

North Carolina Orthopaedic Association
2015 Annual Meeting

Abstracts: Spine/Basic Science/Education/Foot & Ankle/Trauma



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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: Elizabeth W. Hubbard, MD (Resident)
Duke University Medical Center, Durham, NC

Topic: The Effect of Computer-Assisted Surgery Training in the Placement of Iliosacral Screws
Sunday, October 11

Percutaneous placement of iliosacral screws for posterior pelvic ring injuries is the standard treatment to achieve rigid stabilization. However, this is a complex procedure and hardware malposition can result in significant neurovascular complications. This study attempts to determine if computer navigation assisted simulation training can be used as a tool to help surgical novices learn this complex technique. A prospective randomized controlled study was conducted using surgical trainees with no prior experience at percutaneous iliosacral screw placement for pelvic ring injuries. After a training session, participants underwent a pre-test which involved using fluoroscopy to place guidewires for S1 and S2 iliosacral screws. Participants were then randomized to surgical training that involved either fluoroscopic or computer navigation assisted guidance, followed by a post-test using the assistive modality by which each participant had been trained. Participants returned 4 weeks later to perform retention and transfer tests. No significant improvement was seen in the overall frequency or grade of guidewire perforation for S1 and S2 iliosacral screws, regardless of whether fluoroscopy or computer navigation training was used. Participants who trained using computer navigation were able to perform the procedure faster, with fewer attempts and less overall exposure to radiation. The results suggest that computer navigation is a safe and efficient training modality.

Educational Objective: Discuss the potential benefits and disadvantages of using computer navigation software to teach surgical trainees a complex surgical task (in this case, the placement of iliosacral screws for pelvic ring trauma).

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: David B. Musante, MD
Triangle Orthopaedic Associates, PA, Durham, NC

Topic: Are Collapsed Cervical Discs Amenable to Total Disc Arthroplasty? Analysis of Prospective Clinical Study Results with 2-Year Follow-up
Sunday, October 11

Background

There is limited clinical data on the relationship between preoperative disc height and quantity and quality of postoperative motion after cervical total disc replacement (TDR). We investigated this relationship by analyzing the radiographic and clinical results of a prospective, FDA-regulated feasibility study of a compressible cervical disc prosthesis.

Methods

The study included 30 patients: 12 single-level and 18 two-level implantations (C4-C5:7; C5-C6:27, C6-C7:14). All patients received a 6mm-height prosthesis (M6-C, Spinal Kinetics). An independent core facility performed measurements on preoperative and 2-year postoperative radiographs. Anterior, posterior, and average disc heights were measured at the operated (index) and adjacent segments. Segmental and total (C2-C7) range of motion (ROM) was measured on flexion-extension films. We analyzed the influence of preoperative disc height on the postoperative ROM, location of flexion-extension center of rotation (COR), and clinical outcomes (VAS neck and arm pain, NDI) two years following TDR.

Results

The preoperative disc height at the TDR level was 3.7 ± 0.8 mm (median: 3.7; range: 2.0-5.7). Group #1 with disc height below the median height (3.0 ± 0.4 mm, range: 2.0-3.6) had significantly narrower discs than Group #2 with above median disc heights (4.4 ± 0.5 mm, range: 3.8-5.7mm) ($p < 0.05$). Postoperatively the disc height increased to 5.8 ± 1.0 mm at 2 years (range: 3.8-7.5mm), with no significant group difference. Narrow discs were significantly less mobile preoperatively than taller discs (7.4 ± 3.7 vs. 11.1 ± 5.3 degrees, $p < 0.05$). Both groups achieved nearly the same motion postoperatively (6.3 ± 2.8 vs. 6.4 ± 4.6 degrees, $p = 0.922$); thus, narrower discs had greater retention of motion than taller discs ($p = 0.054$).

