

North Carolina Orthopaedic Association
2015 Annual Meeting
Abstracts: Upper Extremity



October 9-11, 2015 • Kiawah Island Golf Resort
Kiawah Island, South Carolina

This continuing medical education activity is jointly provided by the NCOA
and the Southern Regional Area Health Education Center

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: **J. Mack Aldridge, III, MD**
Triangle Orthopaedic Associates, PA, Durham, NC

Topic: **Bilateral Flexor/Pronator Slides for Congenital Hereditary Extrinsic Digital Flexor Contractures**
Saturday, October 10

A case report of a 38 year-old female with congenital extrinsic flexor tightness precluding her ability to open her fingers with her wrist at neutral or extended.

Educational Objective: To share an interesting pathology and application of a known technique to this, as of yet, undescribed condition.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: Julie Neumann, MD (Resident)
Duke University Medical Center, Durham, NC

Topic: Massive Rotator Cuff Repairs using Interposition Porcine Acellular Dermal Matrix Xenograft through a Mini-open Approach
Saturday, October 10

Purpose

The purpose of this prospective, comparative study was to determine if the repair of massive rotator cuff tears using an interposition porcine acellular dermal matrix xenograft improves subjective function, pain, range of motion, and strength at greater than two years follow-up.

Methods

Fourteen men and 23 women (37 shoulders) were prospectively followed for 33 months (range 23-48) following massive rotator cuff repair using porcine acellular dermal matrix xenograft. The average age was 66 years (range 51-80 years) in the 37 patient cohort. Subjective outcomes were measured using the Visual Analog Scale (VAS) pain score (0-10, 0 = no pain), Modified American Shoulder and Elbow Score (M-ASES), and Short-Form12 (SF-12) scores. Preoperative and postoperative objective outcome measures included active range of motion and supraspinatus and infraspinatus manual strength. Postoperative outcome measures included quantitative muscle strength using a dynamometer and static and dynamic ultrasonography to assess the integrity of the repair.

Results

Average pain decreased from 4.5 to 1.1 ($P<0.001$). Average postoperative M-ASES was 89.23. Average postoperative SF-12 was 52.6. In 14 patients, SF-12 improved from 47.5 to 48.5 ($P=0.54$). Average forward flexion, external and internal rotation improved from 133.2° to 157.9° ($P=0.003$), 51.56° to 64.25° ($P=0.001$), and 49.8° to 74.0° ($P<0.001$), respectively. Manual strength (10 point scale) in supraspinatus and infraspinatus increased from 7.3 to 8.9 ($P<0.001$) and 7.4 to 9.4 ($P<0.001$), respectively. Supraspinatus quantitative strength was a mean of 68.6N and infraspinatus quantitative strength was 50.6N. Ultrasound evaluation of repairs showed 33 (89.1%) to be "fully intact," three (8.1%) had "partial tears," and one repair (2.7%) was "not intact."

Conclusion

Following repair of massive rotator cuff tears with interposition porcine acellular dermal matrix xenografts, patients had significant improvement in pain, range of motion, strength and reported good subjective function based on M-ASES and SF-12 scores.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: Susan M. Odum, PhD
OrthoCarolina Research Institute, Inc., Charlotte, NC

Topic: Outcomes Validation of the Ases, Dash, EQ5D, and VR6D in a Population of Orthopedics Patients with Upper Extremity Morbidity
Saturday, October 10

The recent repeal of the sustainable growth rate physician reimbursement formula sets forth a new Merit-based Incentive Payment (MIP) system under which providers will be reimbursed based on quality performance. While the quality measures are not fully defined, there is growing consensus that patient reported outcome measures (PROMs) will be mandated. To that end, adequate information relevant to the measurement properties of the various instruments is needed for decision-makers to select the best PROMs to use in any given patient population. We sought to evaluate upper extremity region-specific measures (American Shoulder and Elbow Surgeon (ASES) and Disabilities of the Arm, Shoulder, and Hand (DASH)) and generic, preference based-measures (EuroQOL SD (EQ-5D) and Veterans Rand 6D (VR-6D)) patient-reported outcomes instruments perform best in an orthopedics patient population with upper extremity (hand, wrist, elbow, or shoulder) morbidity.

