



Orthopaedics

OREF TEXAS REGION RESIDENT RESEARCH SYMPOSIUM Monday, October 5, 2020

University of Texas Health Science Center Virtual Resident Research Symposium

Hosted by:

#### Robert H. Quinn, MD

Department Chair and Professor John J. Hinchey MD and Kathryn Hinchey Chair of Orthopaedics UT Health San Antonio Department of Orthopaedics and

Boris A. Zelle, MD

Professor and Vice Chair of Research and Program Director of Orthopaedic Trauma Fellowship UT Health San Antonio Department of Orthopaedics

#### **Table of Contents**

Resident Research Symposium Summary Agenda	3
Keynote Speaker	.4
Judges	.5
Detailed Agenda	.6
Corporate Recognition	32

About OREF:

The Orthopaedic Research and Education Foundation (OREF) was founded in 1955 to ensure an expanding base of knowledge and effective, evidence-based treatment protocols for orthopaedic surgeons to continually improve patient care. Since its founding, OREF has funded nearly \$150 million in research and educational grants and awards that benefit all of orthopaedics. For more information about OREF grants and awards, please visit www.oref.org. Follow OREF on its Facebook page (OREFtoday) and on Twitter (@OREFtoday).

# OREF TEXAS REGION RESIDENT RESEARCH SYMPOSIUM SUMMARY AGENDA

Monday, October 5, 2020

8:00 a.m. – 8:05 a.m.	Welcome and Introductions Robert H. Quinn, MD Chair and Professor, Department of Orthopedic Surgery John J. Hinchey MD and Kathryn Hinchey Chair of Orthopaedics UT Health San Antonio
8:05 a.m. –8:10 a.m.	Introduction to Scientific Program Boris A. Zelle, MD Professor and Vice Chair of Research Program Director of Orthopaedic Trauma Fellowship UT Health San Antonio
8:10 a.m. – 8:13 a.m.	OREF Welcome Lee Grossman Chief Executive Officer Orthopaedic Research and Education Foundation
8:13 a.m. – 9:16 a.m.	Session 1 – Resident Research Presentations & Discussion
	Break
9:21 a.m. – 10:51 a.m.	Session II – Resident Research Presentations & Discussion
	Break
10:56 a.m. – 11:50 a.m.	Session III – Resident Research Presentations & Discussion
	Break
11:52 a.m. – 12:32 p.m.	Keynote Address A New Type of Systematic Review: How Scientific is this Concept? David Ring, MD, PhD Associate Dean for Comprehensive Care Professor of Surgery and Psychiatry Dell Medical School The University of Texas at Austin
12:35 p.m. – 12:55 p.m.	Awards Presentation and Closing Remarks

#### **KEYNOTE SPEAKER**



#### David Ring, MD, PhD

Associate Dean for Comprehensive Care Professor of Surgery and Psychiatry Dell Medical School The University of Texas at Austin

David Ring, MD PhD is Associate Dean for Comprehensive Care and Professor of Surgery and Psychiatry at Dell Medical School. Trained as a hand and orthopedic surgeon, Dr. Ring's extensive research, patient care, and quality and patient safety leadership contributed to an understanding of and a passion for the ways that mindset and circumstances affect human illness. Getting people interested in innovative ways to get and stay healthy depends on effective communication strategies that establish trust and make healthy habits appealing. Dr. Ring's current work focuses on ways to use existing knowledge, diverse expertise, and innovative applications of technology to help people choose healthy options consistent with their values.

#### Judges

Mohamad J. Halawi, MD Baylor College of Medicine

Melvyn Harrington, MD, FAOA Baylor College of Medicine

Joshua D. Harris, MD Houston Methodist Orthopedics and Sports Medicine

David Ring, MD, PhD Dell Medical School/The University of Texas at Austin

Drew Sanders, MD University of Texas Southwestern Medical Center

> Bradley K. Weiner, MD, FAOA Houston Methodist Hospital

Boris A. Zelle, MD University of Texas Health Science Center, San Antonio

#### OREF Texas Region Resident Research Symposium DETAILED AGENDA

Monday, October 5, 2020

8:00 a.m. – 8:05 a.m.	Welcome and Introductions Robert H. Quinn, MD Chair, Department of Orthonaedic Surgery
	John J. Hinchey, MD and Kathryn Hinchey Chair in Orthopaedics UT Health San Antonio
8:05 a.m. – 8:10 a.m.	Introduction to Scientific Program Boris A. Zelle, MD
	Professor and Vice Chair of Research Program Director of Orthopaedic Trauma Fellowship UT Health San Antonio
8:10 a.m. – 8:13 a.m.	OREF Welcome
	Chief Executive Officer
	Orthopaedic Research and Education Foundation
	Session I – Resident Research Presentations & Discussion
8:13 a.m. – 8:22 a.m.	Dual Plating for Humeral Shaft Fractures James D. Spearman, Jr., MD, University of Texas – Austin Dell Medical School
8:22 a.m. – 8:31 a.m.	The Fate of the Uninsured Ankle Fracture: Significant Delays in Treatment Result in Increased Risk of Surgical Site Infection Case Martin, MD, University of Texas Health Science Center, San Antonio
8:31a.m. – 8:40 a.m.	Infections in Gunshot Associated Long Bone Fractures Vivek Venugopal, MD, Baylor College of Medicine
8:40 a.m. – 8:49 a.m.	Vertical Shear Pelvic Ring Injuries: Do Trans Sacral Screws Prevent Fixation Failure? Breann Tisano, MD, University of Texas Southwestern Medical Center
8:49 a.m. – 8:58 a.m.	The Impact of Malnutrition on Surgical Site Complications in Orthopaedic Trauma Patients with Femoral Shaft Fractures
	Ryan C. Egbert, MD, University of Texas Health Science Center, San Antonio
8:58 a.m. – 9:07 a.m.	Percutaneous Screw Fixation of the Pubic Symphysis versus Plat Osteosynthesis: A Biomechanical Study David O'Neill, MD, University of Texas Southwestern Medical Center
	Same Shell, MD, Shivelong Shirekas Southwestern Medical Center
9:07 a.m. – 9:16 a.m.	Skin Closure with Surgical Staples in Ankle Fractures: A Safe and Reliable Method Gautham Prabhakar, MD, University of Texas health Science Center, San Antonio
	Break

