on disease summary, pathogenesis, diagnosis, treatment, and prognosis. Each website was given two independent quality and content scores from three orthopaedic surgeons.

Results: Three independent observers graded a total of 98 websites for ten diseases and placed the score as a percentage of the maximum

possible score. Thirty-three websites were classified as academic, 30 were commercial, 31 were non-profit, and 4 were physician's websites. Academic websites scored the highest in content (mean 60.8 ± 15.5), while commercial websites scored the lowest (mean 46.7 ± 22.2) (Table 1). Among the diagnoses, osteochondroma websites had the highest content scores (mean 75.8 ± 11.8), while leg length discrepancy websites had the lowest content scores (mean 39.5 ± 16.5). In contrast, websites about developmental dysplasia of the hip had the highest HON scores (mean 10.4 ± 1.8), while those about brachial plexus birth palsy scored the lowest (mean 6.8 ± 2.7). Among the five content subgroups, scores were generally higher for disease summary and diagnostics and lower for prognosis and pathogenesis.

Conclusion: The Internet websites reviewed here demonstrated a wide range of both content and information. We found that academic websites were the best source of Internet information while commercial websites were the least reliable. We advise physicians to talk with their patients about the information they get on Internet and how it dictates their treatment plan and prognostic expectations. We hope this study, combined with further understanding of how our patients use this information, can help improve Internet content.

Table 1: HON and Content Scores by Website Type (*percentage of the maximum possible scores ** ≥ 12 points on 16 point scale)

Type of Website	HON Score* Mean \pm SD	Content Score* Mean \pm SD	No. of Quality Sites by HON Score**
Academic	49.0 \pm 11.8	60.8 \pm 15.5	0
Commercial	43.3 \pm 15.5	46.7 \pm 22.2	2
Non-profit	67.9 \pm 14.8	54.2 \pm 20.2	13
Physician	41.1 \pm 16.0	57.0 \pm 18.0	0



**Tyler J.
Nathe, MD**
Sports Fellow

Education

BS: Chemistry, University of Washington

MD: University of Washington

Orthopaedic Surgery Residency

Program: University of California, Davis

Next Step

Sharon and I will be heading back home to Washington. We are very sad to leave UC Davis, but we are excited about the opportunity up north. I will be joining a group in Bellevue and Issaquah, WA.

Career Objective

To provide excellent care to patients and be respected by my colleagues

Spouse

Sharonjeet Sangha MD

Children

Kian Singh Nathe

Personal Statement

It has been a great six years here at UC Davis and I am very sad to leave. I will be forever indebted to everyone here that has spent considerable time, dedication, and patience to teach myself and the other residents.

Dr. Marder, you have been an incredible mentor to me. A few of your many

great qualities are your perfectionism and the incredible care you have for your patients. I appreciate all of your generosity and patience. You exemplify the type of physician I hope to be.

Dr. Van den Bogaerde, thank you for all of your expertise. I have greatly enjoyed learning from you. Your patience in the operating room, inability to be rattled, and skill in the shoulder have been a great example to me.

Dr. Lee, thank you for your enthusiasm and knowledge. I have learned a tremendous amount from you. I have especially enjoyed discussing and assisting you in complex knee cases.

Dr. Lewis, the Zen master, thank you for your guidance. It was you that steered me towards orthopaedic sports medicine. You have a unique way of approaching and discussing problems that is thought provoking and stimulates further inquiry. I greatly enjoyed my time in Boise and my experience there was invaluable.

Lastly, thank you to my family. Sharon, my wife, you have always been a tremendous amount of support and I could not have made it through all of this training without you. Thank you to my mother and father in law for the sacrifice that you have made to allow us to have a beautiful boy while both of us are training as physicians. Mom and Dad, thank you for your love and support.

New NCAA Bat Standard Is Associated with an Increased Incidence of Hamate Fractures

Tyler J. Nathe MD; Matthew Anderson MS; Ryan Nathe, BS;
Robert M. Szabo MD, MPH

Hand and wrist injuries are uncommon reasons to miss playing time in professional baseball. In fact, fractures of the hand and wrist combined account for less than 1.6% of all injuries in NCAA baseball. Fractures of the hook of the hamate are one of the well-known carpal fractures but even these are considered rare. They most often occur in sports that involve a club such as tennis, golf, and baseball.

Left untreated, hook of the hamate fractures often lead to a myriad of problems including flexor tendon rupture, ulnar nerve symptoms, carpal tunnel syndrome, and chronic pain. Good results, as judged by athletes returning to the former level of competition, have been reported with excision of the hook of the hamate in cases of fracture.