Methods

Data Collection. New patients presenting to our institution with complaints of upper extremity morbidity completed the ASES, DASH, EQ5D, and the Veterans Rand-12 (from which the VR-6D is derived). We oversampled patients at the initial visit to ensure adequate sample size for the six-month follow-up. Based on standard of care, patients received conservative (e.g., casting), operative, or no treatment. Six months after the initial appointment, patient-outcomes were reassessed. **Study Sample Characteristics.** A total of 299 patients provided responses at the first visit and six months later. Of these patients, 21.7% reported to our institution for elbow morbidity, 41.1% for shoulder morbidity, and 37.2% for hand/wrist morbidity. The mean age of respondents was 56.4 years (hand/wrist: 57.7 years, elbow: 52.5 years, shoulder: 57.3 years; $p < 0.01$). **Statistical Analysis.** The psychometric performance of the instruments was evaluated using standard analyses. The ceiling and floor effects were analyzed to assess the extent that instruments discriminate among patients across the high and low levels of pain and function. Validity was evaluated with the Pearson Interclass Correlation (ICC). A ICC of $> .7$ was used as a threshold for convergent validity and $< .4$ for divergent validity. Cronbach's alpha was used to evaluate the internal consistency of each instrument from pre-post measurement intervals, with a threshold of $> .70$. The sensitivity to change from pre-post measurement intervals, or responsiveness, for each measure was assessed using Effect Size (Mean Δ Score/SD pre) and Standardized Response Mean (Mean Δ Score/SD Δ Score).

Results

Mean initial scores were determined for the ASES: 53.1/100; DASH: 26.9/100 (reverse scored), EQ5D: 0.79/1, and VR6D: 0.70/1. Significant differences in the initial and six-month scores were found for all instruments. Ceiling effects were noted for the DASH and EQ5D. The ASES and VR6D scores were normally distributed. Neither the DASH (ICC .6098) nor the ASES (ICC .4713) measurement tools reached the threshold for convergent or divergent validity. The DASH has greater internal consistency (Cronbach's alpha .6777) compared to the ASES (Cronbach's alpha .6406). However, the ASES showed superior responsiveness (ES .6740; SRM .5471) over the DASH (ES -.4056; SRM -.4498). With respect to the general health measures, the VR-6D performed better than the EQ-5D and showed comparable validity and internal consistency results to the DASH.

Conclusions

Our findings suggest that the VR-6D may be the best choice for a general health measure for upper extremity patients. However, there is a tradeoff between internal consistency and responsiveness properties between the DASH and ASES. It may be necessary to use both measures to completely measure the PRO of all upper extremity patients. Further subgroup analyses are underway to provide a recommendation.

Educational Objective: To assess the validity of four commonly used patient reported outcome measures in patients with upper extremity morbidity.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: **Brandon S. Smetana, MD (Resident)**
University of North Carolina, Chapel Hill, NC

Topic: **Current Trends in Carpal Tunnel Release: Analysis of the Effects of Hand Fellowship Training on Endoscopic and Open Carpal Tunnel Release Utilizing the ABOS Certification Examination Database**
Saturday, October 10

Purpose

To investigate the current rates, recent trends, and complications in relation to carpal tunnel surgery and type of fellowship training using the American Board of Orthopaedic Surgery (ABOS) Part II Database.

Methods

The ABOS database was searched for patients with CTS (ICD-9: 354.0) who underwent carpal tunnel release (CTR) either open (OCTR, CPT: 64721) or endoscopically (ECTR, CPT: 29848) from 2003-2013. Cases with multiple CPT codes were excluded. Data was gathered on geographic location, fellowship, and surgical outcomes. Data was then divided into two cohorts based on surgeon level of training: hand fellowship trained versus non-hand fellowship trained. Analysis was performed with Chi-squared tests of independence and for trend.

Results

Overall, 12.4% of all CTR cases were done endoscopically. Hand fellowship trained orthopaedists performed about 4.5 times (18% versus 4%) the number of ECTR than did non-hand fellowship trained surgeons. An increasing trend of ECTR was seen only among the hand fellowship cohort. The Northwest performed the highest (23.1%) and the Southwest the lowest (5.9%) percentage of ECTR. The complication rate associated with CTR overall was 3.56%, with ECTR was 2.83%, and with OCTR was 3.69%, although this was not statistically significant. There was no difference between complication rates with ECTR and OCTR between the two cohorts. However, within the hand fellowship cohort the complication rate for ECTR was significantly less than for OCTR. Wound complications were higher with OCTR and nerve palsy with ECTR, with postoperative pain equivalent between techniques.

Conclusions

The rate of ECTR is increasing, as are reported complications. However, complication rates remain low in the first few years of practice. Hand fellowship trained surgeons perform more ECTR than do non-hand fellowship trained orthopaedic surgeons, however there does not seem to be a difference in complication rates between these groups.