# **OREF Texas Region Resident Research Symposium** DETAILED AGENDA

Monday, October 5, 2020

#### Session II – Resident Research Presentations & Discussion

9:21 a.m. – 9:30 a.m.	Where Do We Stand Today on Racial and Ethnic Health Inequities? Analysis of Primary Total Hip Arthroplasty from a 2011 – 2017 National Database Chun Wai Hung, MD, Baylor College of Medicine
9:30 a.m. – 9:39 a.m.	Factors Associated with Pain Intensity and Magnitude of Limitations Among People with Hip and Knee Arthritis Benjamin Kopp, MD, University of Texas – Austin Dell Medical School
9:39 a.m. – 9:48 a.m.	Combating the Opioid Epidemic: Experience with a Single Prescription for Total Joint Arthroplasty Daniel D. Wang, MD, Baylor College of Medicine
9:48 a.m. – 9:57 a.m.	Increased Likelihood of Low Energy Knee Dislocation After Total Knee Arthroplasty in the Morbidly Obese Patient Victor J. Wu, MD, University of Texas Health Science Center at Houston
9:57 a.m. – 10:06 a.m.	Analysis of Pre-Operative Screening Criteria for Total Joint Arthroplasty in a Veteran Population Matthew T. Valentine, MD, Baylor College of Medicine
10:06 a.m. – 10:15 a.m.	The Missing Link: Defining the Functional Parameters of Pelvic and Acetabular Alignment Kelly R. Stiegel, MD, Baylor College of Medicine
10:15 a.m. – 10:24 a.m.	Gender and Total Joint Arthroplasty: Variable Outcomes by Procedure Type Aalok Patel, MD, Baylor College of Medicine
10:24 a.m. – 10:33 a.m.	Time Trends and Risk Factors for 30-Day Adverse Events in Black Patients Undergoing Primary Total Knee Arthroplasty Akash Trivedi, MD, Baylor College of Medicine
10:33 a.m. – 10:42 a.m.	Primary Total Hip Arthroplasty in Hispanic/Latino Patients: An Updated Nationwide Analysis of Length of Stay, 30-Day Outcomes, and Risk Factors Justin Cardenas, MD, Baylor College of Medicine
10:42 a.m. – 10:51 a.m.	Total Hip Arthroplasty in Black/African American Patients: An Updated Nationwide Analysis Mihir Sheth, MD, Baylor College of Medicine
	Break

# OREF Texas Region Resident Research Symposium DETAILED AGENDA

Monday, October 5, 2020

#### Session III – Resident Research Presentations & Discussion

10:56 a.m. – 11:05 a.m.	Problematic Initial Recovery After Carpal Tunnel Release Surgery Claire Ryan, MD, University of Texas – Austin Dell Medical School
11:05 a.m. – 11:14 a.m.	Epidemiology of NCAA Bone Stress Injuries: A Comparison of Divisions I, II and III Christina Wassef, MD, John Peter Smith Hospital
11:14 a.m. – 11:23 a.m.	Increased Articular Exposure of the Lateral Elbow Joint with the Anconeus Approach Compared to the Kocher Approach: A Cadaver Study Holt Cutler, MD, University of Texas Southwestern Medical School
11:23 a.m. – 11:32 a.m.	Impact of Patient Resilience on Recovery from Rotator Cuff Repair Charlie Dee Wilson, MD, Scott and White Medical Center
11:32 a.m. – 11:41 a.m.	Sarcopenia Predicts Perioperative Adverse Events Following Complex Revision Surgery for The Thoracolumbar Spine Takashi Hirase, MD, Houston Methodist Hospital
11:41 a.m. – 11:50 a.m.	Biomechanical Investigation of Potential Prophylactic Scoliosis Treatments Following Various Sizes of Chest Wall Resection Varan Haghshenas, MD, Houston Methodist Hospital Break
11:55 a.m. – 12:35 p.m.	Keynote Address A New Type of Systematic Review: How Scientific is this Concept? David Ring, MD, PhD Associate Dean for Comprehensive Care Professor of Surgery and Psychiatry Dell Medical School The University of Texas at Austin

12:35 p.m. – 12:55 p.m. Awards Presentation and Closing Remarks

#### **Dual Plating for Humeral Shaft Fractures**

James D. Spearman, Jr., MD University of Texas – Austin Dell Medical School

**Purpose:** The intent of this study was to assess clinical outcomes of humeral shaft fractures treated surgically with orthogonal small fragment dual plating and to assess factors associated with nonunion and implant failure.

**Significance:** The advantageous biomechanical properties of dual plating humeral shaft fractures have been investigated but clinical studies are sparse.

**Methods**: We reviewed 262 fractures that underwent dual plate fixation over a 10-year period (2009-2018) at 3 trauma centers. Data reviewed included demographics, injury characteristics, time until union, length of follow up, and complications. We assessed relationships of demographics, injury characteristics, and construct variables to nonunion and implant failure using bivariate and multivariable analysis.

**Results:** Our retrospective review resulted in a series of 121 humeral shaft fractures. There was a total of 13 complications. Our nonunion rate was 2.6%. In bivariate analysis, OTA/AO-12A fractures were associated with nonunion, however no factors were independently associated.

**Conclusions:** To our knowledge, this is the largest case series of humeral shaft fractures treated with small fragment dual plating. Orthogonal small fragment dual plating is a reliable option in the surgical management of humeral shaft fractures that results in an overall low complication rate and a low rate of nonunion.

# The Fate of the Uninsured Ankle Fracture: Significant Delays in Treatment Result in Increased Risk of Surgical Site Infection

#### Case Martin, MD

University of Texas Health Science Center, San Antonio

**Purpose:** To examine the impact of insurance status on access to orthopaedic care and incidence of surgical site complications in patients with closed unstable ankle fractures.

**Significance:** Elective orthopaedic literature has demonstrated uninsured patients have worse outcomes and access to care, but no study to date has examined impact of insurance status on emergent/urgent orthopaedic care.

**Methods:** This retrospective chart review examined patients undergoing open reduction and internal fixation of closed ankle fractures between 2014 and 2016. Main outcomes measures included time from injury to presentation, time from injury to surgery, rate of surgical site infections, and loss to follow-up.

**Results:** A total of 489 patients (71% uninsured versus 29% insured) were enrolled. Uninsured patients were statistically more likely to present to an outside hospital first (p=0.0044). Time from injury to presentation at our hospital was significantly longer in uninsured patients ( $4.5\pm7.6$  days versus  $2.3\pm5.5$  days, p<0.0001). Time from injury to surgery was significantly longer in uninsured patient ( $9.4\pm8.5$  days versus  $7.3\pm9.1$  days, p<0.0001). Uninsured patients were more likely to be lost to postoperative follow-up care (p=0.0015). A logistic regression analysis demonstrated delayed surgical timing is directly associated with an increased risk of postoperative surgical site infection (p=0.0135).

**Conclusions:** Uninsured patients with ankle fractures requiring surgery experience significant barriers regarding access to healthcare. Delay of surgical management significantly increases the risk of surgical site infections in closed unstable ankle fractures.

#### Infections in Gunshot Associated Long Bone Fractures

Vivek Venugopal, MD Baylor College of Medicine

Purpose: To assess infection rates and culture isolates in civilian gunshot-associated fractures.

**Significance**: There is a paucity of literature on gunshot associated infections with the reported rate 0-15.7%.

**Methods**: We conducted a retrospective review of patients treated for a gunshot-associated long bone fractures at a Level I trauma center between 10/2010 and 12/2016.

**Results**: 347 patients with 384 long bone fractures were included. 32 fractures in 32 patients developed an infection for an incidence of 9.3% of patients and 8.3% of fractures. Gram positive bacteria were present in 23 culture isolates, gram-negative bacteria in 10 culture isolates, and 6 infections were polymicrobial. Staphylococcus (16) and Enterobacter (6) species were the most common isolates. Of the staphylococcus species, 31.3% were MRSA. Lower extremity fractures had a greater risk for infection compared the upper extremity (11.7% vs 3.7% p <0.01) and fractures that developed an infection had a larger average zone of comminution (63.9mm vs 48.5mm p<0.05).

**Conclusion**: Gram positive organisms were most common, with high prevalence of MRSA. Fracture grade can be difficult to assess, but our data implies highly comminuted gun-shot fractures of the lower extremity be viewed with greater vigilance regarding antibiotic coverage and operative debridement.

## Vertical Shear Pelvic Ring Injuries: Do Trans Sacral Screws Prevent Fixation Failure

#### Breann Tisano, MD University of Texas Southwestern Medical Center

**Purpose:** To determine the frequency and mechanism of fixation failure after transsacral-transiliac (TS) screw fixation of vertical shear (VS) pelvic ring injuries (AO/OTA 61C1).

**Significance:** VS injuries can be difficult to treat, with a propensity for malunion or nonunion.

**Methods:** Twenty skeletally mature patients with unilateral, displaced, unequivocal VS injuries were identified between 5/1/2009 and 4/31/2016. Mean age was 31 years and mean follow-up was 14 months. Twelve had sacroiliac (SI) dislocations (61C1.2) and eight had vertical sacral fractures (61C1.3). Operative treatment was performed with at least one TS screw.

**Results:** Radiographic failure, defined as displacement >1cm, occurred in 4 of 8 (50%) vertical sacral fractures. A single TS screw comprised posterior fixation in three of these four failures. The dominant mechanism of screw failure was bending. All failures occurred early in the postoperative period. No fixation failures occurred among the SI dislocations. There were no deep infections or non-unions.

**Conclusions:** This is the first study to describe the mechanism of failure of TS screws in a clinical setting after VS pelvic injuries. We caution surgeons from relying on single TS screw fixation for vertically unstable sacral fractures. Close radiographic monitoring in the first few weeks after surgery is advised.

## The Impact of Malnutrition on Surgical Site Complications in Orthopaedic Trauma Patients with Femoral Shaft Fractures

#### **Ryan C. Egbert, MD** University of Texas Health Science Center, San Antonio

**Purpose:** To identify the prevalence of malnutrition and to investigate the correlation between malnutrition and outcomes in orthopaedic trauma patients.

