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COMPOUND PROXIMAL HUMERUS FRACTURES FIXED WITH A LONG PHILOS PLATE.

Orthopaedics

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ABSTRACT

Background Humeral Fractures with long segments cause a lot of difficulty and instability hence during surgery they mainly require operational stabilisation. **Methods:** 18 patients were treated with the long proximal humeral internal locking system (PHILOS) plate in an open reduction and internal fixation procedure. 16 of the 18 fractures were long segment periarticular fractures reaching into the diaphysis, and 2 of the 18 fractures were pathological.With a final follow-up observation, this study provides a retrospective case series review of these instances.A 12-month follow-up was the average. With a mean age of 52 years (and a range of 19 to 86 years), there were 4 women and 14 men. **Results:** Avascular necrosis, malunion, or loss of fixation did not occur. A radiological union took an average of 9 weeks. At the time of the final evaluation, the mean Constant score for post traumatic fractures was 65.78/100.The median Visual Analogue Score (interquartile range) was 0.8. **Conclusion:** For the treatment of complex humeral fractures, including long segment periarticular fractures, segmental fractures involving the proximal humerus and shaft, periprosthetic fractures around well-fixed humeral resurfacing prosthesis, and pathological fractures, the long PHILOS plate fixation offers dependable, secure fixation.

KEYWORDS

INTRODUCTION

Improvements in implant design have led to a major improvement in the surgical fixing of proximal humeral fractures. However, treating fractures that extend into the humeral diaphysis, fractures surrounding a well-fixed prosthesis, and fractures in pathological bone continue to be difficult.Tiny and osteoporotic proximal pieces of proximal humeral periarticular fractures provide a special problem since sufficient fixing may not be achieved. The therapy of periprosthetic fractures in well-fixed humeral prostheses has been advised, however reduced presence of bone may not offer enough purchase for internal fixation [1].To prevent a stress riser, fractures in diseased bone require repair over a long segment.The traditional method of treating pathological fractures of the humeral diaphysis has been closed intramedullary nailing [2,3]. However, the soft, diseased bone may not provide interlocking screws a firm grip.Long plates cannot be applied without extensive soft tissue dissection, and the humerus's uneven bony surfaces have discouraged surgeons from utilising them.Pre-contoured locking plates have overcome these limits of traditional plating, thanks to their angular stability and non-intimate biological fixing [4,5]. The proximal humeral internal locking system (PHILOS) plate created to reduce soft tissue dissection and enhance screw fixation in osteoporotic bone. The plate enables for several proximal locking screws to be inserted in various directions and is pre-contoured for the proximal humerus.Additionally, the smaller holes enable the passage of sutures needed for the reattachment of tuberosities to the rotator cuffs that correspond to them. This makes proximal fixation more secure. Standard or locking screws can be inserted into the shaft's screw holes. This protects the periosteal blood flow to the bone since pressing of the plate to the bone is not necessary. The possibility of loss of reduction is decreased by ensuring axial and angular stability by locking the screws into the plate.Although the PHILOS plate has been utilised and researched extensively in proximal humeral fractures, no studies have been published in the concerns of the use of the long PHILOS plate. In 35 cases of post-traumatic fractures of the proximal humerus and humeral shaft, satisfactory outcomes were reported in a recent publication in the Chinese literature [6].

Conservative treatment is often linked to malunion,nonunion and avascular necrosis resulting in a painful functional range of movements.The surgical techniques used are transosseous suture fixation, percutaneous fixation by closed reduction, fixation by open reduction and conventional plates applications, proximal humerus inerlocking plate fixation and hemiarthroplasty which have shown to have varied results [7-10]. Proximal humeral internal locking system (PHILOS) plates are fixed angled devices which provide good stability [11-13]. These plates relieve the risk of malunion and also preserve the supply of blood to the bone.

