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A study of anterior bridge plating via MIPPO (Minimal invasive percutaneous plate osteosynthesis) for diaphysial fracture of humerus

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Abstract

The internal fixation of shaft humerus fractures has evolved in recent years with a change of emphasis from mechanical to biological priorities. One such biological internal fixation is MIPPO (Minimally Invasive Percutaneous Plate Osteosynthesis). Objectives were to document functional and clinical outcomes of anterior bridge plating in diaphyseal humerus fracture, range of motion at elbow and shoulder joint following MIPPO, different complications, and radio-logical parameter like time for fracture union. We have done a observational study of the 30 patients of fracture humerus treated with minimally invasive percutaneous plate Osteosynthesis from April 2017 to April 2018. More than 50% patients are in the age group of 30 to 50 years. Based on AO classification 38% of patients were having simple spiral fracture/A1, 32% of patient was having simple transverse fracture/A3, 24% of patients were having simple oblique fracture/A2, 6% of patients were having complex segmental fracture/C2. 86% of patient's post-operative period went event free. 2 patients were having post-operative radial nerve palsy, 2 patients were having superficial infection of stitch line. On DASH questionnaire 86% of patients are able to perform activities. The UCLA scoring system rated 21 patients (70%) as a excellent result; 07 patients (26%) as a good result and 2 patients (4%) as a fair result. The MAYO Elbow performance scoring system rated 24 patients (80%) as a excellent result; 05 patients (17%) as a good result and 01 patients (3%) as a fair result. 50% of patients were having union within 12 to 16 weeks, and 43% patient having union within 17-20 weeks and 7% of patient having union at 22 weeks. In comparison with non surgical treatment for humerus fracture and with conventional plating MIPPO technique has very good clinical and functional outcome and also there is less chances of failure of the procedure.

Keywords: MIPPO, DASH questionnaire, UCLA score, MAYO elbow performance score

Introduction

Fractures of the humerus account for roughly 3% to 5% of all fractures ^[1]. The treatment of these fractures has always been a much debated topic, as both the conservative and the surgical treatment offer advantages and disadvantages. Various methods of treating proximal, middle and distal humeral shaft fractures have continued to evolve from closed methods, K wire, external fixation, ante-grade and retrograde intramedullary nailing, and conventional plating to minimally invasive osteosynthesis. External fixation generally is reserved for high-energy gunshot wounds, fractures with severe soft-tissue injuries, fractures with distal neurovascular deficit, Fractures with massive contamination and fractures of proximal humerus in old debilitated patients. Plate osteosynthesis remains the gold standard of fixation for humerus fractures. Plating can be used for fractures with proximal and distal extension and for open fractures ^[2]. The internal fixation of fractures has evolved in recent years with a change of emphasis from mechanical to biological priorities. One such biological internal fixation is MIPPO (Minimally Invasive Percutaneous Plate Osteosynthesis). MIPPO has been widely used to treat long bone fractures in recent years because of its technical advantages and satisfactory clinical outcomes. The plate is inserted through a percutaneous approach with separate proximal and distal incisions. This method causes less soft tissue disruption and preserves the fracture hematoma & blood supply to the bone fragments ^[3].

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Aim and objectives

1. To study functional and clinical outcomes of anterior bridge plating in diaphyseal humerus fracture.
2. To document range of motion at elbow and shoulder joint following MIPPO.
3. To document different complications, and radio-logical parameter like time for fracture union and malalignment.

Material and Methods

We have done a observational study of the 30 patients of fracture humerus treated with minimally invasive percutaneous plate Osteosynthesis from April 2017 to April 2018 at Government Medical College, Surat. Clinical, Radiology and Functional outcomes were carried out in all cases.