**Significance:** Literature on the ill effects of malnutrition in most medical specialties is relatively well described, however studies defining nutritional deficits and its consequences in the orthopaedic trauma population are scarce.

**Methods:** This retrospective case series was performed at a level-1 trauma centre. Patients 18 years of age and older undergoing intramedullary nail fixation of their femoral shaft fractures were included. Malnutrition was defined as either malnourished as per serum markers (albumin < 3.5 g/dL) or obese as per body mass index (BMI) >30 kg/m<sup>2</sup>. We evaluated the need for any secondary surgical procedures, wound complications and postoperative medical complications.

**Results:** A total of 249 patients were included in this series. We found the risk of secondary surgical procedures was significantly higher in patients with hypoalbuminaemia (p = 0.040) and trended higher in obese patients (p = 0.068). There was a trend towards a higher risk of wound complications in obese patients (p = 0.056).

**Conclusions:** There is relatively high prevalence of malnutrition among orthopaedic trauma patients with high-energy injuries. Malnutrition seems to increase the risk of surgical site complications.

# Percutaneous Screw Fixation of the Pubic Symphysis versus Plate Osteosynthesis: A Biomechanical Study

#### **David O'Neill, MD** University of Texas Southwestern Medical Center

**Purpose:** To compare the strength of screw fixation to plate fixation for symphyseal injuries in a vertically unstable pelvic injury (Tile type C) associated with complete disruption of the sacroiliac joint and the pubic symphysis.

**Significance:** Our work is the first biomechanical study to compare modes of fixation in vertically unstable models with a complete posterior ring injury.

**Methods:** Eight 4th generation composite pelvis models (Sawbones, Vashon Island, WA, USA) underwent biomechanical testing simulating single-leg stance. Four were fixed with a symphyseal screw and four with a symphyseal plate. All had single transsacral screw fixation posteriorly.

**Results:** There was no significant difference between the two groups for mean maximum force to generate 7mm of displacement. There was less displacement at the symphysis in the Y (vertical) axis in the screw group but more displacement in the Z (anteroposterior) axis. There was significantly less rotation in the screw group in the Z axis. The screw group showed increased stiffness compared to the plate group.

**Conclusions:** This is the first biomechanical study to compare screw versus plate symphyseal fixation in a Tile C model. Our biomechanical model using anterior and posterior fixation demonstrates non-inferiority of symphyseal screws to classically described symphyseal plating.

## Skin Closure with Surgical Staples in Ankle Fractures: A Safe and Reliable Method

#### Gautham Prabhakar, MD

University of Texas Health Science Center, San Antonio

**Purpose:** This study addressed the use of metal staples in closure of traumatic ankle injuries following open reduction and internal fixation (ORIF).

**Significance:** This is one of the largest studies comparing staples versus sutures for closure after ankle surgery.

**Methods:** 545 patients with closed ankle fractures were treated at our level 1 trauma center by means of ORIF. 360 patients were included in the final analysis of this study. This included 119 patients undergoing wound closure using sutures and 241 patients using surgical staples. The primary outcome measure was the adverse event of any type of surgical site complication.

**Results:** The overall rate of patients with a surgical site complication was 15.6%. There was a trend towards a higher risk of surgical site complication in patients undergoing wound closure with sutures as compared with staples (20.2% versus 13.3%). The rate of surgical site infection also trended higher in patients undergoing wound closure with sutures versus staples without demonstrating statistical significance (10.1% versus 5%, P = 0.0678).

**Conclusion**: The use of metal staples remains controversial in the setting of orthopaedic surgery. The current study supports that metal staples are a safe and reliable option in the closure of traumatic ankle fractures.

# Where Do We Stand Today on Racial and Ethnic Health Inequities? Analysis of Primary Total Hip Arthroplasty from a 2011-2017 National Database

**Chun Wai Hung, MD** Baylor College of Medicine

**Purpose:** To analyze the state of racial/ethnic disparities of total hip arthroplasty (THA) using a national surgical quality database.

**Significance:** Despite efforts to reduce health disparities in THA, the impact of these changes remains unknown.

**Methodology:** Patients undergoing primary, elective THA using the 2011-2017 American College of Surgeons National Surgical Quality Improvement Program were reviewed. Five minority groups were compared to non–Hispanic whites. The primary outcomes were differences in demographic, disease-burden, perioperative characteristics, THA utilization, length of stay (LOS), and 30-day postoperative outcomes.

**Results:** 155,870 patients were identified with racial/ethnic data available on 134,961 (86.6%). 74.5% were non-Hispanic whites. Except for Asians, all minority groups were younger, had higher BMI, and smoked tobacco(p<0.001). There were higher rates of non-primary osteoarthritis, procedure length exceeding 100 minutes, and comorbidities among all minority groups. All minority groups, except Asian and Hawaiians/Pacific Islanders, were more likely to require LOS > 2 days. Blacks were more likely to develop surgical or medical (OR 1.20) complications whereas Hispanics/Latinos were more likely to develop surgical complications. American Indians/Alaska Natives had more reoperations.

**Conclusion:** Health disparities persist among minority groups with respect to disease burden, THA utilization, LOS, and complications. Blacks and Hispanics/Latinos are most impacted by these disparities.

## Factors Associated with Pain Intensity and Magnitude of Limitations Among People with Hip and Knee Arthritis

#### Benjamin Kopp, MD University of Texas at Austin Dell Medical School

**Purpose:** To assess the influence of location of the arthritis on pain intensity and magnitude of limitations accounting for personal and psychological factors.