Due to an increasing concern for pitchers' safety and increasing run totals, the NCAA changed the bat standard for the 2011 season. The old standard, BESR (ball exit speed ratio), was replaced by the BBCOR standard, (bat ball coefficient of restitution). The NFHS (National Federation of State High School Associations) has adopted the BBCOR standard for the 2012 season. The new bat standard mandates a bat with performance similar to a wood bat without the danger that a broken bat can present when it goes into the field of play or stands. The result in Division one men's NCAA baseball from 2010 to 2011

was a drop from .94 to .52 home runs per game, 6.98 to 5.58 runs per game, and .305 to .282 batting average.

Due to an increased number of hamate fractures seen at our institution since the transition to the new bats we conducted an email based survey that was sent to the athletic trainers responsible for each of 297 Division 1 NCAA baseball teams. In this survey we asked the trainers the number of hamate fractures their players had in 2011 as compared to the 2008, 2009, and 2010 seasons. We also asked about mechanism of injury, type of bat used at injury, treatment, and time missed.

We distributed 295 surveys. The contact information of two trainers could not be obtained. The contact information for the athletic trainers was obtained by searching the school's athletic department website. If a trainer did not respond to the initial survey query, we sent a second survey two weeks later. There have been 118 total responses. 38 hamate fractures were reported for the 2011 season and 33 fractures for the 2008, 2009, 2010 seasons. The average trainer was able to report on 2.25 of the three seasons spanning from 2008 to 2010. All fractures occurred while batting and all but two occurred in the down hand on the bat. The rate of hamate fracture for 2008, 2009, and 2010 was 0.125 hamate fractures per team per season. The rate of hamate fractures for 2011 was 0.322 hamate fractures per team per season. The relative risk of the new bat standard for hamate fracture is 2.2 (95% CI 1.4 to 3.4, $p=0.0003$).

Conclusion: The new bat standard may be responsible for a nearly 250% increase in the incidence of hamate fractures in the NCAA. Further study is warranted to see if this standard should be changed.



**Nicholas H.
Pirnia, MD**
Spine Fellow

Education

Undergraduate: Wright State University,
Dayton, OH

MD: The Ohio State University, College
of Medicine, Columbus, OH

Residency: San Francisco Orthopaedic
Residency Program, San Francisco, CA

Next Step

Private practice in the East Bay, CA

Spouse

Portia Pirnia

Children

Beatrice Pirnia

Personal Statement

I feel grateful for the opportunity to train with the Spine surgeons at UC Davis Medical Center. This year far exceeded my expectations and has been the most formative of my career thus far. All three of my mentors are not just excellent teachers, but also fantastic surgeons and gentlemen in all their interactions. I also would like to thank my co-fellow Ioannis who was an excellent colleague throughout the year. He is smart, dependable, and always willing to help out. Most all, my wife deserves so much credit. Without her love and support I would have never made it this far. Portia, thank you for everything that you have done, it means so much to me.

Clinical and Radiographic Outcomes of Treatment for Severe Pediatric Spinal Deformities

Munish C. Gupta, MD and
Nicholas H. Pirnia, MD

Much has been written on the topic of pediatric spinal deformity, but the outcome of treatment for severe spinal deformity, such as scoliosis or kyphosis of greater than 90 degrees, remains relatively unknown. Most studies of pediatric spinal deformity have few patients with severe deformity, making analysis of this subgroup difficult. We present a retrospective comparative study of patients with severe spinal deformity treated at a single center from 2005 to 2012. Patients with severe deformity were compared to patients with curves of less than 90 degrees with respect to pre and post-op Scoliosis Research Society (SRS) questionnaires, percent correction of the deformity, type of surgery performed, and treatment complications.

A comprehensive chart review was undertaken of all pediatric spinal deformity patients treated at Shriner's Hospital of Northern California from 2005 to 2012. Exclusion criteria included implantation of a growing rod / VEPTR system, age younger than 6 at the time of definitive surgery, poor mental status that precludes use of the SRS questionnaire and patients who lack SRS follow-up data, and surgical treatment for a spine condition other than spinal deformity. Ultimately, 254 patients met the inclusion criteria with 31 patients having a curve magnitude greater than 90 degrees for a prevalence of 12.2%. The most common diagnosis for those with severe deformities was idiopathic scoliosis (37%), followed by neuromuscular scoliosis (31%), congenital scoliosis (13%), syndromic scoliosis (10%), and kyphosis or kyphoscoliosis (10%).

This research project is ongoing and will hopefully provide insight into the differences between treating severe scoliosis and moderate scoliosis.



