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Case Report

Reversed Proximal Humerus Internal Locking System (RPHILOS) plate for distal Humerus shaft fractures through posterior approach

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Abstract:

Humeral shaft fractures account for approximately 2% of all fractures in adults with almost 30% of them being located in the distal third. Extra-articular distal third humeral fractures are difficult to treat due to small distal fragment, which prevents from using enough screws and more stiffness. There is still some debate over which implant is best for rigid fixation. We described the application of PHILOS plate in reversed manner through posterior approach. A 20years old male presented in emergency department with right Humerus fracture while doing arm wrestling. After following the ATLS protocol, patient's fracture was fixed using a PHILOS plate in upside down manner on the posterior surface of Humerus by using posterior approach. Patient was kept in polysling for 2 weeks. Full range of motion was achieved at 3 weeks. We concluded that reversed PHILOS is safe and effective technique in the treatment of extra-articular fracture of distal Humerus by using posterior approach.

Keywords: Reversed PHILOS, distal humerus fracture, posterior approach

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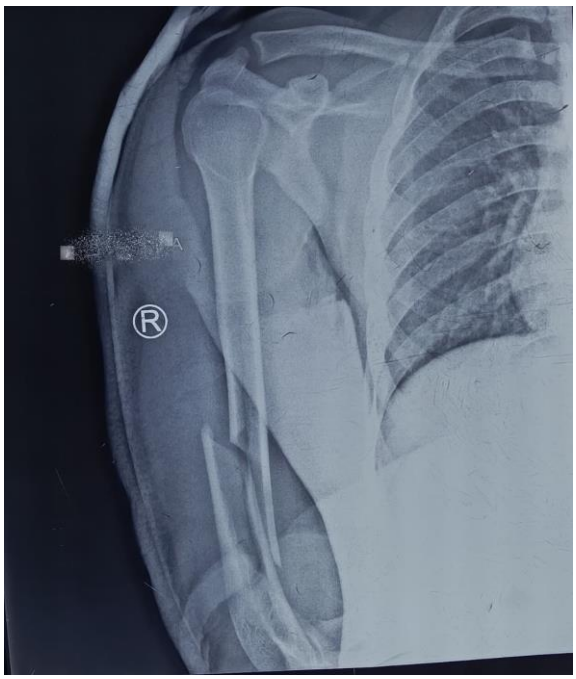
Introduction:

Distal humerus fractures represent approximately 2% of all fractures and 30% of the fractures around elbow [1]. Majority of these fractures presented to us either from a low-energy injury in elderly patients or from a high energy injury in the young population. The aim of management is to fix the distal humerus anatomically; otherwise, disability is inevitable [1]. Due to a high incidence of elbow contracture in prolonged conservative treatment and inability to control the fragments, a stable and rigid osteosynthesis with early mobilization and rehabilitation protocol is advised for this type of injuries. Depending on the distal humeral anatomy and biomechanics in correlation with the fracture morphology, patient status, etc., multiple techniques, approaches and implants have been described in the literature with their complication rates respectively. The most widely used are extra-articular distal humerus plate (EADHP), orthogonal and parallel plating, intramedullary nailing and various hybrid techniques[2–7]. We present an alternative osteosynthesis method in the management of distal third diaphyseal humerus fractures using a reversed (upside-down) "Proximal Humerus Internal Locking System" (PHILOS) plate technique using posterior approach.

Case Presentation:

A 20 years old male presented in emergency department with right Humerus fracture while doing arm wrestling. After following ATLS protocol, baseline ECG, CXR and x-ray Humerus were performed. Patient had oblique extra articular fracture of distal Humerus with butterfly segment.