**Significance**: It is well known that the severity of arthritis does not accurately correlate with how patients experience symptoms. Knowing more about which factors influence symptoms could help guide treatments which aren't solely focused on anatomic pathology.

**Methods:** 154 patients with osteoarthritis of the hip or the knee were enrolled in this prospective crosssectional cohort study. Patients answered questionnaires which included demographics, site, laterality, pain, physical function, kinesiophobia, catastrophic thinking, anxiety, and depression. Associations of these factors with pain and function were assessed using bivariate and multivariable regression models.

**Results:** Psychosocial factors accounted for 50% of variability in function, with the major contributor being catastrophic thinking. The model for pain included time spent exercising and kinesiophobia. Site and severity were not associated with either function or pain in our sample.

**Conclusions:** This study confirms that limitations and pain from osteoarthritis of the hip and knee are more closely related to psychosocial factors than anatomical factors. Treatments to alter common misconceptions that accompany the nociception from osteoarthritis have the potential to improve function and comfort.

# Combating the Opioid Epidemic: Experience with a Single Prescription for Total Joint Arthroplasty

#### Daniel D. Wang, MD Baylor College of Medicine

**Purpose**: To report on our experience with a restrictive opioid protocol allowing patients only a single prescription of low-dose opioids following total joint arthroplasty (TJA).

**Significance**: Despite advances in perioperative TJA pain protocols, opiates continue to play a major role in postoperative pain control.

**Methods**: 100 consecutive elective, primary and revision TJAs were analyzed. All patients received preoperative counseling and multimodal analgesia. 90-days outcomes including pain-related phone calls, opioids refill requests, emergency room (ER) visits, complications, and readmissions were assessed.

**Results**: There was high prevalence of preoperative opioid use, depression, and anxiety (25%, 34% and 39% respectively). 68% of chronic opioid users were able to wean off prior to surgery. The average prescription of opioids was 48 pills of 5 mg oxycodone. There were only 10 pain-related phone calls from 9 patients over the study period, all used opioids chronically pre-operatively. Only one patient requested a refill. There were no ER visits, complications, or readmissions related to pain.

**Conclusion**: A single prescription of low-dose opioids was sufficient for patients undergoing TJA when utilizing preoperative patient counseling and multimodal analgesia. Standardized guidelines are needed to guide best practices for patient education and pain management, especially in patients on chronic opioid therapy.

## Increased Likelihood of Low Energy Knee Dislocation After Total Knee Arthroplasty in the Morbidly Obese Patient

#### Victor J. Wu, MD University of Texas Health Sciences Center at Houston

**Purpose:** Evaluate likelihood for low energy knee dislocation (KD) after total knee arthroplasty (TKA) based on BMI.

**Significance:** With the incidence of TKA and obesity in the United States increasing annually, greater awareness of potential complications in the obese population is necessary to improve outcomes.

**Methodology:** TKA patients from 2007-2016 were collected from a national administrative claims database and assessed for 1-year rates of KD. Exclusion criteria included conditions with ligamentous laxity and high energy mechanisms of injury. Dislocation rates were compared between obesity cohorts adjusting for age, gender and presence of diabetes or rheumatoid arthritis.

**Results:**116,885 patients were included in this study. Compared to BMI < 30, patients with a BMI of 35-39.9 were more likely to have a KD (OR: 1.50; 95%CI: 1.11-2.03). This association increased for those with a BMI of 40-49.9 (OR: 1.55; 95%CI: 1.11-2.15) and BMI 50 (OR: 2.5; 95%CI: 1.61-3.77)

**Conclusion:** Patients with a BMI  $\ge$  35 are more likely to suffer a KD following TKA. This association increases with increasing BMI, with up to a 2.5 times higher likelihood if BMI  $\ge$  50. Providers should have increased suspicion for complications of KD, such as neurovascular compromise, in this vulnerable population receiving TKA.

## Analysis of Pre-Operative Screening Criteria for Total Joint Arthroplasty in a Veteran Population

Matthew T. Valentine, MD Baylor College of Medicine

**Purpose:** To determine the length of time needed to meet preoperative screening criteria (hemoglobin A1c  $\leq$ 7%, BMI  $\leq$ 35, hemoglobin  $\geq$ 11 g/dL, and albumin  $\geq$ 3.5 g/dL) in a veteran population prior to total joint arthroplasty (TJA).

**Significance:** To explore the feasibility of preoperative screening criteria for TJA in a veteran population.

**Methods:** Time to optimization from the initial clinic visit was recorded. Following surgery, the patients' BMI and lab work were tracked to determine if the patient "relapsed" to their pre-optimized state. Descriptive statistics determined 1) the length of time to meet screening criteria, and 2) which screening criteria were most difficult to optimize.

**Results:** Eighty-four patients were included. BMI was the most common criteria not initially met at 59 (70%) patients, and hemoglobin A1c second most common (37%). Only 11 patients (13%) required greater than 1 year to meet criteria. Most patients (76%) relapsed to their previous states after surgery at a mean of 11 months.

**Conclusion:** Patients in a veteran population who can achieve preoperative screening criteria for TJA are able to do so in less than 1 year. Most patients relapse to their pre-optimized states after surgery, but this does not appear to affect clinical outcomes.