We further examined the response of a subset of narrow discs ("collapsed discs"); those with preoperative disc height < 3.0 mm (range: 2.0-2.9mm). The 2-year postoperative disc height was not different compared to the overall group (5.7 ± 0.7 vs. 5.8 ± 0.9 mm, $p = 0.908$). The index-level preoperative ROM (5.1 ± 1.9 degrees, range: 2.4-8.1) was smaller than the overall group (9.1 ± 4.8 degrees, range: 2.4-21.6) ($p < 0.05$). The postoperative index-level ROM (7.6 ± 2.4 degrees, range: 3.3-10.6) was statistically different from the overall group (6.3 ± 3.7 degrees, range: 2.0-20.6) ($p = 0.04$).

The index level COR for the cohort of 48 implanted levels was maintained posterior to disc midline two years after TDR surgery. The VAS neck and arm pain scores and NDI scores all significantly improved after two years after TDR for the cohort of 30 patients ($p < 0.05$). The preoperative disc height did not influence the postoperative index level COR location, pain scores, or NDI scores ($p > 0.05$).

Conclusions

Narrower disc spaces had larger height increase and greater retention of motion without compromising the quality of motion when compared to taller discs. This is contrary to previous biomechanical studies which showed the immediate postoperative ROM decreased with increasing disc-space distraction. Postoperative global and segmental quantity and quality of motion observed in this cohort of patients may be due to intra-operative segmental mobilization, and the seating of metal endplates in the bones and viscoelastic tissue relaxation over time.

The results suggest that disc-space distraction up to 2X preoperative height in a collapsed segment may not degrade the postoperative motion or clinical outcomes two years after TDR with compressible disc prosthesis; and thus, collapsed discs may be amenable to disc arthroplasty.

Educational Objective: Gain familiarity with the preoperative radiographic parameters that influence postoperative function and outcomes in cervical disc arthroplasty.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: **Conor O'Neill, BS (Student)**
Virginia Tech Carilion School of Medicine, Roanoke, VA

Topic: **A Novel Local Cancellous Autograft Source for Anterior Cervical Discectomy with Fusion:
A Technique Description and Comparative Study**
Sunday, October 11

Background

Anterior Cervical Discectomy with fusion (ACDF) is a common, highly effective procedure for managing cervical radiculopathy, myelopathy and myeloradiculopathy. Positive surgical outcomes have been correlated with solid fusion. Fusion rates have been shown to be as high as 96-100% when autograft from the iliac crest (ICBG) is used. However, iliac crest harvest is associated with significant donor site morbidity including but not limited to harvest site pain and infection. Meta-analysis of autograft versus allograft documents an allograft fusion rate of 78%. To improve fusion rates and also avoid donor site issues, many alternative graft materials such as corticocancellous allograft, demineralized bone matrix, synthetic bone graft substitutes such as ceramics and metals, growth factor and cell based bone graft substitutes such as bone morphogenic protein (BMP) have been evaluated. Though each has its merits, none of these has been shown to be superior to autograft.

Methods

In the present study, 12 consecutive patients with cervical radiculopathy, myelopathy or myeloradiculopathy underwent single-level or double level ACDF surgery using an anterior cervical plate with a polyetheretherketone (PEEK) inter-body device packed with demineralized bone matrix (DBX) and a core of autograft obtained from the inferior vertebral body adjacent to the operative disk. An osteotome was used to create a window in the cortical bone approximately 5mm x 5mm. A curette was then used to remove the cortical window and cancellous bone down to approximately 5mm. The autograft was then carefully packed into the right side of the interbody device, for consistency. Patients were followed for fusion with imaging.

Results

The technique was successfully performed in each case and found to be safe and effective. There were no complications. Specifically we observed no infection, no fracture and no implant subsidence. There were no revision operations. There were no pseudoarthroses noted at short-term (less than 1 year) clinical and radiographic follow-up. All patients experienced relief of radicular symptoms with corresponding radiographic evidence of fusion. These results compared favorably to data sets available from meta-analyses of allograft and ICBG autograft fusion.

Conclusions

In the present study, we demonstrate safety and efficacy of anterior cervical discectomy with fusion surgery using a plate and a PEEK inter-body device packed with DBX and a core of vertebral body autograft. This grafting technique avoids the morbidity associated with iliac crest graft procurement, while still maintaining similarly high fusion rate. We found no cases of pseudoarthrosis. The present study is adequately powered to demonstrate superior fusion rate versus fusion rates in the published literature using allograft. The study population will be followed out to 2 years and further study of this technique is warranted.