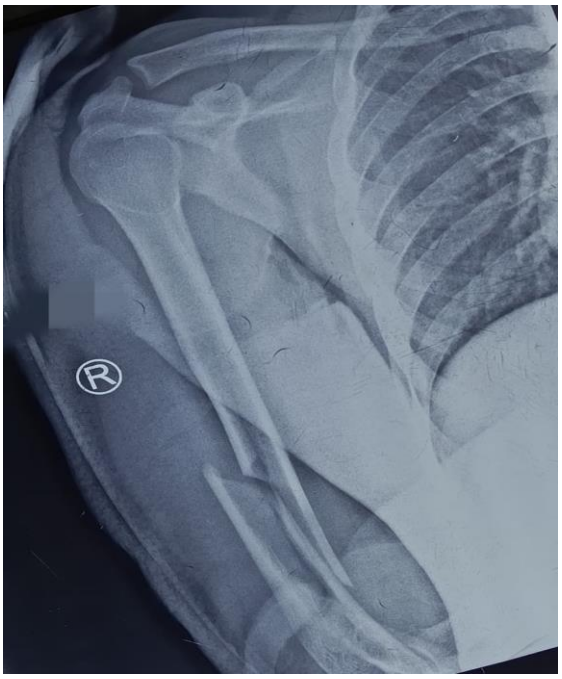
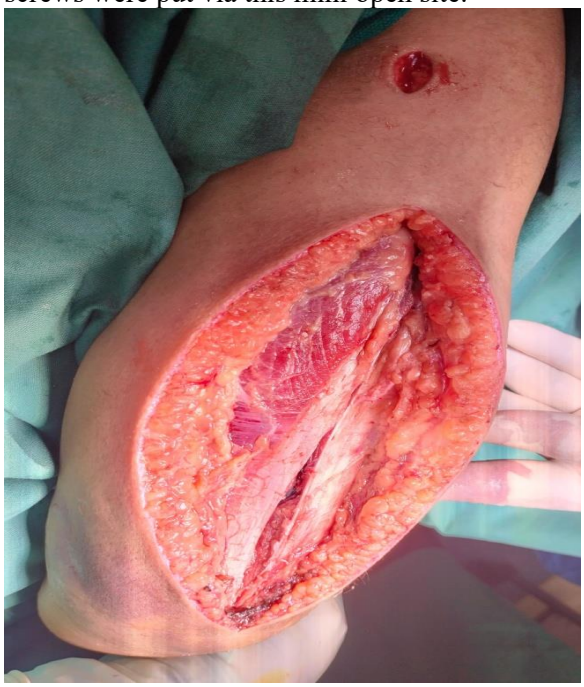


Figure 1: *pre-operative radiographs showing fracture of distal humerus*

The patient was placed in lateral decubitus position with injured arm over the top of body. Adequate prepping and draping, the middle and distal third humeral diaphysis were accessed through posterior approach. Triceps was split in the center along its fibers. Fracture was exposed, reduced and held with two lag screws perpendicular to fracture line by incorporating butterfly segment. PHILOS plate was slightly bent anteriorly around its broad area and used in upside down manners over the posterior surface with adequate proximal and distal screws by sparing olecranon fossa.

Proximal area of plate was not exposed completely. A 2 cm long incision was given at an interval from main exposure site in the superficial skin and subcutaneous tissue by palpating and sparing radial nerve track. Radial nerve is palpated in the spiral grove which is located 10-14cm proximal to lateral epicondyle and 3-4 cm from the apex of triceps aponeurosis. Proximal screws were put via this mini open site.



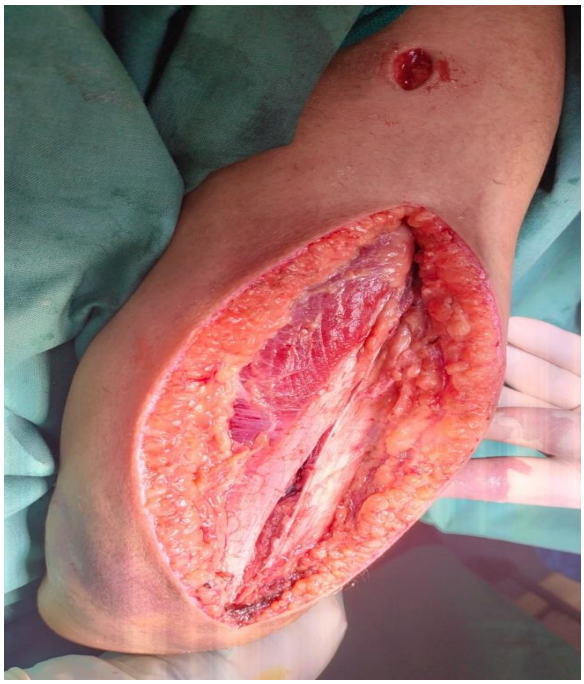


Figure 2: *Posterior approach to the humerus with reversed PHILOS plate in situ*

Wound was closed in layers and aseptic dressing was done. Arm was placed in polysling for 2 weeks. Postoperatively, there was no neurovascular compromise. Patient was discharged next day On the twelfth postoperative day, sutures were removed and early physiotherapy and rehabilitation protocol were initiated. At third post-op week, patient achieved painless full range of motion.