## The Missing Link: Defining the Functional Parameters of Pelvic and Acetabular Alignment

Kelly R. Stiegel, MD Baylor College of Medicine

**Purpose:** The purpose of this study was to define the three-dimensional alignment of the pelvis, proximal femur, and acetabulum during postural and physical activities.

**Significance:** To better understand the functional motion of the hip and pelvis during physiologic activities.

**Methods:** Thirty volunteers aged 40 years or greater were recruited. Reflective markers placed on bony prominences on the pelvis and lower extremities were tracked using a 12-camera motion analysis system. Measurements were obtained for various postures (i.e. supine, standing, sitting) and activities (i.e. walking, ascending/descending stairs).

**Results:** Significant pelvic motion occurred only in the sagittal plane. The mean posterior inclination of the pelvis was 15°, 18°, and 51° in the supine, standing, and sitting positions, respectively. These corresponded to acetabular anteversion/inclination angles of 26°/44°, 28°/45°, and 55°/55°, respectively. The mean posterior inclination of the pelvis was 19°, 19°,

and 20° during walking, ascending, and descending stairs, respectively. These corresponded to acetabular anteversion/inclination angles of 29°/45°, 29°/45°, and 30°/46°, respectively.

**Conclusion:** The functional parameters for pelvic and acetabular alignment were defined. Further research is needed to understand the extent to which these normal parameters are altered in the setting of hip and/or spinal degenerative disease to guide acetabular component placement.

#### Gender and Total Joint Arthroplasty: Variable Outcomes by Procedure Type

#### Aalok Patel, MD Baylor College of Medicine

**Purpose:** This study aimed to elucidate the influence of gender on outcomes of modern-day total hip and total knee arthroplasty.

**Significance:** Recent reports on the influence of gender on the outcomes of total joint arthroplasty (TJA) were limited by either lack of longitudinal data or absent stratification by total hip or knee arthroplasty (THA, TKA). As a result, there remains a lack of clarity on this topic.

**Methodology:** The ACS-NSQIP database was queried for primary THAs and TKAs performed between 2011 and 2017. Demographics, comorbidities, operative time, hospital length of stay (LOS), and 30-day outcomes were compared between males and females.

**Results:** 418,885 patients were analyzed. Females were likely to be older, non-white, have higher BMI, and require functional assistance (p<0.001). Females had lower rates of diabetes, hypertension, anemia and kidney disease. Female gender was an independent risk factor for readmission, reoperation, and wound infection after THA (p<0.001). In contrast, male gender was an independent risk factor for readmission, reoperation, and overall complications after TKA (p<0.001).

**Conclusion:** A variable effect of gender by procedure type was observed on post-TJA outcomes. Gender should be accounted for in risk-stratification models. Future studies are needed to elucidate the underlying causes of these differences.

### Time Trends and Risk Factors for 30-Day Adverse Events in Black Patients Undergoing Primary Total Knee Arthroplasty

Akash Trivedi, MD Baylor College of Medicine

**Purpose:** We examined trends in 30-day outcomes after TKA in Blacks and developed a risk stratification model. We hypothesized improvement in utilization and outcomes in Blacks.

**Significance:** Increased adverse events (AEs) have been reported amongst Blacks undergoing TKA compared to Whites; little is known about their persistence and risk factors.

**Methodology**: The American College of Surgeons NSQIP was queried for Blacks undergoing primary TKA from 2011-2017. Trends in demographics, comorbidities, perioperative characteristics, procedure utilization, and post-operative outcomes were analyzed. Multivariate logistic regression identified independent risk factors for 30-day AEs.

**Results**: 19,496 Blacks were identified. Blacks compared to Whites composed a lower proportion of TKAs (8.7% vs. 85.5%) with higher rates of LOS > 2 days (57.6% vs. 51.2%, p<0.0001) and 30-day AEs (6.3% vs. 5.1%, p<0.0001). However, from 2011-2017, Blacks had increased TKA utilization (230%) with improved comorbidity profiles (p<0.02), LOS (p<0.001) and fewer AEs (p<0.001). Significant risk factors for AEs were male sex, tobacco smoking, ASA score >2, dependent functional status, CHF, COPD, metastatic cancer, dyspnea, CKD, bilateral TKA, and operative time > 100 minutes.

**Conclusion**: This study showed improving trends in Blacks undergoing TKA. A predictive model for 30day AEs was developed to guide risk stratification and optimization.

# Primary Total Hip arthroplasty in Hispanic/Latino Patients: An Updated Nationwide Analysis of Length of Stay, 30-Day Outcomes, and Risk Factors

Justin Cardenas, MD Baylor College of Medicine

**Purpose:** To explore recent time trends in length of stay (LOS), 30-day outcomes, and risk factors for adverse events (AEs) pertaining to total hip arthroplasty (THA) in the Hispanic/Latino population.

**Significance**: It is unclear whether advancements in arthroplasty care have translated to benefits among minority patients who have traditionally experienced worse outcomes.

**Methods:** 4,107 Hispanic/Latino patients who underwent primary THA between 2011-2017 were identified using the ACS-NSQIP database. Annual trends in LOS and 30-day outcomes (readmission, reoperation, complications, and mortality) were calculated using univariate mixed effects logistic regression analyses. Risk factors for AEs were determined using multivariate logistic regression analyses.

**Results:** There was a significant reduction in LOS > 2 midnights (67.6% to 29.5%, p<0.001) among Hispanic patients, which was accompanied with improvements in comorbidity profiles and shorter operative times. Postoperatively, the annual rates of 30-day outcomes were comparable to white patients (p>0.05). CKD, ASA score > 2, and chronic steroid use were the strongest independent predictors for AEs.