**Pranav P.
Rathi, MD**
*Adult
Reconstruction
Fellow*

Education

Undergraduate : D. G. Ruparel College,
Dadar Mumbai India

MD: Seth G. S. Medical College and
K.E.M. Hospital, Parel, Mumbai, India

Residency: Bombay Hospital Institute
of Medical Sciences, New Marine Lines,
Mumbai, India

Next Step

Clinical Fellow in Adult Reconstruction
at NY Queens Hospital, NY

Career Objective

To gain proficiency in Adult
Reconstruction and set up a joints service
in India comparable to US standards

Spouse

Dr. Ashwini Manu-Rathi, MBBS, MD
(OBGY), MRCOG (UK)

Personal Statement

I am truly honored at getting an
opportunity to train at UC Davis which
has a rich legacy in orthopaedics and am
grateful to Dr. Di Cesare, Dr. Giordani
and Dr. Pereira for making this happen.
I come from a different background
and appreciate the extra patience and
understanding accorded to me by not
only my attendings but also all my
colleagues and support staff. To take care

of the patients back in India with the same diligence and sincerity, would be my honest tribute to my teachers here.

Factors Affecting Length of Stay After Primary Total Hip Arthroplasty at a University-Based Teaching Medical Center

Pranav P. Rathi, MBBS, MS; Gavin C.T. Pereira, MBBS, FRCS; Mauro M. Giordani MD; Paul E. Di Cesare, MD

This retrospective analysis explored the effects of demographic, surgical, and patient related factors, along with day of the week surgery was performed on, and length of hospital stay in patients status post THA. This investigation showed that patients who underwent THA on Wednesday or Thursday had a 10% longer length of hospital stay than patients who had surgery on Friday, Monday, or Tuesday. The rationale for analyzing the impact of day of the week stems from the expectation that patients scheduled to have physical therapy or be discharged on the weekend may be affected by the reduction of inpatient weekend physical therapy coverage. Under these circumstances, a more feasible approach to improving length of hospital stay is for surgical planning committees to allot early in the week operative days to total joint services. While it's important to continue to identify patient and surgical factors that affect length of hospital stay, this study also highlights the importance of considering matters from an organizational and planning perspective in order to optimize hospital expenditures.



**Gillian L.S.
Soles, MD**
Trauma Fellow

Education

BS: Biology and Drama, Tufts University,
Medford, MA

MD: Tufts University School of
Medicine, Boston, MA

Orthopaedic Surgery Residency: Boston
University, Boston, MA

Next Step

Orthopaedic Trauma Surgeon at the
University of Connecticut

Career Objective

Academic Orthopaedic Trauma

Spouse

Nathaniel Soles

Dog

Black Labrador retriever named Wellie

Personal Statement

I would like to thank the UC Davis Orthopaedic residents, my co-fellows, and the Trauma faculty for a great fellowship year! For their time and dedication to my education I will be forever grateful. As I begin my career as an attending Orthopaedic Trauma surgeon I hope to make my mentors proud.

Most importantly, I would like to thank my husband Nate for his love and support. From Boston, MA to Sacramento, CA and back again, I could not have done it without you.

Radiographic and Clinical Outcomes of Intramedullary Nailing of Tibia Fractures: Does Approach Matter?

Gillian L.S. Soles, MD, Michael Leung,
Brad J. Yoo, MD

Objective: The purpose of this study is to compare the radiographic and clinical outcomes of tibia fractures treated with intramedullary nails using transpatellar or retropatellar insertion techniques.

Design: Retrospective review with prospective collection of functional outcomes data.

Setting: Level 1 trauma center.

Patients: Of 250 patients with tibia fractures treated with intramedullary nails from July 1, 2007 to July 1, 2011, 90 patients met inclusion criteria for our study.

Intervention: All patients included in the study were between the ages of 18 and 70 and had tibia fractures treated with intramedullary nails using either transpatellar or retropatellar insertion techniques.

Main Outcome Measures: Functional outcomes data including the visual analog scale (VAS) score for knee pain and Western Ontario and McMaster Universities Index of Osteoarthritis (WOMAC) were prospectively collected. Secondary outcomes of interest included the use of adjunctive measures to obtain and maintain fracture reduction, post-operative alignment, time to union, and secondary procedures to achieve union.