Inclusion criteria

- Age of 18 years or older
- Mid shaft humerus fracture
- displaced unstable fracture

Exclusion criteria

- Open type III fracture
- Fracture with neurovascular injury
- Segmental fracture with proximal and distal extension
- Pathological fracture
- Patients in which time lag between injury and surgical intervention exceeded 3 weeks

Method of collection of data

- By interview
- By regular monthly follow up till fracture union
- By clinical examination
- By analyzing case papers

Post operative outcome was assessed by DASH, UCLA and MEPS score DASH questionnaire ^[4, 5] involve 30 item disability/symptom scale, question ask about the degree of difficulty in performing different physical activities because of the arm, shoulder or hand problem. Each item has five response options. The scores for all items are then used to calculate scale score ranging from 0 (no disability) to 100 (most severe disability) UCLA Scoring ^[6] system parameters, the parameters of which include:

Pain (10 points), Motion (10 points), Function (10 points), and patients satisfaction (5 points). The score were further divided into excellent (34 to 35 points), good (29 to 30 points), fair (21 to 28 points), and poor (0 to 20 points).

Elbow function was assessed by utilizing the Mayo elbow performance score ^[7] (MEPS), which evaluates patient on a 100 point scale regarding pain (45 points), range of motion (20 points), stability (10 points) and function (25 points). Function of joint is classified as excellent (>90 points), good (75 to 89 points), fair (60 to 74 points), or poor (<59 points).

On admission, patient was first examined thoroughly in Primary survey for vital data and other major associated injuries in head, thorax, abdomen or spine along with local appendicular injuries.

Fracture assessment: Attitude of the limb

Distal neurovascular status: distal pulsations and distal movements

Definitive treatment and operative details Interval between

day of injury and surgery noted, details of implants, duration of Surgery, Anesthesia given etc details noted.

Immediate post operative: Pain, N/V complication, Immobilization: Slab or brace or pouch arm sling, Physiotherapy and Complications

Follow up duration: 10 days and then every month for 6 months

- Clinical and Radiological

Results

It was found that fracture humerus is more common in adult population. More than 50% patients are in the age group of 30 to 50 years and 17% were in age group of more than 50 years of age. Mean age is 41.26 years.

In our study this fracture is more common among the males 29 (96%) than females.

Based on AO classification of diaphyseal humerus fracture, 38% of patients were having simple spiral fracture/A1, 32% of patient was having simple transverse fracture/A3, 24% of patients were having simple oblique fracture/A2, 6% of patients were having complex segmental fracture/C2.

Among the 30 patients in our study, 66% of patients having RTA that is Road Traffic Accident as a mode of injury, 26% patients having history of fall down from surface level or fall from height, while only 3% of patient having history of sustained injury due to assault and railway injury.

Only 13% of patients had other associated injury in form of spinal injury and forearm injury of same side having humerus fracture. Out of 4 patient 2 patient having spine injury (D8 & D12 wedge #) and 2 having forearm bone fracture of same side. Remaining 80% had isolated fracture of diaphyseal humerus.

Total of 60% patients were having fracture on the right side, and 40% on left side.

Table 1: Duration of Surgery

Minutes	No of patients	Percentage
60-70	18	60
71-80	10	33
81-90	2	7

Duration of surgery vary with type of fractures and surgeons skill. Average time of surgery is 70.16 minutes. Longest time taken was 90 minutes in patient having segmental humerus fracture with same side forearm bone fracture. Shortest time was 60 minutes in many cases.

In our study we found that 86% of patient's post-operative period went event free in terms of union, radial nerve palsy and infection. While 2 patients were having post-operative radial nerve palsy, they were counseled for nerve site exploration after explaining the prognosis, patients refused for same and palsy recovered over period of time. Another 2 patients were having superficial infection of stitch line; they were treated with daily dressing and appropriate injectable antibiotics. There was no hardware failure in any patients.