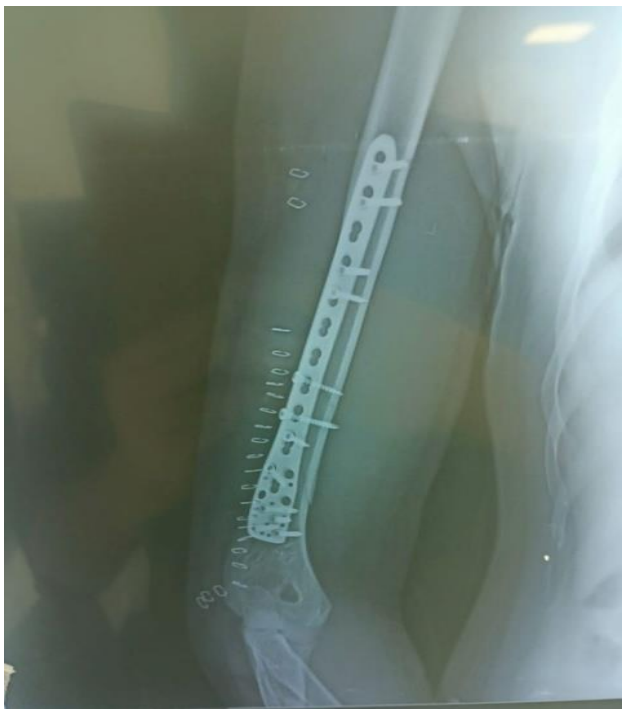


Figure 3: *post-operative radiographs showing reverse PHILOS plate fixation for a distal humerus fracture.*

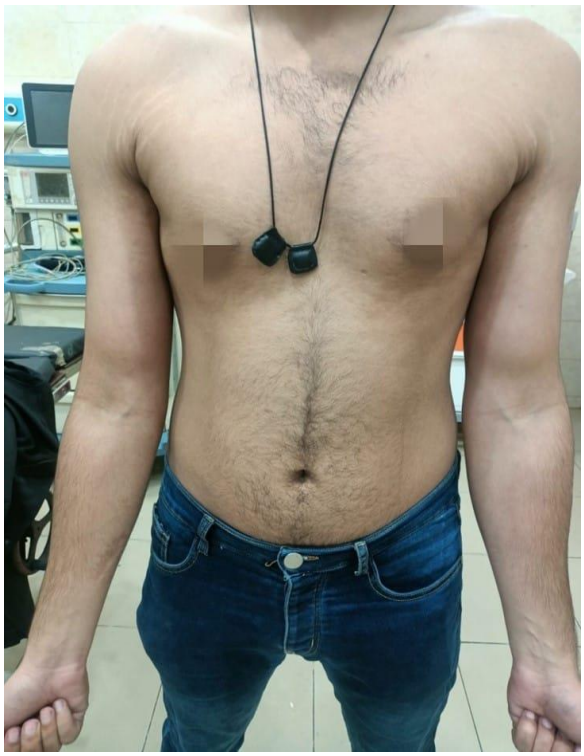


Figure 4: *1.5 months post-operative clinical examination shows normal range of motion after fixation of distal humerus fracture with RPHILOS*

Discussion

The most commonly used approaches for

addressing distal extra-articular humerus fractures are the posterior and anterolateral approach, with posterior being the approach of choice in most of the LCP (Locking Compression Plate) or alternatively LC-DCP (Limited Contact Dynamic Compression Plate) and DCP (Dynamic Compression Plate) cases because of the distal humerus flat surface anatomy suitable for plating as well as the possibility of more distal extension of the plate with additional screw placement and dual plating if necessary. Posterior approach has direct exposure and visualization, decrease risk of neurovascular compromise and good cosmetic and functional outcomes except for triceps strength that can be managed with physiotherapy and strengthening exercises. Use of usual plating techniques have provided fewer screw placement in the distal fracture fragment,
which results in insufficient fracture fixation especially when addressing osteoporotic bone and difficulty in providing early range of motion. Therefore, the reverse (upside-down) PHILOS plate placement, which follows the posterior distal humeral contour with flat distal surface, and which can provide additional number of fixation screws as well as multidirectional if needed, is a suitable alternative except for fractures extending distally more than 2-3 cm from the olecranon fossa. The concept of reverse (upside-down) PHILOS plate placement for extra articular distal humerus fractures has been increasingly reported in orthopedic literature primarily via anterior or anterolateral approach [7,8]. In contrast, our study employed reverse PHILOS plate placement through posterior approach, a technique reported in only one prior series to date, that too in the context of nonunion fractures rather than acute extra-articular distal humeral injuries [9].

Conclusion:

Clinical and radiological results were good when a reversed (upside-down) PHILOS plate was used via posterior approach to treat extra-articular distal-third diaphyseal humeral fractures. It may be a reasonable option for a distal humeral shaft fracture with a short distal fragment. Additional clinical studies on a large scale are necessary to further investigate this technique, approach and its clinical applicability.

Conflict of Interest:

The authors declare no conflict of interest regarding the publication of this paper.

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