



## TO OBSERVE AND EVALUATE PROSPECTIVELY FUNCTIONAL OUTCOME AND COMPLICATIONS OF PHILOS (PROXIMAL HUMERUS INTERNAL LOCKING SYSTEM) PLATE IN PROXIMAL HUMERUS FRACTURES

### Orthopaedics

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### ABSTRACT

**Background** -Most of proximal humerus fractures are dealt with either traditional conservative approach, percutaneous pinning, or open reduction and fixation with non-locking plates resulting in poor outcomes in terms of functional mobility. Alternatively PHILOS (Proximal Humeral Internal Locking system) plate application through either MIPPO or deltopectoral approach has been emerged as an excellent module as also advocated by many authors to deal with Neer's type 2, type 3 & type 4 proximal humerus fractures.

**AIM** -To evaluate functional outcome and complications of proximal humerus fracture fixation by PHILOS (Proximal Humeral Internal Locking system) plate through either MIPPO or deltopectoral approach.

**Materials & Methods** – A complete of 25 patients of closed fracture proximal humerus underwent management through PHILOS plate fixation by either MIPPO or deltopectoral approach. Average age of patient was 40yrs. Regular follow up and physiotherapy sessions were carried out. Average period of follow up was 12 months.

**Results** – Out of 25 patients 24 were finally followed up till 1 year, one patient died in between while another one undergoes implant removal due to persistent infection. From these 24, 8 patients has excellent functional outcome, 6 has good, 4 has fair outcome and 6 patient has poor results in terms of

**Conclusion** – Based on present study and data analysis we conclude that proximal humerus fractures treated through PHILOS plate by either MIPPO or deltopectoral approach results in excellent functional outcome which is evident from ability to early start various day to day activities like performing personal hygiene, combing hairs, putting shirt, shoes themselves and starts eating themselves by 3<sup>rd</sup> to 4<sup>th</sup> week postoperatively. Unlike traditional approach like conservative management, percutaneous pinning or fixation by non-locking plate, it maintains adequate rotator cuff mechanism, does minimal soft tissue damage, minimal post op pain, promote early wound healing and avoid post-operative shoulder stiffness.

### KEYWORDS

Proximal humerus fracture, PHILOS (The Proximal Humeral Internal Locking system), Murley's Constant score, DASH Score (Disability of Arm, Shoulder and hand score), Deltopectoral approach, Neer's classification & types, Locking plate.

### INTRODUCTION-

Proximal humerus fractures are considered to be among the most challenging surgery which requires experienced surgical hands. The surgery is technically demanding which requires adequate exposure along with proper fracture reduction and stable fixation of proximal humerus articular surface is important for surgery. Traditional treatment techniques include open reduction and internal fixation with proximal humeral plates, hemiarthroplasty, and percutaneous or minimally invasive techniques such as pinning, screw osteosynthesis, and the use of intramedullary nails. Loosening or failure of the implant and non-union are possible complications of surgery in humeral fractures. There is still no treatment that can be the golden standard in this fractures. To improve the overall outcome of management & to decrease the complication rates of proximal humeral fractures treatment, AO/ASIF group emerged with new PHILOS (The Proximal Humeral Internal Locking Osteosynthesis) plate. It is an internal fixation system that enables angled stabilization with multiple interlocking screws. However, there are many prospective studies available that evaluate the results of this technique and advocated over the treatment-related complications.

**MATERIAL & METHOD** – An observational prospective study was carried out in department of orthopaedics GRMC & JAH hospital group, Gwalior (M.P.). Total of 25 cases with proximal humerus fracture were being selected randomly with age group (18-60) yr and study was carried out between Jan 2019 to Jan 2020.

### AIMS & OBJECTIVES–

To determine adequacy of exposure and functional outcome in terms of soft tissue dissection and shoulder functionality for fixation of various types of proximal humerus fractures. Inclusion criteria includes closed displaced proximal humerus fractures in age group (18-60yr) Neer's

classification 2part type, 3 part type & 4 part type fractures. Exclusion criteria includes compound, un-displaced (Neer's type 1), old mal-united, Non-union, pathological fractures & patients with other comorbidities.

### METHODOLOGY–

Procedure of obtaining sample: Samples are selected randomly based on OPD and Trauma Centre admissions in GRMC Gwalior M.P. (After taking prior informed consent).

### Operative Procedure:

After a detailed history and through clinical examination, routine investigations and PAC fit patient is taken for operative procedure. Surgery was performed in supine position on a radiolucent table under general anaesthesia using the either MIPPO or anterior deltopectoral approach. After making incision of 8-10 cm deltopectoral groove is identified and cephalic vein was retracted laterally or ligated to prevent inadvertent injury during retractor placement. The greater and lesser tuberosity fragments were tagged with non-absorbable sutures. The tuberosity fragments were reduced to the lateral cortex of the shaft. Reduction of the tuberosities may indirectly reduce the head fragment; alternatively, to restore the medial calcar of the proximal humerus, an elevator was inserted to disimpact the head fragment. If required, the fracture was reduced and provisionally fixed into position using 1.5 mm Kirschner wires, sutures was passed through the rotator cuff and attached to the plate through the suture eyelets before permanent fixation with the contoured proximal humerus locking plate will be performed. On the anteroposterior view, the plate was ideally placed 8-10 mm distal to the superior tip of the greater tuberosity; from the lateral view, the plate was centred against the lateral aspect of the greater tuberosity. An adequate gap was left between the plate and the biceps tendon to prevent disruption of the anterior humeral circumflex

artery or entrapment of the tendon. The initial screw was then placed in the elongated hole in the humeral shaft (in classic 3 or 4 part fractures), so that the height of the plate could be adjusted. After achieving the appropriate fracture reduction and plate position, the locked screws were inserted into the humeral head using the insertion guide and sleeve assembly. At least three distal shaft screws were inserted. A final fluoroscopic image was taken to ensure adequate reduction and proper medical support. Rotator cuff, capsule and subscapularis muscle tears/avulsions were repaired meticulously. The wound was closed in layers and a suction drain will be inserted. Active assisted and passive exercises were used during the first two weeks, and 3 weeks later active motion was started and followed till union achieved or till 1yr. Similarly in MIPPO Technique two small incision of 1-2cm are given proximally and distally and then plate is glided over anterolateral surface with acceptable reduction and then fixed with minimum soft tissue damage.



