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To evaluate intraoperative technical difficulties during PHILOS plating for treatment of displaced proximal humerus fractures

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Abstract
Background: This is a Prospective study carried out at Department of Orthopaedics & traumatology, Amaltas Institute of Medical Sciences, Dewas, M.P. in 30 patients of proximal humerus fracture were attended in casualty and OPD and were admitted.
Result: Most of the injuries caused by was road traffic accident. In our study, patients with two part fracture had better functional outcome as compared to patients with three and four part fracture.
Conclusion: The internal fixation with the PHILOS plate seems to be a reliable option in the operative treatment of upper end humeral fractures, especially in osteoporotic bone. It allows secure fracture fixation and quick shoulder mobilization. PHILOS plates are pre-shaped & pre-contoured plates to match proximal humeral anatomy with multiple proximal locking screw placement options has made fixation of complex fractures easy. It provides rigid fixation, enhanced axial & angular stability & allows early mobilization of the shoulder without compromising fracture union.

Keywords: Intraoperative, PHILOS, plating & proximal humerus fracture

Introduction
Proximal humerus fractures are the result of an indirect force such as a fall onto the outstretched arm rather than a direct blow to the shoulder. The origin of a proximal humerus fracture is due to a combination of factors, which include relatively osteoporotic bone (In the elderly), direct contact against the adjacent acromion and glenoid rim, and forceful pull of the rotator cuff muscles and extrinsic muscles such as the pectoralis major [1].
Hippocrates first documented a proximal humerus fracture in 460 BC and treated it with traction. In 1869, to improve treatment, Krocher classified fractures of the proximal humerus. In 1934, Codman developed a classification that divided the proximal humerus into 4 parts, based on epiphyseal lines. In 1970, Neer‘s classification expanded on the 4-part concept and included anatomical, biomechanical, and treatment principles, providing clinicians with a useful framework to diagnose and treat patients with these fractures.
The development of “locking plates” for the proximal extremity of the humerus has brought a new perspective for treatment of fractures, especially for fractures in three or four parts, epiphyseal fractures in young patients and fractures in bones that have become fragile, for which there is greater technical difficulty in fixation [2]. The theory of the mechanical advantage of “locking plates” is that sufficient stability is achieved without bone-plate contact, which would be necessary if conventional plates were used [3]. This stability is provided by means of locking screws, thereby leading to better results in bones that are porous [4].

Material & Method
This is a Prospective study carried out at Department of Orthopaedics & traumatology, Amaltas Institute of Medical Sciences, Dewas, M.P. from September 2013 to October 2015. 30 patients of proximal humerus fracture were attended in casualty and OPD and were admitted. After the patient with proximal humerus was admitted to the hospital, all history and clinical details were recorded in history sheet according to planned proforma. Radiographic evaluation was done and fractures were classified according to Neer’s

classification. Patients were shifted to the ward after initial temporary immobilization with universal shoulder immobilizer or POP U slab. All routine investigations were done with complete medical and anaesthetic fitness for surgery. All patients were treated by open reduction and internal fixation by PHILOS plating.

The inclusion criteria of the study

1. Patients presenting with displaced proximal humerus fractures two, three and four part according to Neer's classification.
2. All skeletally matured patients aged 18 years and above.
3. Compound fractures of proximal humerus grade I, II according to Gustilo- Anderson grading.
4. Patients presenting with displaced proximal humerus fractures with dislocation of shoulder joint.

The exclusion criteria of the study

1. One part fracture according to Neer's classification.
2. Fractures in pediatric age group.
3. Pathological fractures.
4. Polytrauma patients with expected delay in primary and immediate fixation.
5. Compound fractures of humerus with Grade III according to Gustilo-Anderson grading.
6. Old, un-united fractures of humerus.
7. Patients with uncontrolled diabetes, patients on chronic steroid therapy and Immuno-compromised patients.

Results

Table 1: Mode of trauma most of the injuries caused by was road traffic accident.

Mode of Trauma	Number of Cases	Percentage
RTA`	06	20%
Fall	23	77%
Assault	01	3%

Table 2: Average constant score according to F racture type

Fracture type	No of patients	Excellent (86-100)	Good (71-85)	Moderate (56-70)	Poor (<56)	Avg. constant score
Two part	17	07	08	02	00	77.52
Three part	09	00	04	04	01	70.7
Four part	04	00	01	02	01	65.5

In our study, patients with two part fracture had better functional outcome as compared to patients with three and four part fracture.

PATIENT-1

Fig 1: Pre-Operative X-ray (AP & Lateral)

Fig 2: Post OP X-ray

Discussion

More recently newer implants such as the plan tan humerus fixator plate, Polaris nail and the PHILOS plate have been used for fixation of proximal humeral fractures. In our study we used PHILOS plate in the management of displaced proximal humeral fractures. The PHILOS plate combines the principles of fixation with a conventional plate with those of locking screws. The plate is pre-shaped and pre-contoured for the proximal humerus. The benefits of this implant are that it gives enhanced purchase in osteopenic bone, there is no loss of reduction or varus/valgus angulations, the locking screws into the plate provide angular and axial stability of the construct and it is a low-profile plate. We have been able to produce the early results with regard to functional outcome following use of locking plates (PHILOS). Plate can also be used with minimally invasive technique. It permits indirect fracture reduction thus lowering the possibility of AVN and by reducing the need of immobilization time helps diminishing the possibility of frozen shoulder [5, 6].

The only technically demanding part of the operation is to obtain proper reduction of the humerus for accurate plate positioning. The other demanding aspect is to avoid placing the plate too proximally on the humerus with resulting impingement of the top of the plate on the acromion. This can be avoided by using a K wire inserted through a hole at the top of the plate, which should line up with the tip of the greater tuberosity. Image intensifier is necessary to check correct positioning and placement of the implant and screws [7].

Conclusion

The internal fixation with the PHILOS plate seems to be a reliable option in the operative treatment of upper end humeral fractures, especially in osteoporotic bone. It allows secure fracture fixation and quick shoulder mobilization. PHILOS plates are pre-shaped & pre-contoured plates to match proximal humeral anatomy with multiple proximal locking screw placement options has made fixation of complex fractures easy. It provides rigid fixation, enhanced axial & angular stability & allows early mobilization of the shoulder without compromising fracture union.

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