Level of Evidence:

Observational Cohort Study, IV

Educational Objective: To elucidate and enumerate the current rates, recent trends, and complications surrounding carpal tunnel surgery in regards to both the open and endoscopic technique, and subcategorized based on type of fellowship training.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: Austin V. Stone, MD, PhD (Resident)
Wake Forest School of Medicine, Winston-Salem, NC

Topic: A Critical Review of the Long-Toss in Baseball Throwing
Saturday, October 10

Introduction

The use of long-toss throwing in baseball training is routine; however, little is known about the loads experienced by the upper extremity and the utility of this component in such throwing programs. We hypothesized that long-toss throwing can be recommended as a component of interval, strengthening, maintenance, and recovery throwing programs.

Methods

A literature search was conducted to identify all articles related to long-toss and interval throwing programs. The following databases were searched: Medline, CINAHL, Cochrane, and Pubmed. Controlled vocabulary was used when available and reference tracking was performed for any articles potentially missed throughout the search.

Results

A total of 54 manuscripts were identified with 4 meeting the inclusion criteria. The definition of long-toss varied among studies, but distances of at least 37 m (120 ft) were consistently used. Pitchers experienced similar biomechanical loads across the shoulder and elbow at the distances of 37 and 55 m (120 and 180 ft). Maximal throwing distance and mound pitching were associated with the greatest increase glenohumeral internal rotation torques and elbow varus torques. Flat ground and long-toss throwing were associated with a decreased ball velocity. Forward trunk tilt decreased with increasing distance.

Conclusions

Despite implementation from Little League to professional levels of baseball, long-toss throwing programs are poorly defined in the literature. Long-toss throwing demonstrates some potential advantages of transferring load from the upper extremity, but alterations in the mechanics may place some players at risk. The benefits of the long-toss need to be understood as a recovery and arm strengthening tool, and separated from a mechanics point of view. Continued exploration of long-toss throwing is warranted.

Clinical Relevance

Long-toss interval training programs provide some potential benefits during conditioning and rehabilitation. The forces across the upper extremity are altered during long-toss and changes in throwing mechanics may, theoretically, exacerbate underlying pathologies.

Educational Objective: To demonstrate that long-toss interval training programs provide some potential benefits during conditioning and rehabilitation. The forces across the upper extremity are altered during long-toss and changes in throwing mechanics may, theoretically, exacerbate underlying pathologies.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: Brian T. Nickel, MD (Resident)
Duke University Medical Center, Durham, NC

Topic: Humeral Shaft Nonunion: A New Surgical Technique Using Cup and Cone Reamers
Saturday, October 10

Introduction

Nonunion following closed treatment of humeral shaft fracture is estimated to be 5.5%. Many surgical techniques have been described to address humeral shaft nonunion including: open reduction, internal fixation (ORIF) with compression plating and bone graft, dual plating, cortical strut allograft and autograft, and adding biologic augmentation (BMP). The current standard of care includes ORIF with compression plating and bone grafting, but even this technique has an approximated 10% failure rate. We describe a novel surgical technique using cup and cone reamers, which were originally designed for metatarsophalangeal or metacarpalphalangeal arthrodesis. Cup and cone reamers are the appropriate size for mid-shaft, transverse humeral nonunions to ensure ideal apposition of healthy, bleeding bone.

Methods

We retrospectively reviewed 3 patients with nonunion of the midshaft humerus which were treated with the cup and cone technique and a large fragment LCDC plate. An anterolateral approach was used in 2 cases and a posterior in the other. After exposure of fracture ends, 24-mm cup and cone reamers were then used to ream the proximal and distal ends in order to create a cup and cone articulation of the fracture ends. All patients were followed for a minimum of 6 months with a mean follow-up of 12 months.

Results

All patients treated with this technique achieved union, reported zero pain and full functional outcome. Specifically, patients had a mean age of 39.5 and the mean interval between injury and time to surgery was 11.5 months. Two of the patients presented with nonunions after attempted closed treatment and the other patient had 3 prior surgeries for infected nonunion. Union was achieved at a mean of 12 weeks.

Conclusion

To our knowledge, the use of cup and cone reamers for nonunion of the humerus has never been described. We describe a simple and effective technique for humeral shaft nonunions which has been successful in both septic and hypertrophic nonunions, as well as from multiple approaches -- both anterolateral and posterior.