**Conclusion:** Among Hispanic patients undergoing THA, current evidence shows significantly shorter LOS and comparable overall 30-day outcomes to whites. Patients with CKD, ASA score > 2, and chronic steroid use are at highest risk for developing 30-day AEs.

# Total Hip Arthroplasty in Black/African American Patients: An Update Nationwide Analysis

#### Mihir Sheth, MD Baylor College of Medicine

**Purpose:** to investigate recent trends in procedure utilization, comorbidity profiles, LOS, 30-day outcomes, and adverse events (AEs) among black patients undergoing THA.

**Significance:** Black TJA patients have inferior procedure utilization rates, complication rates, functional outcomes, and patient satisfaction. A greater understanding of population-specific risk factors and trends in outcomes may identify targets to reduce racial disparities in TJA care.

**Methods:** Using the NSQIP database, we reviewed black patients who underwent elective, primary THA from 2011-2017. We used mixed effects logistic regression analyses to determine yearly trends and multivariate logistic regression analyses to identify independent risk factors for AEs.

**Results:** 11,574 black patients were analyzed. Over the study period, there was a 109% increase in THA performed. There were reductions in the prevalence of anemia, dyspnea, smoking, and osteonecrosis (p<0.001). Rates of 30-day surgical complications, readmissions, reoperations, and mortality remained unchanged. The rate of medical complications improved (p<0.001), and there was a reduction in LOS > 2 days (68% to 37%, p<0.001).

**Conclusion:** From 2011-2017, there was improvement in procedure utilization, comorbidity profiles, and LOS among black primary THA patients, but overall rates of 30-day AEs were unchanged. We identified multiple risk factors to guide preoperative optimization to mitigate postoperative AEs.

#### Problematic Initial Recovery After Carpal Tunnel Release Surgery

# Claire Ryan, MD

University of Texas at Austin Dell Medical School

**Purpose:** The purpose of this study was to test the hypothesis that there are no factors associated with problematic recovery after carpal tunnel release including psychological distress and disease severity.

**Significance:** Carpal tunnel release (CTR) can stop progression of carpal tunnel syndrome. Intermittent symptoms usually resolve after surgery, but persistent symptoms can be permanent. There is evidence that dissatisfaction with CTR is related to advanced disease and symptoms of depression. We studied dissatisfaction among people having CTR surgery in a setting of routine measurement of symptoms of depression and anxiety.

**Methods:** A retrospective review of 157 patients who underwent in-office CTR between February 2017 and November 2020 recorded symptoms of anxiety and depression, signs of severe carpal tunnel syndrome, and problematic recovery (defined as unsettling post-operative pain, hand stiffness, or persistent numbness) within 6 months of surgery.

**Results:** Thirty-eight patients (24%) had problematic initial recovery. In bivariate analysis, problematic recovery correlated with symptoms of anxiety (p = 0.04), but not with signs of severe carpal tunnel.

**Conclusion:** The finding that problematic recovery after CTR surgery was related more to psychological distress than to severity of median neuropathy suggests attention to mental health is merited prior to scheduling surgery.

## Epidemiology of NCAA Bone Stress Injuries: A Comparison of Divisions I, II and III

**Christina Wassef, MD** John Peter Smith Hospital

**Purpose:** We hypothesize that BSI (Bone stress injury) rates will be higher in DII and DIII athletes compared to DI athletes.

**Significance:** In National Collegiate Athletic Association (NCAA) athletics, different divisions have different risks for specific injuries, but there have been no studies on the difference of BSI rates between Division I (DI) and Divisions II/III (DII/DIII) athletes.

**Methodology:** 5 years of recorded BSI data in collegiate athletes via the NCAA Injury Surveillance Program were examined between 2009 and 2014. BSI rates and time lost to injury were compared between DI and DII/DIII.

**Results:** DII/DIII programs reported 252 BSIs over 1,793,777 athlete exposures (AEs) and DI programs reported 235 over 3,738,769 AEs. The relative risk (RR) was significant between DII/DIII and DI (RR: 2.24; 95% CI, 1.87 - 2.67). There was a significant difference in time lost to injury between DI and DII/ DIII (p = .006).

**Conclusion:** DII/DIII athletes suffer BSI at a greater rate and have a greater loss of time due to injury than DI athletes. This discrepancy was surprisingly caused by sports typically viewed as low risk. Results suggest those providing care to DII/DIII athletes should be particularly attentive to BSIs to minimize long-term complications.

## Increased Articular Exposure of the Lateral Elbow Joint with The Anconeus Approach Compared to the Kocher Approach: A Cadaver Study

Holt Cutler, MD University of Texas Southwestern Medical School

**Introduction:** The Kocher approach is the workhorse approach to the lateral elbow. However, the exposure is often limited. The purpose of this study is to quantitatively compare the articular exposure of the anconeus and Kocher approaches to the lateral elbow.

**Materials and Methods:** Eight surgical approaches (4 Kocher and 4 Anconeus) were performed on 4 fresh cadavers. Access to key articular landmarks were assessed, including the capitellum, humeral trochlea, radial head, olecranon, coronoid process, and greater and lesser sigmoid notches of the ulna. A calibrated digital image was taken from the optimum surgeon's viewing angle of each approach, and these images were analyzed with ImageJ software (NIH, Bethesda, MD) to calculate the area of exposed articular surfaces.