Table 2: DASH Score

Score	Percentage	No.
0-10	86	26
10-20	14	4

DASH questionnaire involve 30 item disability/symptom scale, question ask about the degree of difficulty in

performing different physical activities because of the arm, shoulder or hand problem. Each item has five response options. The scores for all items are then used to calculate scale score ranging from 0(no disability) to 100 (most severe disability). From above data we can interpret that majority of patients are able to perform activities without much difficulty

Table 3: Functional assessment of shoulder joint (UCLA SCORE):

Score	No.	Percentage
34-35 (Excellent)	21	70
29-33 (Good)	7	26
21-28 (Fair)	2	4
0-20 (Poor)	0	0

The UCLA scoring system rated 21 patients (70%) as a excellent result; 07 patients (26%) as a good result and 02 patients (04%) as a fair result.

Table 4: Functional assessment of elbow joint (MAYO SCORE)

Score	No.	Percentage
>90 (Excellent)	24	80
75-89 (Good)	5	17
60-74 (Fair)	1	3
<60 (Poor)	0	0

The MAYO Elbow performance scoring system rated 24 patients (80%) as a excellent result; 05 patients (17%) as a good result and 01 patients (3%) as a fair result.

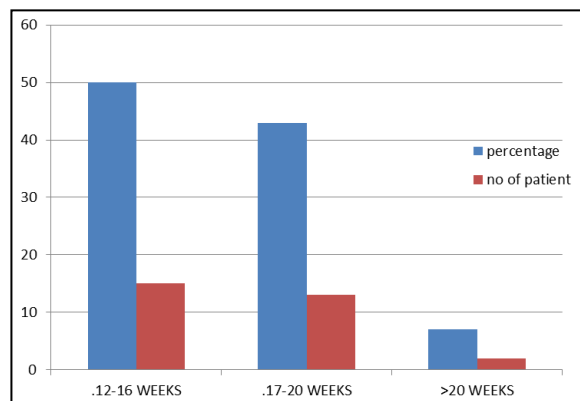


Fig 1: Fracture union time

We found that 50% of patients were having union within 12 to 16 weeks, and 43% patient having union within 17-20 weeks and 7% of patient having union at 22 weeks.

Case Report

Case 1:



Fig 1: Pre Op

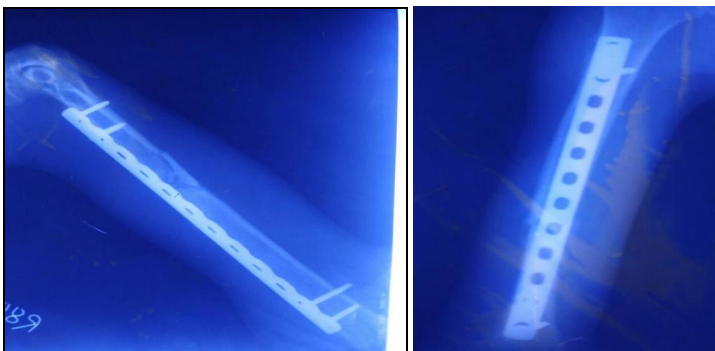


Fig 2: Immediate Post-Op

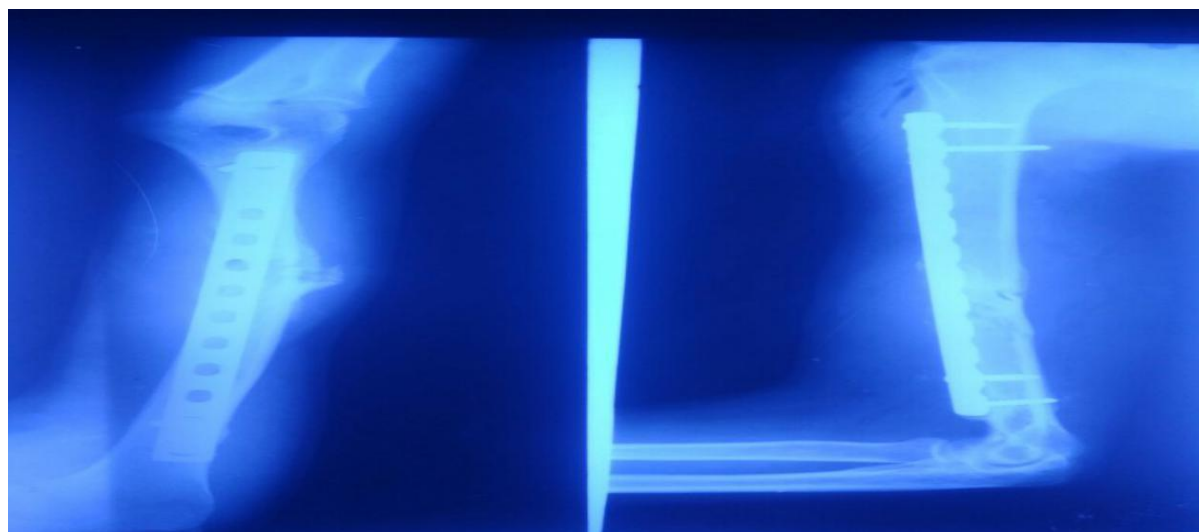
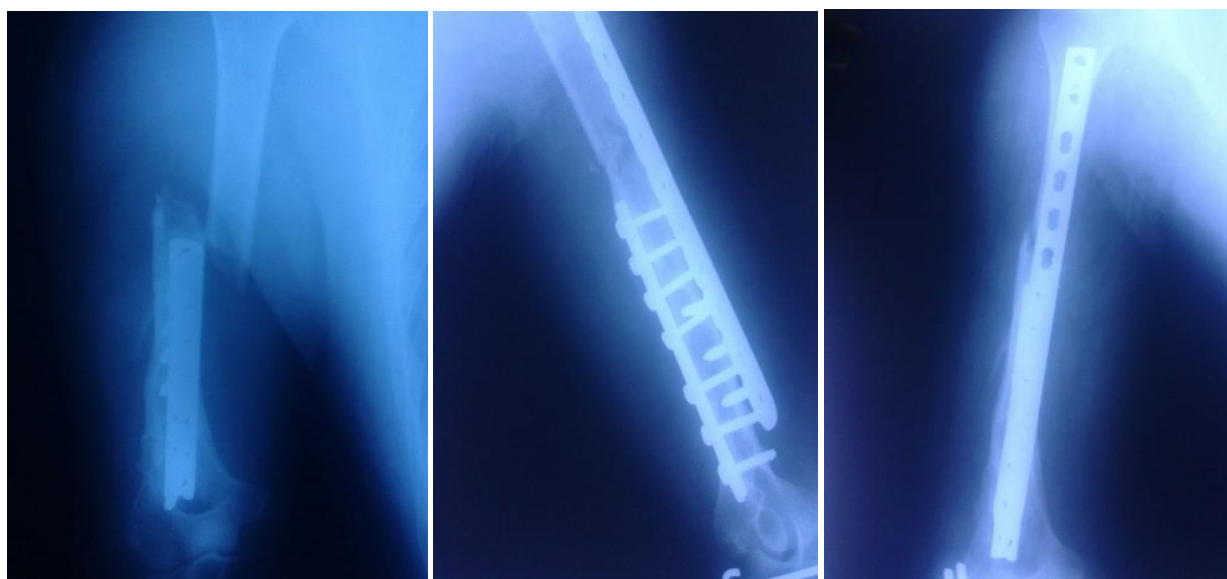


Fig 3: 4 Month Followup



Case 2:



PRE OP

Immediate Post Op



6 Month Follow Up



Post op Shoulder and Elbow range of motion and size of minimal scar mark



Post op Shoulder and Elbow range of motion and size of minimal scar mark

Discussion

In comparison with non-surgical treatment for humerus fracture and with conventional plating, MIPPO technique has very good clinical and functional outcome and also there is less chances of failure of the procedure.

