

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

Alamgir MHM¹, Hossain SMA², Barua A³, Kader A⁴, Monzer SM⁵, Rahman SMM⁶

Abstract

Conflict of Interest: None

Received: 09-05-2018

Accepted: 16-10-2018

www.banglajol.info/index.php/JSSMC

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.

[J Shaheed Suhrawardy Med Coll 2018; 10(2): 80-82]

DOI: <https://doi.org/10.3329/jssmc.v10i2.41162>

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

1. Dr. M.H.M. Alamgir, Associate Professor, Department of Ortho-surgery, Shaheed Suhrawardy Medical College, Dhaka
2. Dr. S.M. Amir Hossain, Associate Professor, Department of Ortho-surgery, Shaheed Suhrawardy Medical College, Dhaka
3. Dr. Anupam Barua, Junior Consultant, Department of Ortho-surgery, Shaheed Suhrawardy Medical College Hospital, Dhaka
4. Dr. Abdul Kader, Senior Consultant, Department of Ortho-surgery, Shaheed Sheikh Abu Naser Specialized Hospital, Khulna
5. Dr. Salauddin M. Monzer, Medical Officer, Department of Ortho-surgery, Shaheed Suhrawardy Medical College Hospital, Dhaka
6. Dr. S.M. Mosheer Rahman, Assistant Registrar, Department of Ortho-surgery, Shaheed Suhrawardy Medical College Hospital, Dhaka

Correspondence to: Dr. M.H.M. Alamgir, Associate Professor, Department of Ortho-surgery, Shaheed Suhrawardy Medical College, Dhaka

were classified as 2 part (n=12), 3 part (n=3) and 4 part (n=2) according to Neer classification.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 radiological using the Constant Shoulder Score.¹⁴

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.

Table-I

<i>Comparism of Constant Scores</i>			
Constant Score	No.(%) of patients		
	2-part fracture (n-12)	3-partfracture (n-3)	4-part fracture (n-2)
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)

Discussion

Non-operative treatment for displaced proximal humeral fractures is still advocated, patient satisfaction is high, especially in those with 2 part fractures,¹⁵ in elderly patients with low functional demand even with poor reduction on radiograph and low Constant score.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.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.¹⁸ Tension band wiring and nonoperative treatment had similar functional results.¹⁹ Tension band wiring was superior in 4 part fractures and nonoperative in 3 part fractures.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).⁵ Cloverleaf plate fixation achieved good results but a hemiarthroplasty was recommended in elderly patients with poor bone stock.²⁰ Although hemiarthroplasty achieved good pain relief, its functional results were unpredictable and its strength poor.^{21,22}

Reverse prosthesis fixation achieved better functional outcome.²³ Polarus nail fixation yields good results⁸ and used in combine neck and shaft fractures.²⁴ But the complication rate was high (proximal screw loosening 3/20, revision surgery 2/20, lateral metaphyseal comminution predisposes to implant failure).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.^{26,27,28,29,30} Angle stabilizing plates fixation were not necessarily associated with good functional outcome.²⁹ Caution is needed in cases of medial comminution during locking plate fixation.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.

Acknowledgement

I acknowledged all my patients their relatives, all staff of inpatient departments and operation theatre, others who helped me preparing manuscript. I thank my family members especially my wife.

References

1. Kim SH, Szabo RM, Marder RA. Epidemiology of humerus fractures in the United States: Nationwide emergency department sample, 2008. *Arthritis Care Res (Hoboken)*. 2012;64(3):407-414.