Educational Objective: Describe a novel surgical technique and the successful outcomes associated with its use.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: Thorsten Seyler, MD, PhD
Duke University Medical Center, Durham, NC

Topic: **Prosthetic-Related Complications after Perioperative Transfusion in Total Shoulder Arthroplasty**
Saturday, October 10

Introduction

90-day prosthetic related complications are an important metric in hip and knee arthroplasty in the Medicare population, yet these guidelines have not been established for total shoulder arthroplasty (TSA). TSAs are rising in the Medicare population, however the transfusion rate has remained constant. The purpose of this study was to determine if perioperative blood transfusion predicts early post-operative complications in Medicare patients who underwent TSA.

Methods

We retrospectively queried 116,537 total and reverse shoulder arthroplasties in a Medicare database containing 100% of inpatient and outpatient administrative records from 2005 to 2011 using PearlDiver technologies. International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) and Current Procedural Terminology (CPT) codes were used to identify the procedure, patient demographics, Elixhauser comorbidities, and post-operative complications. Rates (R), odds ratios (OR), and 95% confidence intervals (CI) were calculated. 90-day complications returning an OR >1.75 were considered substantial.

Results

0,559 patients received perioperative blood transfusion and 105,978 did not. Patients who received perioperative blood transfusion had higher prevalence of comorbidities and were older, suggesting a "sicker" cohort. Bivariate analysis revealed these patients had higher 90-day rates of prosthetic related complications including: periprosthetic infections (OR 2.48, CI 2.02 – 3.04), cellulitis/seroma (OR 2.10, CI 1.81 – 2.44), prosthetic dislocation (OR 1.75, CI 1.48 – 2.06), and broken prosthetic joint/periprosthetic-fracture (OR 2.04, CI 1.61 – 2.59). There was no difference in early TSA revision/repair rates. The same patients had statistically significant higher rates of medical complications including acute MI, respiratory failure, stroke, PNA, sepsis/sirs, acute renal failure, and UTI.

Discussion and Conclusion

TSA remains an important treatment modality for numerous indications. Perioperative blood transfusion may serve as a useful metric to identify sicker patients. Surgeons should be aware that these patients may have higher rates of early complications and should preemptively counsel patients during admission and at discharge.

Educational Objective: Determine if perioperative blood transfusion in total shoulder arthroplasty can be used to identify patients that may experience early post-operative complications.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: Christopher Caldwell, BS (Student)
Boyette Orthopedics, Greenville, NC

Topic: The Use of Ultrasound as the Sole Diagnostic Tool for Rotator Cuff Tears
Saturday, October 10

This retrospective study demonstrates the effectiveness of using ultrasound as the sole imaging modality for rotator cuff tears, with the purpose being to show that ultrasounds can be an adequate diagnostic tool for rotator cuff tears when compared to the gold standard of shoulder MRI. Although literature does exist on the use of ultrasounds in orthopedics, research specifically on rotator cuff sonography performed by the treating surgeon is relatively sparse. This study used data collected from 37 shoulder arthroscopy patients who had shoulder ultrasounds prior to the procedure. In these patients, intraoperative findings are compared to ultrasound diagnoses, and an advanced statistical analysis was used to demonstrate the accuracy of the shoulder ultrasound. Additionally, patients were divided into partial and full thickness tears, and a statistical analysis was performed to demonstrate the accuracy of shoulder ultrasounds within these groups. The findings of this study are then compared to statistics for diagnosing rotator cuff injuries via MRI to demonstrate the utility of shoulder ultrasounds in busy orthopedic clinics.

Educational Objective: To show the efficacy of using ultrasounds to diagnose rotator cuff tears.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: Sanjeev Kakar, MD
Mayo Clinic, Rochester, MN

Topic: **Tips & Tricks to Stay Out of Trouble in the Operating Room in the Treatment of Distal Radius Fractures**
Saturday, October 10

Since the advent of volar plating, the management of distal radius fractures has evolved. There are circumstances, however, where its use is not advocated or sufficient to achieve fracture reduction and fixation. The goal of this lecture is to present the audience with an overview in the management of comminuted intra-articular distal radius fractures. The role of volar plating, fragment specific fixation and distraction plating, with an emphasis on technical pearls to achieve fixation of these difficult injuries will be discussed.

Educational Objectives:

1. Have an understanding as to when the use of volar plating is and is not appropriate for the management of distal radius fractures.
2. Understand the indications for fragment specific fixation and distraction plating for severely comminuted intra-articular distal radius fractures.