Educational Objective: Present a novel bone graft harvest site for the well-established Anterior Cervical Discectomy and Fusion surgery.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: Victor Taylor, II, PhD
Wake Forest Medical Center, Winston-Salem, NC

Topic: Impact of BMP-7 on Cell Migration in the Meniscus
Sunday, October 11

The effect of Bone Morphogenic Protein-7 (BMP-7) on cell migration in the meniscus was examined to evaluate the potential of this agent to augment meniscus repair and tissue engineering applications. More cells were seen in the middle zone in the BMP-7 (23% in the inner zone, 40% in the middle zone, and 37% in the outer zone) and PDGF groups (12% inner zone, 39% middle zone, and 49% outer zone) compared with the control group (24% inner zone, 34% middle zone, and 42% outer zone).

Educational Objective: Observe the regenerative effects of BMP-7 on the meniscus.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: **William Runge, MS (Student)**
UNC School of Medicine, Chapel Hill, NC

Topic: **Whole Body Vibration Increased Cartilage Thickness and Cancellous Bone Strength, but not Femoral Neck Density**
Sunday, October 11

Whole body vibration has been proposed as a non-pharmaceutical intervention to improve musculoskeletal health, especially in the osteoporotic patient. However, there has been little concerted effort to establish optimal parameters for application of this treatment, and there is relatively little data on therapeutic changes with its use. This study examined five different amplitudes of whole body vibration in adult female rats. Each animal received 15 minutes of whole body vibration each day, 5 days per week, for a period of six weeks. At the end of the treatment period, the animals were sacrificed, and femurs were isolated for analysis. It was found that there was a large increase in cancellous bone strength (70%) and cartilage thickness, but no significant changes in bone mineral density or strength of the femoral neck or diaphysis. Moreover, these changes were independent of vibration amplitude.

Educational Objective: To share research findings on this proposed new therapy with regards to a number of parameters of clinical interest.

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 Prospective Evaluation of Three Serum Biomarkers in Hip Arthroscopy Patients and Matched Controls
Sunday, October 11

Summary

Elevations in pre-arthritic serum biomarkers may correlate with patient reported outcomes, but not patient selection for hip arthroscopy.

Purpose

The predictive value of serum biomarkers in the development of early hip osteoarthritis and arthroscopic findings remains unknown. We hypothesized that serum levels of vascular cell adhesion molecule-1 (VCAM-1), interleukin-6 (IL-6), and cartilage oligomeric protein (COMP) would be increased in patients undergoing hip arthroscopy for pre-arthritic hip pain. Additionally, we sought to develop a clinical risk assessment model for hip arthritis based on these findings.

Methods

This is a prospective case-control cohort study approved by our institutional review board. Twenty consecutive patients (ages 18 to 40) with pre-arthritic hip pain in the absence of hip injury were selected prior to arthroscopy. Ten age, weight and sex matched volunteers were selected for the control cohort. All participants were non-smokers. Serum levels of VCAM-1, IL-6, and COMP were measured. All subjects completed functional outcomes questionnaires. Statistical analysis included Student t-test, Pearson correlation coefficient, and linear regression with significance at $p < 0.05$.

Results

Serum levels of VCAM-1, IL-6 and COMP were not significantly increased in operative patients versus controls. VCAM-1 levels were moderately correlated with the Vail hip score ($R = 0.579$; $p = 0.012$). VCAM and COMP were moderately correlated ($R = 0.579$; $p = 0.007$). Logistic regression analysis identified that age, BMI, VCAM-1 and COMP were significant predictors of the Vail functional hip score ($p = 0.012$). The most significant predictors were VCAM-1 level ($p = 0.016$) and the BMI ($p = 0.011$). Additionally the Vail hip score was found to positively correlate with a several established functional outcome scoring systems.

Conclusion

Our results support the null hypothesis that there is not a difference in serum levels of VCAM-1, IL-6, and COMP between pre-arthritic hip pain patients and matched controls. Elevated pre-arthritic markers may predict patient functional outcomes reported in the Vail Hip Score. Future analysis of these biomarkers over time will be needed to determine disease progression. The correlation of the Vail Hip Score with multiple functional outcome measurements supports its usefulness in evaluating pre-arthritic hip pain and potential hip arthroscopy patients.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: Aaron J. Casp, MD (Resident)
University of Virginia, Charlottesville, VA

Topic: Does Time during the Academic Year and Level of Resident Involvement Affect Complication Rates in Lower Extremity Orthopaedic Trauma?
Sunday, October 11

Background

The "July effect" is the hypothetical increase in morbidity and mortality associated with the education of newly entering resident physicians in their training program. The association between resident involvement and surgical complication rates following orthopaedic trauma surgery has not yet been investigated. This study utilized the 2005-2012 American College of Surgeons National Surgery Quality Improvement Program (ACS-NSQIP) database to assess the rate of 30-day post-operative complications, to investigate any potential "July effect" in lower extremity orthopaedic trauma surgery.

Methods

Patients who underwent operative fixation for hip fractures (CPT 27235, CPT 27244, CPT 27245 or CPT 27236), or operative fixation of femoral or tibial shaft fractures (CPT 27506, CPT 27507, CPT 27758, or CPT 27759) from 2005-2012 were identified in the ACS-NSQIP database. Complication rates were assessed for all residents (n= 1851), and then separately for junior residents (PGY1, 2 or 3) (n=587) and senior residents (PGY4, 5, or 6) (n=1264). These complication rates were then separated by academic quarter in order to evaluate for a "July effect", and trended throughout the academic year. Outcome measures included serious adverse events, any adverse events, and surgical complications only.

Results

In terms of resident involvement there is no "July effect" for post-operative complication rates in lower extremity orthopaedic trauma surgery. The percentage of patients experiencing a serious adverse event post-operatively was 10.9% during the first academic quarter and 11.4% during the remainder of the year (p=0.8025). The percentage of patients experiencing any adverse event post-operatively was 18.6% during the first academic quarter compared to 17.8% for the remainder of the year (p=0.7113). During the first academic quarter the rate of any adverse event was higher among senior level residents compared to junior level residents, 20.6% and 11.8% respectively (p=0.0375).

Conclusions

This attempt to trend the complication rates among junior and senior residents throughout the academic year has found no "July effect" in resident-level lower extremity orthopaedic trauma surgery. Although we found no "July effect" in this patient population there was a higher complication rate for senior residents compared to junior residents during the first half of the academic year. Our findings highlight the overall safety of orthopaedic residency training throughout the academic year, and the need for a balanced approach to autonomy and operative supervision for senior level residents during their surgical training.

Educational Objective: Describe if post-operative complication rates involving resident physicians changes throughout the academic year.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: Gabriella E. Ode, MD (Resident)
Carolinas Medical Center, Charlotte, NC

Topic: **Knee Arthroscopy Simulation Training: Does It Translate to Improved Proficiency in Wrist Arthroscopy?**
Sunday, October 11

Introduction

Joint-specific arthroscopy simulation has a growing role in improving skills competency during orthopaedic training, however, no studies have evaluated if arthroscopy simulation training is translatable between different joints. The purpose of this study was to determine if simulated knee arthroscopy training translates to improved wrist arthroscopy proficiency.

Methods

Between April to August 2014, 26 orthopaedic residents participated in a arthroscopy simulation training program. Participants included 21 PGY1 to PGY5 residents from the 2013-2014 academic year and 5 matriculating PGY1 residents from the 2014-2015 year (called PGY0). Subjects were video-recorded performing a 10-minute wrist arthroscopy simulation test that involved identification of 23 anatomic landmarks through four arthroscopy portals on a cadaveric wrist. Each subject's arthroscopy video was synchronized with external video of his or her gloved hands to allow for blinded observation of each subject's instrument handling (Figure 1). Subjects were then allotted four weeks to complete a diagnostic knee arthroscopy module on the ArthroSim Knee Simulator (Touch of Life Technologies, Aurora, CO). ArthroSim is a virtual reality simulator that uses haptic feedback to simulate knee arthroscopy. After completion of the ArthroSim module, subjects repeated the wrist arthroscopy test. Three fellowship trained hand surgeons graded randomized, double-blinded footage of the pre- and post-intervention assessments using the ASSET Global Rating Scale. ASSET is a validated, video-based objective measure of technical arthroscopy proficiency (5-6). Primary outcomes were mean ASSET score and test completion rate. Secondary outcomes were subjective comfort with arthroscopy pre- and post-intervention and subjective areas of technical improvement.