2. Ogiwara N, Aoki M, Okamura K, et al. Ender nailing for unstable surgical neck fractures of the humerus in elderly patients. *Clin Orthop Relat Res.* 1996;(330):173–180.
3. Horak J, Nilsson BE. Epidemiology of fracture of the upper end of the humerus. *Clin Orthop Relat Res.* 1975;(112):250–253.
4. Young, TB, Wallace, WA. Conservative treatment of fractures and fracture-dislocations of the upper end of the humerus. *J Bone Joint Surg Br* 1985;67:373–7. en, n.
5. Kristiansen, B, Christensen, SW. Plate fixation of proximal humeral fractures. *Acta Orthop Scand* 1986;57:320–3. Google Scholar, Crossref, Medline
6. Kristiansen, B, Kofoed, H. External fixation of displaced fractures of the proximal humerus. Technique and preliminary results. *J Bone Joint Surg Br* 1987;69:643–6. , Medline
7. Park, MC, Murthi, AM, Roth, NS, Blaine, TA, Levine, WN, Bigliani, LU. Two-part and three-part fractures of the proximal humerus treated with suture fixation. *J Orthop Trauma* 2003;17:319–25. Google Scholar, Crossref, Medline, ISI
8. Rajasekhar, C, Ray, PS, Bhamra, MS. Fixation of proximal humeral fractures with the Polarus nail. *J Shoulder Elbow Surg* 2001;10:7–10. Google Scholar, Crossref, Medline, ISI
9. Robinson, CM, Page, RS, Hill, RM, Sanders, DL, Court-Brown, CM, Wakefield, AE. Primary hemiarthroplasty for treatment of proximal humeral fractures. *J Bone Joint Surg Am* 2003;85:1215–23. Google Scholar, Crossref, Medline, ISI
10. Sadowski, C, Riand, N, Stern, R, Hoffmeyer, P. Fixation of fractures of the proximal humerus with the PlantTan Humerus Fixator Plate: Early experience with a new implant. *J Shoulder Elbow Surg* 2003;12:148–51. Google Scholar, Crossref, Medline, ISI
11. Wagner, M. General principles for the clinical use of the LCP. *Injury* 2003;34(Suppl 2):B31–42. Google Scholar, Crossref, Medline, ISI
12. Walsh, S, Reindl, R, Harvey, E, Berry, G, Beckman, L, Steffen, T. Biomechanical comparison of a unique locking plate versus a standard plate for internal fixation of proximal humerus fractures in a cadaveric model. *Clin Biomech (Bristol, Avon)* 2006;21:1027–31. Google Scholar, Crossref, Medline, ISI
13. Neer, CS. Displaced proximal humeral fractures. I. Classification and evaluation. *J Bone Joint Surg Am* 1970;52:1077–89. Google Scholar, Crossref, Medline, ISI
14. Constant, CR, Murley, AH. A clinical method of functional assessment of the shoulder. *Clin Orthop Relat Res* 1987; 214:160–4. Google Scholar
15. Rasmussen, S, Hvass, I, Dalsgaard, J, Christensen, BS, Holstad, E. Displaced proximal humeral fractures: Results of conservative treatment. *Injury* 1992;23:41–3. Google Scholar, Crossref, Medline, ISI
16. Zyto, K. Non-operative treatment of comminuted fractures of the proximal humerus in elderly patients. *Injury* 1998;29:349–52. Google Scholar, Crossref, Medline, ISI
17. Sadowski, C, Riand, N, Stern, R, Hoffmeyer, P. Fixation of fractures of the proximal humerus with the PlantTan Humerus Fixator Plate: Early experience with a new implant. *J Shoulder Elbow Surg* 2003;12:148–51. Google Scholar, Crossref, Medline, ISI
18. Wanner, GA, Wanner-Schmid, E, Romero, J, Hersche, O, von Smekal, A, Trentz, O. Internal fixation of displaced proximal humeral fractures with two one-third tubular plates. *J Trauma* 2003;54:536–44. Google Scholar, Medline, ISI
19. Ilchmann, T, Ochsner, PE, Wingstrand, H, Jonsson, K. Non-operative treatment versus tension-band osteosynthesis in three- and four-part proximal humeral fractures. A retrospective study of 34 fractures from two different trauma centers. *Int Orthop* 1998;22:316–20. Google Scholar, Crossref, Medline, ISI.
20. Esser, RD. Treatment of three- and four-part fractures of the proximal humerus with a modified cloverleaf plate. *J Orthop Trauma* 1994;8:15–22. Google Scholar, Crossref, Medline, ISI
21. Goldman, RT, Koval, KJ, Cuomo, F, Gallagher, MA, Zuckerman, JD. Functional outcome after humeral head replacement for acute three- and four-part proximal humeral fractures. *J Shoulder Elbow Surg* 1995;4:81–6. Google Scholar, Crossref, Medline
22. Gronhagen, CM, Abbaszadegan, H, Revay, SA, Adolphson, PY. Medium-term results after primary hemiarthroplasty for comminute proximal humerus fractures: A study of 46 patients followed up for an average of 4.4 years. *J Shoulder Elbow Surg* 2007;16:766–73. Google Scholar, Crossref, Medline, ISI
23. Bufquin, T, Hersan, A, Hubert, L, Massin, P. Reverse shoulder arthroplasty for the treatment of three- and four-part fractures of the proximal humerus in the elderly: A prospective review of 43 cases within a short-term follow-up. *J Bone Joint Surg Br* 2007;89:516–20. Google Scholar, Crossref, Medline
24. Adedapo, AO, Ikpeme, JO. The results of internal fixation of three- and four-part proximal humeral fractures with the Polarus nail. *Injury* 2001;32:115–21. Google Scholar, Crossref, Medline, ISI
25. Agel, J, Jones, CB, Sanzone, AG, Camuso, M, Henley, MB. Treatment of proximal humeral fractures with Polarus nail fixation. *J shoulder Elbow Surg* 2004;13:191–5. Google Scholar, Crossref, Medline, ISI
26. Bjorkenheim, JM, Pajarinen, J, Savolainen, V. Internal fixation of proximal humeral fractures with a locking compression plate: A retrospective evaluation of 72 patients followed for a minimum of 1 year. *Acta Orthop Scand* 2004;75:741–5. Google Scholar, Crossref, Medline
27. Koukakis, A, Apostolou, CD, Taneja, T, Korres, DS, Amini, A. Fixation of proximal humerus fractures using the PHILOS plate: Early experience. *Clin Orthop Relat Res* 2006;442:115–20. Google Scholar, Crossref, Medline, ISI
28. Moonot, P, Ashwood, N, Hamlet, M. Early results for treatment of three- and four-part fractures of the proximal humerus using the PHILOS plate system. *J Bone Joint Surg Br* 2007;89:1206–9. Google Scholar, Crossref, Medline
29. Frangen, TM, Muller, EJ, Dudda, M, Arens, S, Muhr, G, Kalicke, T. Proximal humeral fractures in geriatric patients. Is the angle-stable plate osteosynthesis really a breakthrough? *Acta Orthop Belg* 2007;73:571–9. Google Scholar, Medline, ISI
30. Voigt, C, Woltmann, A, Partenheimer, A, Lill, H. Management of complications after angularly stable locking proximal humerus plate fixation [in German]. *Chirurg* 2007;78:40–6. Google Scholar, Crossref, Medline, ISI
31. Gardner, MJ, Weil, Y, Barker, JU, Kelly, BT, Helfet, DL, Lorich, DG. The importance of medial support in locked plating of proximal humerus fractures. *J Orthop Trauma* 2007;21:185–91. Google Scholar, Crossref, Medline, ISI.