MATERIAL AND METHODOLOGY

The current study is an analysis of a retrospective case series done at a tertiary hospital with a concluding observation. Between 2020 and 2022, our facility treated a total of 18 patients with open reduction and internal fixation utilising the long proximal humeral internal locking system (PHILOS) plate. Patients were taken to a separate follow-up clinic where all case notes were examined.Long segment periarticular fractures reaching into the diaphysis (16 of 18) and pathological fractures (2 of 18) were the types of fractures treated. A long PHILOS plate was utilised to stabilise a lengthy section following a failed internal fixation. Giant cell tumor-related proximal humeral fractures were the pathological fractures.Additionally, each patient exhibited a proximal metaphyseal lesion.

Patients underwent clinical and radiological evaluations. A visual analogue scale was used to measure their unresolved suffering. Constant Shoulder Scoring system was used to evaluate the functional result. This covers the evaluation of discomfort, everyday activities (such as arm placement, work, sleep, and recreation), range of motion, and power.Utilising a Nottingham Mecmesin Myometer, power was evaluated.With no attempt to standardise for age or gender, the Constant score was expressed as the original score. Any issues and further processes, such as the removal of metal work, were noted.

Procedure:

Open reduction and internal fixation of three and four component fractures were performed using an extended deltopectoral technique. A key marker for identifying fracture pieces is the biceps long head. The larger tuberosity is often displaced from the shaft, from the head, and from the smaller tuberosity as a distinct fragment in a four-part fracture. The bicipital groove is located posterior to the greater tuberosity fracture line. First, K-wire was used to decrease and stabilise the larger tuberosity relative to the head and smaller tuberosity. The four-part fracture has now been reduced to two parts. Bone clamps were used to manually reduce and hold the shaft. With the locking plate on the lateral side, the decreased head, greater tuberosity, and lesser tuberosity are joined to the shaft.K wires were first used to secure the plate. Under an image intensifier, reduction was measured. The long head of the biceps tendon was spared by performing definitive fixation with a proximal humerus locking plate that was positioned at least 5 mm distal to the proximal end of greater tuberosity followed by a minimum 2 mm gap to posterior of bicipital groove. A 2-0 Vicryl transosseous suture was used to help keep the reduction in place. Under an image intensifier, the plate's position and reduction were verified. The plate was fastened using many 3.5mm locking screws in the head and three to four cortical/locking screws distally. Rechecked plate position and reduction under the picture intensifier.

Drain is present, and the wound is cleaned and closed in layers.

Following surgery, a sling was used for 4 weeks, enabling the shoulder to be stablized. Four weeks after surgery, check radiographs were taken, and the patients were then sent to physiotherapy services for complete active, assisted, and passive mobilisation followed by a plan for muscle strengthening. After the wound had healed, external beam radiation was administered to all pathological fractures.At four weeks, three months, six months, and twelve months-or until full radiological healing of the fracture-patients were followed up in the clinic.The Constant score was used to evaluate the shoulder's function.Trabecular continuity and the absence of discomfort at the fracture site were indicators that the fracture had healed.

RESULTS:
In all, 18 of the patients were reachable for follow-up.The typical follow-up period was 12 months. There were 4 women and 14 males, ranging in age from 19 to 86, for a mean of 52. The typical radiological union took nine weeks. Malunion or loss of fixation were not common. In the to humeral head, there was no evidence of screw penetration.At our most recent follow-up, avascular necrosis was not radiologically nor clinically suspected.

At final evaluation, the mean Constant score for posttraumatic fractures was 65.78/100 (interquartile range: 64-100).Additionally, there were five patients (27.8%) who had excellent outcomes, six (33.3%) who had good results, two (11.1%) who had moderate results, and five (27.8%) who had poor results.

Two patients reported minor discomfort, but none of them reported limitations in activities of daily life or employment.The average Visual AnalogueScore ranged from 0.8 (Range 0-3)

On the themyometer, the average power was 15 with a wide range of 8 to 25 (4 kg to 13 kg).On comparison with the other side, the largest difference was five points (2.5 kg). Only one patient complained of shoulder weakness. Her preoperative radial nerve palsy required extensive rehabilitation.Two of our patients suffered fractures that were pathological. A pathological fracture of the proximal humerus and pathological involvement of the proximal half of the humerus shaft were found in an 81-year-old man receiving therapy for a giant cell tumour. He was open reduced and plated on a lengthy PHILOS plate. An 86-year-old woman was diagnosed with a painful pathological proximal humerus fracture and a giant cell tumour.The fractures in both cases were reported as "healed and painless." Implant removal was necessary for two individuals.

