Role of Neer's Prosthesis in Proximal Humerus Fracture Dislocation

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Abstract. The article deals with investigations on the Role of Neer's Prosthesis in Proximal Humerus Fracture Dislocation and aims to evaluate the role of Neer's prosthesis in fracture dislocation of proximal humerous especially four-part fractures and old shoulder dislocation. The assessment of the anatomical and functional improvement after the surgery has also been done. Neer's prosthesis are considered to be a good way to manage comminuted proximal humerus fracture dislocation. Neer's prosthesis though become very unpopular still have great scope in four-part fracture dislocation and specially when the fracture become old.

Key words: Neer's prosthesis, Proximal Humerus Fracture Dislocation, four-part fractures, shoulder dislocation.

Introduction.

Proximal humerus fracture comprises 4–5% of all fractures (Green and Norris, 2002: 1623-1755). The treatment of displaced proximal humerus fracture is controversial. It varies from conservative to surgical management. Surgical management includes close reduction and percutaneous pinning, open reduction, and internal fixation with locking compression proximal humerus plate and hemiarthroplasty (Lanting et al., 2008: 42-54). The main aim of treatment is an anatomical reduction of fracture, preservation of vascularity of humeral head, and good functional outcome of the shoulder. Primarily, shoulder hemiarthroplasty is indicated in patients with grossly displaced three and four part fractures or fracture dislocations, split head fractures, impacted fractures with loss of over 40% articular surface, and anatomical neck fractures of proximal humerus (Phipatanakul and Norris, 2005: 357-362; Mighell et al., 2003: 569-577; Bosch et al., 1998: 479-484; Gerber and Warner, 1997: 215-243). Three or four-part fracture and fracture dislocations comprise 5% of all proximal humerus fractures (Bhandari et al., 2004: 126-127).

Shoulder hemiarthroplasty is a technically challenging procedure which can predictably restore shoulder-level function in patients with 4-part fractures, some 3-part fractures, fracture dislocations, head-splitting fractures, and impaction fractures of the humeral head with involvement of more than 50% of the articular surface (Bigliani and McCluskey III, 1990; Dim; akopoulos et al., 1997: 7-11; Kontakis, 2008: 1407-1413; Solberg et al., 2009: 1689-1697).

Neer had described good and satisfactory results after primary shoulder hemiarthroplasty in displaced three and four part fractures (Bigliani and McCluskey III, 1990). The first generation monoblock prostheses were used by Neer (Neer, 1970: 1103). Later on, the second generation modular prostheses were introduced which provided better soft tissue balancing and good range of motion. In 1991, the third generation prostheses were introduced which recreates the anatomy of proximal humerus more accurately and were adaptable to the individual bony anatomy (Walch and Boileau: 1999: 443-451; Wirth, 2007: 111-116). Early surgical intervention within 2 weeks postinjury, accurate tuberosity reconstruction, and appropriate height and retroversion of the prosthesis are the factors with the greatest impact on functional outcome (Bigliani and

McCluskey III, 1990: 129-137; Dimakopoulos et al., 1997: 7-11; Kontakis, 2008: 1407-1413; Solberg et al., 2009: 1689-1697). Success of shoulder hemiarthroplasty depends on soft tissue integrity with reattachment of the tuberosities (rotator cuff), bone quality, glenoid bone stock, stem height, version of the prosthesis, and soft tissue balancing. In this study, we are proposing to study the functional outcome after primary hemiarthroplasty in three or four part proximal humerus fracture and to compare the results with other similar published studies.

Objective

The principal objective of the study was to evaluate the role of Neer's prosthesis in fracture dislocation of proximal humerous especially four part fractures and old shoulder dislocation. To assess the anatomical and functional improvement after the surgery. To study prognostic factors on the outcome and assess the complications of the procedure.

Material and Methods

We report prospective longitudinal midterm results of proximal humerous fracture dislocation. This study included 20 patients, between May 2016 to Nov 2017, presented to us and treated with hemiarthroplasty with replacement of head of proximal humerous with Neer's prosthesis. The evaluation of results was done on the basis of Neer's critiria.

Operative Procedure

All patients were operated in a "beach chair position" under general anesthesia. In this position we can hyperextend the proximal humerus for canal reaming, cementation, and implantation of prosthesis. To avoid complications of hypotension associated with this position, the head was never elevated beyond 45°. Calf pumps were used in all cases. The standard deltopectoral approach was used. The lesser and greater tuberosities were meticulously dissected with their tendinous attachments. The tuberosities were later reattached to the proximal humerus for stability of the prosthesis. The size of the prosthetic head was measured according to the anatomical head. Cemented prosthesis was used in all cases. Pressurized cementing was done by cement gun. All prosthesis were inserted in 20–30° of retroversion by external rotating and adducting the arm. The height of the prosthetic stem was determined by the metaphyseal calcar. In case of severe comminution, pectoralis major insertion was taken as a reference point. Anatomically, prosthetic humeral head lies approximately 5.6 cm proximal to the superior border of the pectoralis major tendon. Fixations of the tuberosities around the prosthesis were done by making drill holes and were tied to the prosthesis and proximal humerus using Ethibond No. 5 sutures. Ethibond sutures were passed through the holes over fin and neck of the prosthesis to tightly secure the tuberosities with their soft tissue attachments . One patient also had a fracture of glenoid, anteroinferior articular surface, which needed screw fixation. The glenoid margins were assessed during the surgery and all osteophytes impinging the soft tissues were carefully removed.

Results

20 patients that included our study are of an average age 49.5 years, 75% were male and rest were female, 17 were freshly injured while 3 were old fracture dislocation and operated within an average span of a week with follow up of 12 months on average. 3 out of 20 patients showed good result, 13 showed satisfactory while 4 showed poor results.

Discussion

The major aims of hemiarthroplasty in fracture of proximal humerus are pain relief, adequate shoulder function, patient satisfaction, and strength. Meticulous surgical technique and anatomical tuberosity fixation correlate directly with the outcome. Factors that affect the tuberosity union are positioning of prosthesis, stable fixation of tuberosity, and bone quality (rate of nonunion are higher in elderly and in osteoporotic bone). Higher placement of prosthesis is associated with higher risk of tuberosity nonunion. Hence, the assessment of stem height at the time of implantation is important. During surgery, in neutral position, there should be a gap of at least 1 cm or one finger width between the implant and the acromion. Boileau et al. (2019: 437-444) showed that tuberosity healing was a major determinant of functional outcome. In their study, 23% patients had detachment and migration of tuberosity, while in our study that was only 16.67%. Modern prosthesis has holes over proximal end of the prosthesis for better attachment and integration of tuberosities. Anatomical healing of tuberosity gives good functional outcome due to the restoration of rotator cuff anatomy.

Conclusion

We concluded that Neer's prosthesis is a good way to manage comminuted proximal humerus fracture dislocation. Less cumbersome procedure than reverses shoulder arthroplasty and more stable than PHILOS fixation. Neer's prosthesis though become very unpopular still have great scope in four-part fracture dislocation and specially when the fracture become old.

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