Results

Table 1 summarizes pre- and post-intervention objective outcomes and subjective value of ArthroSim by program year. ArthroSim training had no statistically significantly effect on ASSET scores or task completion rates for all subjects. Wrist arthroscopy competency had no correlation with previous wrist or knee arthroscopy experience or program level. However, a majority of residents (65%) found the intervention to be valuable and reported subjectively improved wrist arthroscopy proficiency. More junior residents (PGY0 to PGY2) found the intervention valuable than senior residents (PGY3 to PGY5).

Conclusions

Knee arthroscopy simulation training did not objectively improve wrist arthroscopy competency among orthopaedic residents. A majority of subjects reported subjective improvement with greatest value among junior residents.

Educational Objective: To convey that wrist-specific training programs are needed to aid in wrist arthroscopy competency among orthopaedic residents.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: Douglas Landry Jarvis, MD (Resident)
Wake Forest University Baptist Hospital, Winston-Salem, NC

Topic: Differences between Various Methods of Measuring the Size of Posterior Malleolus Fracture Fragments
Sunday, October 11

Many surgeons agree on the fixation of the posterior malleolar fragment of trimalleolar fractures if the posterior fragment includes greater than 25% of the total articular surface; however, the method for accurately measuring this fragment remains unclear. We conducted a retrospective chart review (2013-2014) evaluating trimalleolar ankle fractures with and without posterior fragment fixation. We compared posterior fragment sizes, as percentage of the total articular surface, using linear measurements from lateral X-rays and sagittal CT scans, as well as surface area measurements in two dimensions (axial CT scan) and three dimensions (3D reconstruction). Based on the preliminary results (n=37), there was no significant difference in the measurements of the lateral X-rays and the sagittal CT scans, with mean fragment sizes of 26.2% and 25.2%, respectively. The 2D surface area measurement, however, grossly underestimated the posterior fragment size as compared to the 3D measurement, with mean sizes of 16.1 % and 28.9%, respectively. Additionally, of the 4 measurement methods, the only one that significantly correlated with the decision to fix the posterior fragment was the linear measurement of the sagittal CT scan, with mean fragment sizes of 28.3% in the group undergoing fixation and 22.8% in the group without fixation.

Educational Objective: To determine the most accurate method of measuring posterior malleolus fractures and to more effectively classify which patients should undergo fracture fixation.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

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

Topic: Major Perioperative Complications Are Higher in Ankle Fusion than Total Ankle Arthroplasty: Results of a Matched Cohort Study
Sunday, October 11

Objective

Ankle fusion and total ankle arthroplasty (TAA) are common surgical procedures used to treat ankle morbidity. Little is known about the comparative rates of in-hospital surgical complications between patients treated with ankle fusion and TAA.

Methods

Data from the 2002-2012 releases of the Nationwide Inpatient Samples were analyzed. A total of 3,638 TAA patients and 15,053 ankle fusion patients were identified using International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) procedure codes (81.11 and 81.56, respectively). ICD-9-CM diagnosis codes were utilized to identify patients that experienced major or minor perioperative complications. A matching macro was used to identify exact matches of ankle fusion and TAA patients matched on age, gender, race, hospital type, geographical region, number of comorbidities, and diabetes status. Perioperative complications (including in-hospital mortality) were compared between procedures using bivariate statistics and multivariate logistic regression.

