



CASE REPORT

Proximal Humerus Nonunion: Operated with Fibular Strut Allograft and Locking Plate

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ABSTRACT

Proximal humerus fracture is one of the common fractures seen in practice. Being metaphyseal region, it is less prone for nonunion. Although more than 80% of these heal with no surgical intervention, displaced unimpacted surgical neck fractures are associated with a higher incidence of nonunion with rates varying from less than 1% to as high as 23%. We report a case of 35-year-old male with nonunion following fracture of left proximal humerus.

Keywords: Proximal humerus nonunions, Fibular strut allograft, Locked plating, Fixed-angle plate.

How to cite this article: Vieira AE, Chaudhary A, Diwedi A, Vaibhav. Proximal Humerus Nonunion: Operated with Fibular Strut Allograft and Locking Plate. MGM J Med Sci 2015;2(1): 50-51.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Nonunions of the proximal humerus, although uncommon, are challenging for even the experienced upper extremity specialist. The bone quality is typically poor, and the proximal bone stock is limited. These patients often possess multiple comorbidities contributing to the development of the nonunion.^{1,3-7} Common predisposing factors contributing to the development of the nonunion include: smoking, alcoholism, diabetes mellitus, soft-tissue interposition, extensive comminution, hanging arm casts, poor surgical technique or any combination thereof. Although not all patients with humeral nonunions are clinically symptomatic, those presenting with symptoms are typically severely disabled by pain and loss of motion.^{2,6,7} Most heal uneventfully, however, nonunion is not uncommon. Surgical management should be considered for fractures that demonstrate no evidence of progressive healing on consecutive radiographs taken at least 6 to 8 weeks apart during the course of closed treatment.

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CASE REPORT

A 35 years old man sustained isolated left proximal humerus following fall from chair. He was taken to a local hospital where he was assessed and his left arm was placed in a U slab which was removed after a month (Fig. 1).

He was brought to the emergency department 1 year later with complaints of pain and limited range of motion (10-20 abduction) in the left arm. X-ray left shoulder (AP) revealed nonunion of proximal humerus.

Fracture was later managed by open reduction internal fixation with proximal humeral interlocking system (PHILOS) plating and fibular graft (Fig. 2).



Fig. 1: Post-trauma X-ray



Fig. 2: Fibular strut allograft with plating, callus formation seen



Fig. 3: Postoperation: range of motion at abduction

Postoperation the range of motion at the left shoulder gradually improved to around 80 abduction after 5 months (Fig. 3).

DISCUSSION

The historical approach to treatment of proximal humeral nonunions has typically involved open reduction and internal fixation. Several techniques have been described with no superior solution identified. Reported techniques include standard plate-and-screw fixation, screw augmentation with polymethyl methacrylate, tension banding of the rotator cuff with extramedullary plates or intramedullary nails,^{1,2,4,6,7} bone grafting with autograft struts and standard plate modification into a blade plate construct. Many of the alternative techniques arose out of high failure rates with early standard plating. Neer and Rockwood first recommended tension band technique with intramedullary rods to facilitate head compression and improve stability.⁴ Despite better union rates with this technique, Nayak et al noted both a 20% incidence of persistent nonunion and a vascular necrosis and an 80% incidence of subsequent hardware removal secondary to pain. The addition of bone graft via various autografting techniques has also resulted in improved union rates at the expense of patient morbidity. Walch et al first proposed an intramedullary bone peg technique whereupon a corticocancellous graft was harvested from the patient's iliac crest, anterior tibia or fibula to supplement fixation with rush rods or screws. Although a 96% union rate

was achieved, donor site morbidity was substantial with 50% of patients developing a pathological fracture after harvesting from the anterior tibial crest. Other authors have strictly used iliac crest bone graft; however, donor site morbidity can be substantial with a relatively high incidence of persistent pain postoperatively. Based on published series, the best overall success for treatment of humeral nonunions involves the use of fixed-angle devices and bone grafting. Plate modification into fixed-angle devices enhances fixation in the humeral head and has frequently been advocated, owing to better biomechanical strength and improved overall results. Most recently, Ring et al used a site-specific blade (Synthes Ltd, Paoli, PA) plate with autogenous cancellous bone graft in 25 ununited fractures and noted a 92% union rate with 80% of the results considered good to excellent. Even in this series, two patients reported complications as a result of their iliac crest harvest.

CONCLUSION

Intercalary allograft strut with locking plate has been highly successful at our institution and is the best treatment modality in treating proximal humerus nonunion as compared to other techniques, like plate fixation, plate with TBW, plate and screw fixation and intramedullary nail.

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