

Paper Presentations



**2010 Annual Meeting
April 22-24, 2010**

Great Wolf Lodge ~ Grapevine, Texas

Scientific Presentations

Saturday, April 24th - 3:00 pm - 4:00 pm

Title of Presentation:

Clinical and Radiographic Evaluation of a Tissue-Ingrowth Glenoid Component

Authors: Michael Wirth, MD, Rebecca Loredo, MD, Glenn Garcia, MD, and Carleton Southworth, MS
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INTRODUCTION

We evaluated the effectiveness of inserting an all-polyethylene glenoid which had a central peg with four circumferential fins and three short, peripheral pegs. The design of the component was based upon previous radiologic, mechanical, and histologic data that revealed osseous integration of the central peg. The purpose of this study was to examine the validity of the hypothesis that (1) a minimally-cemented pegged glenoid component could be implanted and seated in a reproducible fashion, (2) the prevalence of radiolucencies would compare favorably with the literature, and (3) radiographs would demonstrate findings similar to a previous published report documenting osseous integration and fixation in a weight bearing canine model.

MATERIALS AND METHODS

We prospectively evaluated 42 consecutive patients (45 shoulders) with primary osteoarthritis who were managed by a single surgeon with total shoulder arthroplasty. There were 24 males and 18 females with a mean age of 66 years. The mean follow-up was 46 months (range, 24 to 84). Outcome metrics included ASES, SST and Visual Analog Scores. Radiographs were evaluated by musculoskeletal, board certified radiologists who were blinded to the clinical and patient-derived outcome scores; grading included glenoid seating, radiolucency, and bone density change about the central peg.

RESULTS

At final follow-up, SST increased from a preoperative mean of 3.0 to 9.1. The VAS scores improved by a mean of 30 points. Forward Flexion improved from 95.1 degrees to 147.0, external rotation from 9.4 to 44 degrees, and the mean improvement in internal rotation was 5.5 spinal segments. Each clinical improvement was statistically significant ($p < 0.001$). Based on a composite score of the two raters, the proportion of glenoids that were well fixed at final follow-up (Franklin score < 2) was 98%. One patient developed loosening of the glenoid at 6 weeks following trauma and eventually had revision surgery. Of the remaining 44 shoulders, a seating rating of A was observed in 71% and 29% had a rating of B; 38 had no complete lucency around any peg; 24 were perfect (grade 0), 11 were grade 1, 3 were grade 2 and 2 were grade 3. Compared to postoperative findings, bone density around the central peg decreased in 3, increased in 30, and remained unchanged in 11. For the 30 shoulders which had an increase in bone density, all demonstrated finger-like projections of bone between the central peg flanges suggesting osseous integration of the implant.

CONCLUSIONS

In this study, radiolucency and component seating evaluation of a new glenoid implant design was superior to published reports of conventional pegged and keeled components. Additionally, 30 of 45 shoulders demonstrated increased bone density about the central peg and radiographic findings suggesting osseous integration of the implant. The preliminary implications of component durability and potential for higher rates of long-term clinical success are encouraging.



Title of Presentation:

Inferior scapular notching in reverse shoulder arthroplasty is reduced with a novel glenoid component design

Authors: Michael Wirth, MD, Dave Collins, MD, Lieven De Wilde, MD, Didier Poncet, Laurent Lafosse, MD, Ryan Tibbetts, MD

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PURPOSE:

Scapular notching has been shown to have an adverse effect on long-term outcomes of reverse shoulder arthroplasty. We hypothesized that inferior placement of a smaller metaglene and an inferior-offset glenosphere would reduce impingement between the humeral component and the inferior scapular neck, thus decreasing the radiographic incidence of notching.

METHODS:

Two methods were employed for assessment: First, a computer model based upon 200 cadaveric scapulae and a spatial reference system was designed to virtually simulate abduction/adduction. From this model, the inferior glenosphere overlap and a “Notch Angle” was calculated (maximum adduction in degrees prior to impingement) for both the Delta III and the Delta Xtend (the latter was designed to reduce notching by means of inferior placement of a smaller metaglene and an inferior-offset glenosphere option). Second, radiographs from a consecutive series of 55 patients undergoing Delta III reverse total shoulder arthroplasty were compared to 55 patients who underwent surgery using the Delta Xtend prosthesis. Radiographs were graded for notching according to the Nerot classification. The minimum follow-up for all patients was 12 months.