DISCUSSION:
In difficult fractures involving the proximal humerus and shaft that are not susceptible to conventional kinds of fixing, the current study demonstrates that the long PHILOS plate offers excellent fixation throughout a long stretch. We believe that the proximal fracture fragment is the fixation's weakest link. With locking screws and suture holes for fixing tuberosities and inserting a rotator cuff, the long PHILOS plate offers a stable attachment of the proximal fragment. Combinations of locking or non-locking screws are used to achieve the distal fixation.

The locking plate may be placed to irregular bony shapes with little soft tissue incision since it is independent of the friction between the bone implant contacts.The violation of the anterior part of deltoid insertion has been a problem with long lateral humeral plate fixation. The danger of fracture through these holes may also rise with linear screw orientation. Helical plate fixation has been described for the fixing of long segment proximal humerus fractures in order to get around these issues. These research [14,15] have primarily used cadavers or biomechanical methods. In 10 patients, Yang described his experience with helical plate fixation [16].

Additionally, the forces created during contouring may have an impact on the plate's fatigue characteristics. The musculocutaneous nerve is in danger during the insertion of the anterior segment of the helical plate, cadaveric dissections have demonstrated. According to anatomical research, the brachialis and the brachialis fascia are continuous with the deltoid insertion anteriorly, the lateral intermuscular septum posteriorly, and the deltoid insertion itself [17]. Therefore, if these linkages are intact, elevation of the deltoid insertion may not cause a significant loss of deltoid function.The humerus has the second-highest rate of metastatic disease involvement (9.6%) among the long bones [3]. Our knowledge of the long PHILOS plate fixation in pathological fractures is limited. Our preferred technique for diaphyseal pathological fractures is closed nailing. However, due to inadequate tissue, proximal and distal lesions are not susceptible to nailing.

CONCLUSION:
As the sole available choice for severe fractures, we believe that long PHILOS is unquestionably a less morbid treatment than massive endoprosthetic replacements.It has been discussed how to treat periprosthetic fractures around stemmed humeral components [1]. Literature on the treatment of humeral fractures in the presence of shoulder resurfacing is, however, scarce. In our series, we were able to preserve the humeral resurfacings without sacrificing their functionality.

Figure 1:Pre operative spiral type fracture with Metaphyseal-Diaphyseal involvement.

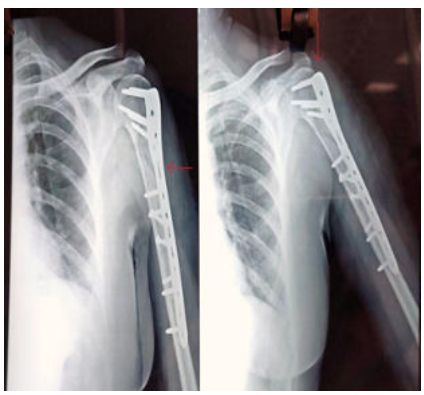

Figure 2: Post operative image showing fracture fixation with long PHILOS plate.

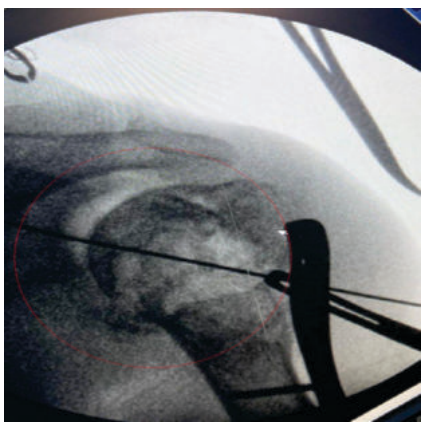

Figure 3: Intra operative radiographic image showing Pathological fracture fixation with long PHILOS

Figure 4 :Post operative clinical image showing range of movements at 12 months follow up of fracture fixation with long PHILOS.

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