CASE NUMBER -5/28, POOJA D/O POORAN SINGH, A/S – 24YR F, R/O-MORENAM.P.

DATE OF TRAUMA-08/10/18, PRE OP IMAGES, INTRAOP C-ARM IMAGES

FINAL POST OP IMAGES &, CLINICAL IMAGES AFTER 1 YEAR FOLLOW UP.



CASE NO 11/28 - SHER SINGH S/O JHABBAR SINGH, A/S 43YR M, R/O MURAR, GWALIOR M.P.

DATE OF TRAUMA-11/01/19, PRE OP IMAGES, IMMEDIATE POST OP IMAGES, FINAL POST

OPIIMAGES & CLINICAL INTRAOPIMAGES.

**RESULTS-**

We have prospectively evaluated 25 cases of fresh closed proximal humerus fractures of which 16 were males and rest 9 were females. Average age was taken to be 40 years with a range of 18 to 60 years. Based Neers proximal humerus fracture classification system, 50% of fracture operated were of Grade 3, 30% grade 4 & 20% were of grade 2. . All of 25 patients were operated for proximal humerus fracture with pre-contoured PHILOS plating either MIPPO or deltopectoral approach, of which one gets complicated with persistent Infection resulting in implant removal while another one died in between (during follow up) due to RTA. Delayed wound healing in 2 patients seen which got healed subsequently with regular dry dressings.

The mean period for follow-up was 1 year (range 10 -14 months). All fractures healed in a mean time (range, 16 to 20 weeks).Physiotherapy was started by 5<sup>th</sup> to 6<sup>th</sup> day postoperatively in most of the patients. Average time of surgery was calculated to be 120 minutes (range from 90 -180 minutes).Similarly 75% of patients had injury following an RTA while 25% sustained injury following fall from height.

In our study out of 25 patients treated, 24 (96%) patients were finally follow up till 1 year. 1 patient died in between due to RTA and 1 patient undergoes implant removal due to persistent infection. From 24 follow up, 8 (32%) had excellent functional outcome, 6 (24%) had good results, 04 (16%) had fair outcome and 6 (24%) patient had poor results in terms of postoperative complications and functional assessment measured through Constant Murley score & DASH scoring system.

**DISCUSSION-**

Management of comminuted and displaced proximal humeral fractures, especially in osteoporotic bone, has been a complex and challenging problem. Traditional treatment techniques include open reduction and internal fixation with proximal humeral simple plates, hemiarthroplasty, and percutaneous or minimally invasive techniques such as pinning, screw osteosynthesis, and the use of intramedullary nails. Although number of management techniques are available but all of them are associated with numerous complications like Non-union ,infection, malreduction,plate pullout /implant failure ,AVN,Frozen shoulder,rotatar cuff insufficiency etc. To overcome this PHILOS plate was developed by AO/ASIF group. The PHILOS plate is locked compression plate that 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 [20]. Furthermore, it is a low profile plate with the proximal fixed angled screws thus making it a fixating device with a high stability in osteoporotic bones.

In our study we have achieved a mean Constant Murley score of 68.31 .However our results were somehow different to those reported in the western literature. Various studies had reported varying results. Thyagarajan et al [17] in their study on 30 patients showed an overall average Constant score of 57.5. The mean age in this series was 58 years (range 19-92 years) and fractures were Neer's 2-part, 3-part, and 4-part fractures [20]. Kettler et al [11] reported a Constant-Murley score between 52 to 72 points after ORIF with the PHILOS plate. Baron JA [08] reached a mean Constant-Murley score of 55 points in these specific fracture types, which was lower than for fractures without dislocation. These results match ours, knowing that the Constant-Murley score of different studies are difficult to compare. However, the systematic review by Thanasis et al [22] reported an overall Constant score of 74.3. and most of other studies have reported good functional outcomes and recommended the use of locking plates for proximal humerus fractures especially in elderly patients with poor bone quality. This leads us to believe that application of locking plate technology for proximal humerus fractures has a steep learning curve and appropriate surgical technique is very important for achieve good functional outcome. Number of complications were also found in our study in early cases but later on with surgeon's experience, further less complications were encountered. The most common complications included varus malunion, AVN, screw perforation of the humeral head into the joint, subacromial impingement, and infection.

**CONCLUSION-**

Based on observation of present study and data analysis we can conclude that proximal humerus fractures which were treated by

PHILOS plate through either MIPPO or deltopectoral approach has resulted in an excellent improvement in functional outcome of shoulder which was well evident from the patients ability to early start various day to day activities like combing hairs, performing personal hygiene, putting shirt and shoes themselves and started eating by the first week of surgery itself. Open reduction and internal fixation of proximal humerus fractures by PHILOS plate provide adequate exposure of fracture site with no adverse effect on rotator cuff muscle strength & function, minimal post op pain, and early better healing of wound, all of which finally helps in early initiation of shoulder mobility. In comparison to other available approaches PHILOS plating in management of Neer's 2part, 3part & 4part proximal humerus fracture stands out as the most effective treatment modality in terms of functional outcomes & minimum complications. It is also evident by other studies except in few cases with comminuted fractures in highly osteoporotic bones.

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