Presented at the EFORT Meeting, London, 2014

#482

Seeing Is Believing: Treatment Of Proximal Humerus Fractures Using A Novel Radiolucent Implant And Its Effect On Reduction Accuracy, Healing Rate, And Functional Outcome

Trauma / Shoulder & Upper Arm Trauma / Surgical Treatment

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keywords:Proximal Humerus Fracture, Internal Fixation, Carbon Fiber Implant

Introduction: The development of locked implants has markedly improved our ability to obtain fixation in proximal humerus fractures, however complication rates remain substantial. Recently, a radiolucent carbon fiber plate with a low modulus of elasticity has become commercially available for management of proximal humerus fractures.

Objectives: The purpose of this study was to review the reduction accuracy, healing rate, functional outcome, and complications of a series of patients treated with a novel radiolucent carbon fiber plate.

Methods: We retrospectively reviewed 17 displaced proximal humerus fractures in 16 patients treated by ORIF using a novel radiolucent carbon fiber proximal humerus plate. The average patient age was 57 years (range 25 – 96 years). The injury mechanism was low-energy (fall from standing) in 8 patients, and high-energy in 8 patients (3 motorcycle collisions, 2 motor vehicle collisions, 2 struck pedestrians, and 1 fall from 25 feet). Two high-energy fractures were type II open while the remainder were closed fractures. There were seven 2-part fractures, eight 3-part fractures, and two 4-part fractures. Three cases were lost to follow-up. The average follow-up of the remaining patients was 6 months. Radiographs, operative data, and post-operative data were analyzed.

Results: The average total operative time was 117 minutes and the average total fluoroscopic imaging time was 81 seconds. A deltopectoral approach was used in 15 cases, while 2 were fixed using a deltoid split. The average number of screws inserted into the humeral head was 7 (range 6 – 9) and all but one plate was secured to the shaft with 3 bicortical screws. Adjunctive calcium phosphate cement was injected into the humeral head in 4 cases. Reduction accuracy was assessed as anatomic or near-anatomic in 14 cases, while in 3 cases there was either a varus or extension malreduction. The radiolucent plate permitted excellent intra-operative reduction visualization, but the deforming forces precluded an anatomic reduction in these cases. There was no loss of fixation or implant failure. Humeral head settling with secondary screw penetration was seen in only 1 case, a 65 woman with known osteoporosis in whom the humeral head fixation was supplemented with calcium phosphate cement. All fractures united. The progression of fracture healing could be easily observed on the lateral radiographs, since the plate did not obscure the ability to see the anterior and/or posterior cortex. There were no post-operative infections. One patient, who suffered a loss of tuberosity fixation, failed to recover satisfactory range of motion.

Conclusions: The radiolucent carbon fiber plate offers advantages in fixation of proximal humerus fractures. It's radiolucent property permits more accurate assessment of fracture reduction and healing. The plates low modulus of elasticity may be beneficial in achieving fracture union and minimizing settling with secondary screw penetration. Our preliminary experience with this novel implant is very favorable for the management of displaced proximal humerus fractures.