RESULTS:

The computer model demonstrated that inferior glenosphere overlap and Notch Angle increased by a mean of 6 mm and 42 degrees, respectively, with the Delta Xtend design. The computer model data was corroborated clinically by a statistically significant decrease in scapular notching. Nerot grades (Xtend vs. CTA) were as follows: 0 (41 vs. 12), I (6 vs. 11), II (4 vs. 16), III (4 vs. 12) and IV (0 vs. 4). There were 14 occurrences of HO or osteophytes associated with Delta Xtend compared to 33 for Delta CTA. Prosthetic glenoid loosening or screw breakage was not observed for either prosthesis.

CONCLUSIONS:

Inferior scapular notching observed in the earliest months after Delta RSA can be reduced by using a prosthesis with specific design attributes that enable the glenoid component to be placed as low as possible on the glenoid. Osteophytes and HO formation are reduced as well. The clinical implications of these observations are, at this time, unknown.

Title of Presentation:

The Effect of Anatomical Reconstruction on Patient Derived Outcome Scores Following Hemiarthroplasty for Proximal Humerus Fractures

Authors: Michael A. Wirth, MD, Josh Fox, MD, Mitch Larsen, MD, Charles A. Rockwood, Jr., MD, Peter Silvero, MD

INTRODUCTION

Factors that affect the outcome of humeral head replacement for fractures have been analyzed in a number of studies. These factors include problems with greater tuberosity healing, patient age and the timing of surgery. This study presents the results of 52 hemiarthroplasties for complex proximal humerus fractures that were graded according to the quality of the anatomic reconstruction of the proximal humerus. The purpose of this study was to test the hypothesis that anatomic reconstruction and restoration of glenohumeral alignment results in superior functional outcome and pain relief.

MATERIALS AND METHODS

52 patients were evaluated at a mean follow-up of 3 years (range, 1 to 11 years). Shoulders were stratified into two groups: Group I, had union of both the greater and lesser tuberosities with less than 5mm of displacement and anatomic glenohumeral alignment. Anatomic alignment was achieved when the distance between the center of the humeral head and the center of the glenoid was less than 20% of the humeral head diameter, the humeral head height was 2 to 10 mm above the greater tuberosity, and the acromiohumeral interval was greater than 3 mm. Group II shoulders did not meet these criteria.

Outcome measure included ASES scores, SST and Visual Analog Scores for pain and function.

RESULTS

ANOVA analysis of the forward flexion showed only a trend toward significance in improvement of forward flexion for Group I versus Group II (114.2° vs 94.1°, p=0.078). ASES scores were significantly better for Group I compared to Group II (83 vs 62 with p=0.005). Similarly, SST scores for Group I and Group II were 9 and 7, respectively (p=0.026).

CONCLUSIONS

The data presented suggests that reconstructions that more closely approximate original anatomy leads to improved function and decreased pain at an average follow-up of 3 years. The combination of decreased difficulty in performing tasks, decreased pain, and the ability to perform a larger number of normal ADL's suggests a better quality of life for patients whose post-surgical results more normally approximate their pre-injury anatomy.

Title of Presentation:

Severe shortening of the femoral neck is a risk factor for the development of Avascular necrosis of the femoral head in femoral neck fractures treated with internal fixation.

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PURPOSE (HYPOTHESIS):

To determine the effect of shortening in the development of avascular necrosis (AVN) in femoral neck fractures treated with internal fixation.

METHODS:

This is both prospective and retrospective study conducted at a level 1 trauma centre. 103 patients treated at a single institution for femoral neck fractures in whom the femoral head has been preserved and with a minimum follow-up of 1 year were included. The patients with femoral neck fractures treated with cannulated screws, dynamic hip screws and reconstruction nails were identified and included in the study. Shortening of the femoral neck in both the abductor moment arm and the vertical length arm was calculated from the patient X-rays and correlated with the outcomes of AVN. The shortening was divided into mild (0-5 mm), moderate (6-10mm) and severe (>10mm) and correlated with AVN.

RESULTS:

The mean follow-up was 42 months (12-190 months). 13 (12.6%) patients developed AVN at the end of follow-up. The incidence of AVN was 4/69 (5.7%), 1/17 (5.8%) and 8/17 (47.1%) in the mild, moderate and severe shortening of the femoral neck in the abductor moment arm respectively. Shortening of the femoral neck at the abductor moment arm was not significantly associated with higher occurrence of AVN when treated as a continuous variable. However when the shortening at the abductor moment arm was compartmentalized into the mild, moderate and severe groups, there was a higher incidence of AVN in the severe shortening group ($p<0.05$). Similarly the incidence of AVN was 3/63 (4.7%), 2/21 (9.5%) and 8/19 (42.1%) in the mild, moderate and severe shortening of the femoral neck in the vertical length respectively. Shortening of the femoral neck at the vertical length was not significantly associated with higher occurrence of AVN when treated as a continuous variable. However when the shortening at the vertical length was compartmentalized into the mild, moderate and severe groups, there was a higher incidence of AVN in the severe shortening group ($p<0.05$).

