Locked Plating of Proximal Humeral Fracture: Complications and Functional Outcomes

INTRODUCTION: Fractures of the proximal humerus represent 4% to 5% of all fractures [1-4]. These fractures occur in a bimodal frequency with younger high energy and older lower energy mechanisms. The majority of proximal humeral fractures are minimally displaced, stable patterns and therefore can be treated nonoperatively [2, 5]. Unstable displaced fractures can benefit from operative stabilization.

Osteoporosis, comminution, short segment fracture length, and need for early mobilization complicate stabilization and fracture healing. Open reduction with internal fixation for such fractures can aid in stability and allow the patient to begin early mobilization and rehabilitation. Locked plating technology for fixation of proximal humerus fractures has shown encouraging results in biomechanical and clinical trials [6, 7].

The purpose of this study was to evaluate the complications and functional outcomes of locked plating technique in the treatment of a consecutive series of patients. METHODS: Over a 5-year period of time, 2001-2006, 69 fractures in 66 consecutive patients were treated with locked proximal humeral plating techniques and retrospectively identified. All patients had prospectively gathered outcome data consisting of DASH, SF36, and SMFA measurements at 6, 12, and/or 24 months.

RESULTS: The average age was 61 years (range 23-90) with a bimodal distribution. The gender was predominately female (62%). The mechanism was varied: low energy fall (36, 53.7%), MVV (17, 16.4%), and high energy fall (11, 16.4%), and other (3, 4.5%). When grouping younger versus older, a significant difference (p = 0.000) was noted based upon high energy versus low energy mechanism, respectively. An inverse relationship between age and presence of polytrauma was noted (n = 0.030, p = 0.012). Neer fracture classification recorded 2 part (32, 46.4%), 3 part (19, 27.5%), or 4 part (18, 26.1%) fractures. Associated ipsilateral injuries were head split fracture with marginal impaction (6), diaphyseal extension (9) and glenoid neck (1). Seventeen of the 69 fractures (24.6%) had associated osteoporosis noted on radiographs and/or intraoperatively. Overall complications were screw loosening (3, 4.3%), AVN with collapse (7, 10.1), axial neuropathy (1, 1.4%), infection (2, 2.9%), and fracture below plate (2, 2.9%). The fractures that resulted in AVN were analyzed. Of the 7 patients with AVN, five occurred with Neer 4 part and two with Neer 3 part fractures. Six of the seven patients with AVN had a conversion to total shoulder arthroplasty. Secondary surgery was noted with conversion to total shoulder arthroplasty (6, 8.7%), plate removal (4, 5.8%), and screw removal secondary to intraarticular screws (5, 7.2%). At the two-year interval, the average DASH score was 30.9. At the two-year interval, DASH scores were 26.5 and 37.4 for isolated and polytrauma patients, respectively. For age differences, DASH scores were 33.1 and 28.9 for isolated versus trauma patients and between the age groups.

DISCUSSION: Proximal humeral fracture outcome measures are evolving. In a series of 176 fractures of the proximal humerus treated with a locking proximal humeral plate, Constant scores measured improved outcomes of 80% and 73% in patients greater than 65 years old compared to patients less than 65 years old [8]. In a series of 72 fractures treated with a locking proximal humeral plate, Bjorkenheim noted the Constant score to be acceptable [9]. In a smaller series of 32 fractures treated with the Philos plate, Moonot measured the Constant score to be 66.5% with no difference in the older versus the younger patients [10]. Younger compared to older patients continue to improve until the two-year mark for function and arm/hand but not for bother. Similar to the prior outcome studies, bother and emotional scores for younger patients were better than older at the two-year interval. As expected, polytrauma patients consistently performed worse than isolated injury patients. Significant differences in arm/hand measurements were noted between Neer 2 part, Neer 3 part, and Neer 4 part fractures. Proximal humeral fractures are debilitating injuries that require years of rehabilitation until reaching maximum medical benefit. A majority of our patients, 96%, returned to a similar level of activities, functioning, and occupation. Having one third of our patients retired and one seventh unemployed could have skewed our results. Even though, vocational retraining or worker’s compensation may benefit from delaying changes until further rehabilitation is attempted.

REFERENCES: