Surgical Treatment of the Displaced Proximal Humeral Fractures in Adults with Philos Plate

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Abstract

Aim: To evaluate the treatment outcome of Philos plate fixation for displaced proximal humeral fractures in 17 patients.

Methods: This was a prospective study with 17 patients, 11 women, 6 men with average age 62yr having displaced proximal humeral fractures fixed with Philos plate. All the fractures were closed and no associated injuries, classified as 2 part (n=12), 3 part (n=3), 4 part (n=2) according to Neer classification. All patients were evaluated clinically, functionally and radiologically using the Constant Shoulder Score.

Results: Patients were followed up for 6 to 24 months. All the fractures healed except one which was four part fracture in 65yr woman. The fracture was in varus position and screw penetration of humeral head at six week. Revision surgery was done and eventually fracture united.

Conclusion: Philos plate fixation is a good stable construct with minimal metal work problems and permit early movement.

Key Words: Bone plate, screw, humeral fractures.

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Introduction

Proximal humeral fracture may be defined as fractures occurring at proximal to surgical neck of humerus.1 It is the commonest fracture of shoulder girdle in adult.2 Proximal humeral fractures composed 4% of all fractures and nearly one half of all humeral fractures.3

There are many options for treating proximal humeral fractures. Minimally displaced proximal humeral stable fractures are being treated conservatively with good results.4 Displaced and unstable fractures are difficult to manage and have a high morbidity. The ultimate goal of treatment is to have a painless stable functional shoulder. Different methods are described namely Kirshner wire fixation, suture fixation, External fixation, Tension Band Wiring, Rush nail fixation, intramedullary fixation and prosthetic replacement.5-11

Locking plate fixation provides angular and axial stability minimizes risks of screw toggle and pull out as well as loss of reduction. Divergent or convergent locked screw improves the pull out resistance of the whole construct.11 Locking plate fails at greater load than nonlocking plates.12

Philos (Proximal Humeral Locking system) plates are preshaped and precontoured. Locking compression plates with an aiming device for insertion of the locking screw and positioning of the plate to prevent impingement. We evaluate the treatment outcome of Philos plate fixation for displaced proximal humeral fractures in adults.

Materials and Methods

This was a prospective study carried out at Shaheed Suhrawardy Medical College Hospital, Dhaka from January 2015 to December 2017. There were 17 patients out of which 11 women and 6 men with average age 62yrs. All patients having displaced proximal humeral fractures were fixed with Philos plate. Fractures were due to fall on ground (n=10) and road traffic accidents (n=7). All the fractures were closed and have no associated injury. All fractures
were classified as 2 part (n=12), 3 part (n=3) and 4 part (n=2) according to Neer classification.\textsuperscript{13}

A deltopectoral incision was made with patient in supine position. Fractures were reduced and temporarily fixed with Kirshner wires and sutures. Reduction was checked under image intensifier. Philos plate was applied with at least 4 locking proximal screws and 4 nonlocking distal screws. Passive assisted movement were started on day-1 followed by active assisted exercise after 3 weeks. All the patients were assessed clinically, functionally radiologically using the Constant Shoulder Score.\textsuperscript{14}

\section*{Results}

Patients were followed up for 6 to 24 months (mean 13 months). All the fractures were united except one in 65 yr woman with a 4 part fracture. There was screw penetration of humeral head at 6 weeks. Eventually she developed nonunion and revision surgery was done. Ultimately fracture united. There was no wound infection. The mean Constant Shoulder Score was 68 with a range of 40 to 85. 7 patients having score more than 75, Seven patients having were between 50 to 75, 3 patients below 50. Constant scores in 2part, 3part and 4part fractures were compared in Table.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
Constant Score & No.(\%) of patients & & \\
\hline
2-part fracture & 3-part fracture & 4-part fracture & \\
(n-12) & (n-3) & (n-2) & \\
\hline
Mean(range) & 75(50-85) & 66(40-84) & 45(41-49) & \\
>75 & 6(50) & 1(33) & 0(0) & \\
50-75 & 6(50) & 1(33) & 0(0) & \\
<50 & 0(0) & 1(33) & 2(100) & \\
\hline
\end{tabular}
\caption{Comparism of Constant Scores}
\end{table}

\section*{Discussion}

Non-operative treatment for displaced proximal humeral fractures is still advocated, patient satisfaction is high ,especially in those with 2 part fractures,\textsuperscript{15} in elderly patients with low functional demand even with poor reduction on radiograph and low Constant score.\textsuperscript{16} Surgical treatment with minimal soft tissues stripping enables satisfactory reduction, stable fixation and early mobilization but the technical difficulties including poor bone stock, minimum subchondral bone in humeral head and excessive soft damage. The most common risks include screw cut out back out, penetration of humeral head, loss of reduction, avascular humeral head necrosis and subacromial impingement.

Plant Tan plate fixation with 2 cancellous screws resulted in a 100% failure rate in elderly osteoporotic patients.\textsuperscript{17} Fixation with 2 one-third tubular plates resulted in a complication rate of 12% including loosening of implants, avascular necrosis, subchondral impingement, frozen shoulder and fracture redisplacement.\textsuperscript{18} Tension band wiring and nonoperative treatment had similar functional results.\textsuperscript{19} Tension band wiring was superior in 4 part fractures and nonoperative in 3 part fractures.\textsuperscript{19} AO plate fixation had also a high complication rate including deep infection (4/32), impingement necessitating implant removal (5/32) and avascular necrosis(4/32).\textsuperscript{5} Cloverleaf plate fixation achieved good results but a hemiarthroplasty was recommended in elderly patients with poor bone stock.\textsuperscript{20} Although hemiarthroplasty achieved good pain relief, its functional results were unpredictable and its strength poor.\textsuperscript{21,22}

Reverse prosthesis fixation achieved better functional outcome.\textsuperscript{23} Polarus nail fixation yields good results\textsuperscript{8} and used in combine neck and shaft fractures.\textsuperscript{24} But the complication rate was high (proximal screw loosening 3/20, revision surgery 2/20, lateral metaphyseal communition predisposes to implant failure).\textsuperscript{25}

Locking proximal humeral plate fixation achieved acceptable results even in osteoporotic bone but nonunion, implant failure, avascular necrosis of humeral head and revision surgery also have been reported.\textsuperscript{26,27,28,29,30} Angle stabilizing plates fixation were not necessarily associated with good functional outcome.\textsuperscript{29} Caution is needed in cases of medial communition during locking plate fixation.\textsuperscript{31}

Our study, Philos plate fixation provided a stable good construct with minimal metal works problems and enabled early range of motion exercises to achieve acceptable functional results. Nonetheless, the choice of treatment should be based on patient age, functional needs, bone quality, fracture personality and surgeon’s preference. Prospective randomized trials are needed to compare different methods of fixation.

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