Results: Our final analysis included 90 patients age 18-70 years (mean 39 years) with 90 tibia fractures. 58 patients underwent tibial nail insertion by the transpatellar technique and 32 patients by the retropatellar technique. In the transpatellar group 34% of patients had a closed reduction, 40% required a single adjunctive measure, and 26% required more than one adjunctive measure for fracture reduction. In the retropatellar group 25% of patients had a closed reduction, 59% required a single adjunctive measure, and 16% required more than one adjunctive measure for fracture reduction. Post-operative alignment was acceptable in all patients. The average post-operative alignment for the transpatellar group was 0.3 degrees of valgus + 1.0 degree and for the retropatellar group 0.4 degrees of valgus + 0.9 degrees. In our cohort of 90 patients, 38 patients had sufficient clinical and radiographic follow up to determine union. Of this group, 25 had the transpatellar approach and an average time to union of 4.4 months + 1.7 months and 13 had the retropatellar approach and an average time to union of 4.9 months + 1.4 months. Secondary procedures to achieve union were performed for 1 patient in the transpatellar group with an infected nonunion requiring serial irrigation and debridement, hardware removal, and repair of nonunion with exchange nailing.



**Robert J.
Steffner, MD**
Trauma Fellow

Education

Undergraduate: Saint John's University,
Collegeville, MN

MD: Wayne State School of Medicine,
Detroit, MI

Residency: University of Chicago
Chicago, IL

Next Step

Musculoskeletal Oncology Fellowship at
the University of Chicago

Career Objective

Providing excellent care to patients and
performing high-level fracture surgery,
ideally in an academic setting.

Spouse

Engaged to Kirsten Rhee

Personal Statement

It has been a privilege to train under Mark Lee, Tania Ferguson, Phil Wolinsky, and Brad Yoo. The art, science, and technical skill imparted from these individuals leaves me feeling ready and willing to take responsibility as an orthopaedic traumatologist. I greatly appreciate their patience and commitment to education. I know I have rigorously tested both of these attributes over the course of the year. They have provided excellent mentorship and whether they like it or not, I plan on using them as mentors for the rest of my career.

Time to Antibiotics for Open Fractures

Robert J. Steffner, MD; Gannon
Kennedy, MD; Philip R. Wolinsky, MD

Purpose: To determine the time from ER arrival to administration of antibiotics for patients with open fractures at a Level 1 Trauma Center and the factors that influence this timing. We will secondarily examine the incidence of infection with increasing time to administration of antibiotics. Lastly, we will examine the most important factors in predicting infection in open fractures amongst time to antibiotics, time to debridement, Gustilo and Anderson Grade, tobacco use, location of injury, and comorbidities.

Rationale: Open fractures are at increased risk of infection. Treatment of these fractures includes appropriate IV antibiotics. It is believed and taught that these antibiotics should be administered as soon as possible and that the prevention of infection may partly depend on the timing of the antibiotics. As physicians we cannot control some of the causes of infection such as the injury severity and extent of wound contamination, but we can control timing of antibiotic administration. These concepts are taught to orthopaedic surgeons during residency training and at continuing medical education courses. We believe that our patients are receiving antibiotics in a timely fashion, but there is no data to support this.

A benchmark exists for early

administration of antibiotics for elderly patients evaluated for pneumonia as it decreases mortality and hospital length of stay. Hospital reimbursement is tied to this benchmark. Despite this, it is only achieved 60.9% of the time. We believe time to antibiotics in open fractures is instrumental in the prevention of infection. We hypothesize that there are factors that influence when antibiotics are administered in the Emergency Department and that in some instances, administration is delayed. We feel a similar urgency should exist for early administration of antibiotics for open fractures to prevent infection and the added costs associated with treating that infection as currently exist for the treatment of pneumonia.

The secondary studies will look to prove a direct relationship between delay in antibiotic administration and increasing incidence of infection in open fractures. Currently, it is believed that risk increases beyond three hours, but this has never been demonstrated with statistical significance. Further, several factors influence the likelihood of infection and the most noted include antibiotic administration, wound debridement, severity of initial injury, tobacco use, comorbidities, and fracture location. The strength of association of these factors to infection has never been examined.

Methods: This will be a retrospective review of patients with open fractures treated at our institution from 2006 to 2009. The data collected will include time of arrival in the ED, timing of the

order for antibiotics, and the time that the antibiotics are administered. We will also collect demographic data (age, gender, BMI, tobacco use, comorbidities), Gustilo and Anderson Classification, mechanism of injury, fracture type and pattern (AO Classification), associated injuries, whether the patient was a trauma activation code or not, what level of trauma activation, mode of transportation to the ED (private vehicle, ambulance, or air), type of admission (general floor vs. ICU) what type of physician ordered the antibiotics, time to debridement, and if the patient developed a wound infection or not. Patients who were transferred from another institution, patients with open spine or hand fractures, and patients administered antibiotics before arrival to the Emergency Department will be excluded from the study. We will use bivariate analysis to look at the relationship of time to antibiotic administration and incidence of infection, and multivariate analysis to examine various factors and the strength of their association to the development to infection.