Results

Of the 3,638 TAA patients and 15,053 ankle fusion patients exact matches were identified for 3,424 (94.1%) TAA patients, with a mean age of 62.2 years. More than twice as many ankle fusion patients experienced a major perioperative complication (14.1% (N=482) versus 6.4% (N=220), $p < .01$). Adjusted for patient demographics and case complexity, ankle fusion patients were 2.31 times more likely to experience major complications (OR: 2.31, 95% CI 1.94-2.75). However, TAA patients were slightly more likely than ankle fusion patients to experience minor perioperative complications (4.6% (N=156) versus 3.9% (N=133), $p = 0.17$). Adjusted for patient characteristics, ankle fusion patients were 4.8% less likely to experience a minor complication (OR: 0.95, 95% CI 0.74-1.23). Fewer than 10 patients in either surgical group died ($p = 0.53$). While not statistically significant, ankle fusion patients were 2.2 times more likely to die during hospitalization than TAA patients (OR: 2.20, 95% CI: 0.56-8.59).

Conclusions

Compared to a matched cohort of ankle fusion patients, TAA patients are less likely to experience major perioperative complications and in-patient mortality. These findings suggest that TAA may be a safer surgery than ankle fusion.

Educational Objective: To compare the rates and odds of surgical complications in total ankle arthroplasty and ankle fusion.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: Andrew P. Matson, MD
Duke University Medical Center, Durham, NC

Topic: Stability of Reduced Ankle Fracture-Dislocations Prior to Surgery
Sunday, October 11

Objectives

In our practice, ankle fracture-dislocations are treated according to protocol. Reductions are performed in the Emergency Department (ED). If the reductions are stable, the fractures are scheduled for clinic visits to set up delayed open reduction and internal fixation (ORIF). If reductions are deemed unstable –either in the ED or in clinic, urgent operative reduction and internal vs. external fixation is performed based on the status of the soft tissues. We seek to identify factors that are predictive of instability and unsuccessful delayed ORIF.

Methods

Following IRB approval, a retrospective chart review identified patients with closed, isolated, bi- and tri-malleolar ankle fracture-dislocations treated operatively between 2008-2012 at a single, Level 1 trauma center. All patients were managed initially with closed reduction and splinting in the Emergency Department, followed by operative treatment. Patient characteristics, as well as pre- and post-reduction radiographic injury characteristics were recorded. Closed reduction was considered to be successful when delayed ORIF was performed, and unsuccessful when urgent surgery was required. Statistical analysis was performed using the Student t-test with significant set at P value <0.05.

Results

After exclusion criteria were applied, there were 55 patients included in the statistical analysis. There were 20 successful closed reductions (36%) and 35 unsuccessful closed reductions (64%). Successful closed reduction was more common in patients without a posterior malleolus fracture (58%) than in patients with a posterior malleolus fracture (29%). When compared to patients with unsuccessful closed reductions, patients who underwent successful closed reduction had less fibular shortening (4.1 mm vs. 9.4 mm) and smaller posterior malleolus fracture fragment size (5.5mm vs. 8mm) on average. Post-reduction radiographic characteristics were not associated with reduction success rate.

Conclusion

Larger posterior malleolus fracture size and greater fibular shortening are associated with higher rates of closed reduction failure in ankle fracture-dislocations. Consideration of these characteristics during initial evaluation and management may assist the surgeon in operative planning.

Educational Objective: To communicate new findings relevant to the Orthopaedic management of ankle fracture-dislocations.

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION 2015 ANNUAL MEETING

Lecture Abstract

Speaker: **Brendan M. Patterson, MD, MPH (Resident)**
University of North Carolina, Chapel Hill, NC

Topic: **Treatment Trends of Midshaft Clavicle Fractures**
Sunday, October 11

Background

The treatment of clavicle fractures remains a controversial topic among orthopaedic surgeons. Historically clavicle fractures were for the most part treated with nonoperative management. Literature over the past decade has provided new evidence to support operative management of displaced clavicle fractures in adult patients. For selected patients with displaced midshaft clavicle fractures the benefits of operative treatment include improved function and increased patient satisfaction. The purpose of this study was to investigate the trends of operative and nonoperative management of clavicle fractures in the United States.

Methods

Data were obtained from the PearlDiver Patient Records database. This database was queried for all patients over 20 years of age for ICD-9 810.02 (closed fracture of shaft of clavicle) and treatment with either CPT-23500 (closed treatment of clavicular fracture) or CPT-23515 (open treatment of clavicular fracture) from 2007 to 2011. The rates of operative and nonoperative management of clavicle fractures were calculated and compared from 2007-2011 using chi-square analysis. Subgroup analysis was performed based on patient age and sex.