**Results:** The average surface area exposed was 2.9 times greater with the anconeus approach compared with the standard Kocher approach (8.3 vs 3.1 cm2, p-value 0.001). All key anatomic landmarks were directly visualized with the anconeus approach in each specimen. Visualization of the humeral trochlea, olecranon, coronoid process, and greater and lesser sigmoid notches of the ulna was not obtained in any of the Kocher approaches.

**Conclusions:** The Anconeus approach provides superior exposure of the lateral elbow joint compared with the Kocher approach.

#### Impact of Patient Resilience on Recovery from Rotator Cuff Repair

#### **Charlie Dee Wilson, MD** Scott and White Medical Center, Temple

**Purpose:** To evaluate the correlation between preoperative and concurrent resilience, as measured by the Brief Resilience Scale (BRS), and postoperative shoulder pain and function (measured by ASES), and global health (measured by PROMIS-10) at 3- and 6-month follow-up of patients who underwent rotator cuff repair (RCR).

**Significance:** Resilience, or the ability to recover from stress, may predict recovery from RCR.

**Methods:** We prospectively enrolled 104 patients scheduled to undergo arthroscopic RCR and obtained BRS, ASES, and PROMIS-10 scores preoperatively and postoperatively at 3- and 6-months. We used Spearman correlation coefficients (r) to evaluate associations.

**Results:** Ninety-eight patients ultimately underwent RCR; 76 and 68 patients provided 3- and 6-month follow-up, respectively. There was no statistically significant correlation between preoperative BRS and 6-month ASES (r = 0.1233, p = 0.6266) and 6-month PROMIS-10 (r = 0.2439, p = 0.262). There was a statistically significant correlation between pre-operative BRS and 3-month PROMIS-10 (r = 0.3763, p = 0.009) and concurrent BRS and PROMIS-10 at 3-months (r = 0.5657, p = 0.0025) and 6-months (r = 0.5308, p = 0.0025).

**Conclusions:** Resilience appears to be more predictive of global physical and mental health than shoulder pain and function in recovery from RCR.

## Sarcopenia Predicts Perioperative Adverse Events Following Complex Revision Surgery for the Thoracolumbar Spine

**Takashi Hirase, MD** Houston Methodist Hospital

**Purpose:** To determine the relationship between sarcopenia and perioperative adverse events (AEs) among patients undergoing complex revision thoracolumbar spine surgery (TLSS).

**Significance:** Sarcopenia measured by psoas muscle index (PMI) has been shown to predict perioperative AEs after various surgeries. This relationship has not been studied in complex TLSS.

**Methods:** A retrospective analysis of patients undergoing complex revision TLSS was performed. Sarcopenia was analyzed using PMI. Receiver operating characteristic (ROC) curve analysis was used to determine gender-specific PMI cut-off values for predicting perioperative AEs.

**Results.** 114 patients were included. ROC curve analysis demonstrated PMI <  $500 \text{ mm}^2/\text{m}^2$  for males and < 412 mm<sup>2</sup>/m<sup>2</sup> for females as predictors for perioperative AEs. 49 patients were in the sarcopenia cohort and 65 patients in the non-sarcopenia cohort. The sarcopenia group had higher overall perioperative AEs (73.5% vs 29.2%, p<0.001), 30-day reoperation rate (14.3% vs 3.1%, p=0.028), 30-day readmission rate, (16.3% vs 3.1%, p=0.013), rate of discharge to a facility (83.7% vs 50.8%, p<0.001), and longer length of stay (LOS) (7.3±4.2 days vs 5.6±3.5 days, p=0.029).

**Conclusion.** Sarcopenia is associated with higher perioperative AEs, 30-day readmission rates, 30-day reoperation rates, rate of discharge to a facility, and longer LOS among patients undergoing complex revision TLSS.

# Biomechanical Investigation of Potential Prophylactic Scoliosis Treatments Following Various Sizes of Chest Wall Resection

#### Varan Haghshenas, MD Houston Methodist Hospital

**Purpose:** Evaluate whether rib resection causes spinal instability.

**Significance:** Chest wall resection is used to treat several thoracic disorders including tumor removals often complicated by development of scoliosis. The degree of the scoliosis correlates to the number of resected ribs. There is a paucity of evidence for the etiology and biomechanics of this phenomenon.

**Methodology:** Captured range of motion (ROM) of six specimens (C7–L2) in flexion extension (FE), lateral bending (LB), and axial rotation (AR). Posterior ribs were sequentially resected from T5-T10. Injured specimens were instrumented with unilateral anterior fixation (UA) then with unilateral posterior fixation (UA+UP).

**Results:** ROM of the injured specimens increased as ribs were resected at same rate as the unresected model ( $0.90^{\circ}\pm0.52^{\circ}$  FE,  $0.98^{\circ}\pm0.40^{\circ}$  LB, and  $2.75^{\circ}\pm1.50^{\circ}$  AR). The UA construct reduced motion, and the UA+UP construct further reduced motion in all planes FE ( $22.0\pm12.3\%$  vs.  $58.4\pm13.2\%$ ), LB ( $51.0\pm9.8\%$  vs.  $74.4\pm9.0\%$ ), and AR ( $25.4\pm9.0\%$  vs.  $58.7\pm11.2\%$ ). The greatest difference was in FE and AR.

**Conclusion:** Posterior rib resection does not create immediate instability of the thoracic spine. The etiology of scoliosis following chest wall resection is multi-focal.

**OREF** gratefully acknowledges these Corporate Associates



Passion for Innovation. Compassion for Patients.®









For supporting the Annual OREF Resident Research Symposia



oref.org