CONCLUSION:

Shortening of the femoral neck greater than 10mm in both the abductor and vertical arm is a risk factor for the development of AVN.

Title of Presentation:

Variation of fracture patterns and mechanism of injury of distal radius fractures between young adult and elderly patients

Author: Joshua Fox, MD

Co-authors: Adam Neustine, MS, Rahul Banerjee, MD, Adam Starr, MD

PURPOSE:

Acute fractures of the distal radius are among the most common bony injuries treated by orthopaedic surgeons. The purpose of this study was to compare and contrast the patterns of distal radius fractures seen at a level I trauma center in two populations, young adults and the elderly.

METHODS:

Utilizing the trauma registry, all distal radius fractures treated at Parkland Memorial Hospital between January 1, 2006 and January 1, 2008 were identified and reviewed. Of these patients, two groups were selected based on age. The groups were young adults (ages 18-35 years) and the elderly (age >60 years). Over this two year period, 137 young adults and 69 elderly were treated at our institution for distal radius fractures.

Electronic medical records from emergency department visits and digital radiographs of injury films were examined to determine mechanism of injury and to classify fracture patterns according to the AO-OTA classification system.

RESULTS:

The patients in the young adult group were more likely to have been injured by a high-energy mechanism (49.6% vs. 18.8%). In contrast, most patients in the elderly group were injured in a fall from standing. The rate of open fractures was higher in the young adult group (5.1% vs. 1.4%) and the fractures in this group were more likely to have a more severe AO-OTA classification. The proportion of female patients was 3.5 times higher in the elderly group.

CONCLUSIONS:

Our data demonstrates that distal radius fractures that are treated at a level 1 trauma center have a bimodal distribution with young males and elderly females having the highest instances of injury. Younger patients tend to have high energy injuries, such as motor vehicle collisions, and the injury pattern more commonly involves the articular surface. In the elderly population, fractures are usually the result of low-energy falls and the resulting fractures are more commonly extra-articular.

Title of Presentation:

Results of Open Reduction and Screw Fixation of Isolated Posterior Wall Acetabular Fractures

Author: Josh Fox, MD Josh Fox, MD

Co-authors: Henry B. Ellis, MD, Rahul Banerjee, MD, and Adam Starr, MD

BACKGROUND:

Fractures involving the posterior wall of the acetabulum that result in hip instability require operative fixation. The original publications on these fractures advocated anatomic reduction and interfragmentary screw fixation. More recent publications direct the use of a supplemental reconstruction plate to buttress the posterior acetabular rim. To our knowledge, no clinical studies exist that demonstrate superior results with this additional fixation.

PURPOSE:

The purpose of this study was to retrospectively review our results utilizing interfragmentary screws without plate fixation, and quantify our fixation failure rate based on review of post operative radiographs.

METHODS:

After obtaining IRB approval, an analysis of the Parkland Trauma Registry revealed that from July, 1999 to October, 2005, 97 isolated posterior wall fractures were operatively treated at Parkland Hospital. 34 patients were treated by open reduction with interfragmentary screw and supplementary plate fixation. 63 patients were treated with open reduction and interfragmentary screw fixation alone. Of these 63 patients, 28 patients were followed for an average of 14.4 months.

Computerized patient records and radiographs were subsequently evaluated. Preoperative and postoperative arthrosis was graded according to the scale outlined by Matta. Quality of reduction was graded according to the scale outlined by Letournel and Matta. Fixation failure was characterized as a loss of reduction as evidenced by fragment displacement, a change in hardware position or evidence of screw breakage.

RESULTS:

There was one failure in a 43 year old female who developed avascular necrosis of the femoral head prior to implant failure. One additional patient, without evidence of failure of fixation, developed severe arthrosis following a poor reduction.

CONCLUSION:

In isolated, non-comminuted posterior wall acetabular fractures, interfragmentary screw fixation alone may be sufficient to maintain the reduction. The quality of reduction (including restoration of marginally impacted fragments), and not the choice of implants, is the primary factor in determining outcome.