Results

There was a significant increase in the rate of clavicle fractures treated with operative fixation from 28.7% in 2007 to 37.5% in 2011 ($p < 0.001$). There was a significant decrease in the rate of clavicle fractures treated with nonoperative management from 71.3% in 2007 to 62.5% in 2011 ($p < 0.001$). Subgroup analysis revealed that there was a significant discrepancy among males and females with 38.0% of males compared to 31.7% of females having operative fixation ($p < 0.001$). There was a decrease in operative fixation of clavicle fractures with increased patient age, with 38.4% of patients 20-24 years of age undergoing operative fixation compared to 25.3% of patients 60-64 years of age ($p < 0.001$).

Conclusion

Trends in the treatment of clavicle fractures show an increased rate of operative fixation from 2007-2011. These trends are more pronounced among the younger male population and are likely a result of the recent literature supporting operative fixation of displaced midshaft clavicle fractures. This study provides an example of the impact of evidence-based medicine on treatment trends in orthopaedic surgery.

Educational Objective: Describe the treatment trends of midshaft clavicle fractures in adult orthopaedic patients.

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: Radiographic Measurements of Hip Dysplasia Correlate with Decreased Size of Acetabular Posterior Wall Fractures
Sunday, October 11

Objectives

To determine if radiographic hip dysplasia measurements correlates to traumatic hip dislocation and posterior wall fragment size in acetabular fractures.

Design

Diagnostic retrospective review of consecutive patients.

Setting

Level I Trauma Center.

Patients/Participants

Consecutive patients treated operatively or non-operatively for a posterior wall acetabular fracture and/or hip dislocation over a 10-year period.

Main Outcome Measurements

Radiographic measurements of hip dysplasia, including the lateral Center Edge (LCE) angle, Sharp's angle, Cross-over sign, Posterior Wall Sign, and Shenton's Line, were recorded on each injured and uninjured patient hip. Injury computed tomography (CT) scans were evaluated for the presence and size of the posterior wall fracture. Radiographic measurements were analyzed with the Pearson Product Moment Correlation and multiple linear regression to determine if the size of the posterior wall fracture fragment predicted hip instability. A subgroup analysis divided patients into those with a posterior wall fracture fragment less than 40% and those greater than 40% of the acetabulum based on CT measurements.

Results

Radiographic dysplasia correlated with both isolated posterior hip dislocation and hip dislocations with smaller posterior wall fractures. In addition, those patients' fractures less than 40% of the posterior wall demonstrated increasing radiographic parameters of dysplasia.

Conclusions

Traumatic hip dislocations with smaller posterior wall fractures appear to be associated with increased hip dysplasia. The classic definitions of stable posterior wall size may not accurately reflect stability in the injured dysplastic hip. Surgeons should consider an exam under anesthesia to determine if surgical stabilization is required.

Educational Objective: Traumatic hip dislocations with smaller posterior wall fractures appear to be associated with increased hip dysplasia. The classic definitions of stable posterior wall size may not accurately reflect stability in the injured dysplastic hip.

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: Older Patients Really Do Break More Easily: Decreased Collision Energy in Geriatric MVC
Sunday, October 11

Summary/Abstract

As the population continues to age, an increasing number of motor vehicle collisions will involve older adults. Elderly drivers may have medical co-morbidities for fracture independent of high energy collisions. This study was designed to examine the association between patient age and collision energy across various fracture patterns seen in older adults involved in motor vehicle collisions compared to younger adults involved in similar crashes. In motor vehicles involving adults, older adults demonstrated an inverse association between patient age and energy levels in all fracture types, except in head and face while younger adults showed an inverse correlation between age and energy levels in only thorax fractures. This study reveals that traumatic fractures in motor vehicle collisions occur at lower velocities with increasing age, and require less energy with increasing age. Most importantly, it supports emerging data that bone density is an important contributor to fractures previously even in previously unrecognized arenas such as "high energy" motor vehicle collisions.

Educational Objective: Demonstrate the inverse association between collision energy and geriatric fracture pattern in motor vehicle collisions.