Minimally invasive percutaneous plate osteosynthesis has the advantage as it decreases the soft tissue disruption, fracture hematoma is maintained, periosteal circulation around the fracture fragment is minimally disrupted and thus bone union is promoted and complication such as nonunion are decreased. As it does not involve the exposure of radial nerve chances of radial nerve palsy are reduced.

We conducted a study with 30 patients having diaphyseal fracture humerus treated with MIPPO technique.

Demographic data

Mean age of the present study population was 41.26 years, and more than 50% of patients were in age group 30-50 years of age. Thus we can say that fracture humerus is more common in 4th and 5th decade because of a more active life and so are more exposed to trauma (high velocity esp). In age distribution we found that there is a male preponderance with 96% (29 patient) male and 4% (1 patients) female, which was comparable to study conducted by Zogaib RK *et al.* [8] in 2014 [22 patients were analyzed having male preponderance. males (65%) and females (35%)]. The main mode of injury was due to Road traffic accident seen in 66% (20 patients) of cases. 26% (08 patients) of cases were due to fall down either from surface level or from height. There was 1 case of assault and 1 case of railway injury, which was comparable to similar study conducted by Jayant sharma *et al.* [9] [study of 11 patient with 90% were case of Road traffic accident (RTA) and 10% of assault].

Outcome variables

Duration of surgery- We found that fixation by MIPPO technique takes less time and there is less amount of blood loss. Results of our study show that mean duration of surgery was 70.16 minutes, which was less than the time taken for conventional open plating and minimally invasive plate osteosynthesis 116 minutes and 105 minutes respectively [10] as shown in study conducted by JI Wan Kim *et al.*

Most of patient returns to their normal activity after 16-20 wks. Using DASH (Disability of Arm, Shoulder and Hand Score) score, majority of patients had DASH score similar to opposite limb. According to UCLA scoring, 70% (21 patients)

had excellent outcome, 26% (07patients) had good outcome and 04% (02) had fair outcome. According to MEPS score, 80 % (24 patients) had excellent outcome, 17% (05 patients) had good outcome while 03% (01 patients) had fair outcome.

The mean time for fracture site consolidation in our study was 17 weeks, which was marginally longer than a similar study conducted by An Zhiquan *et al* in 2007 [16.2 weeks union time] [11].

Conclusion

From our study for diaphyseal humerus fracture treated by MIPPO technique we conclude that RTA is the major cause for fracture in our study and the males are the most common victims of the same. With plate osteosynthesis, We found the union rate and the chances of union are more. Early weight lifting and return to previous work can be encouraged.

Limitation: With this we also conclude that we have done study of 30 patients with follow up for 1 year this add to the limitation of our study which we should keep in mind.

References

1. Netter's concise atlas of orthopedic anatomy
2. AO system principle of fracture management
3. <http://teachmeanatomy.info/wp-content/upload/2013-02>
4. Hudak PL, Amadio PC, Bombardier C. Development of an upper extremity outcome measure: the DASH (Disabilities of the arm, shoulder and hand) [corrected]. The Upper Extremity Collaborative Group (UECG). Am J Ind Med. 1996; 29:602-608.
5. Orfale AG, Araujo PMP, Ferraz MB, Natour J. Translation into Brazilian Portuguese, cultural adaptation and evaluation of the reliability of the disabilities of the arm, shoulder and hand questionnaire. Braz J Med Biol Res. 2005; 38:293-302.
6. Amstutz HC, Sew Hoy AL, Clark IC. UCLA Anatomic Total Shoulder Arthroplasty. Clin Orthop Relat Res. 1981; (155):7-20.
7. Journal of orthopaedic trauma: September. 2006; 20(8):S127.
8. Zogaib RK, Morgan S, Belangero PS, Fernandes HJA, Belangero WD, Livani B. Minimal invasive osteosintesis for treatment of diaphyseal humeral shaft fractures. Acta Ortop Bras. [Online]. 2014; 22(2):94-8.
9. Jayant Sharma, Avinash Jain, Pooja Gupta Jain, Prashant Upadhyay. Anterior bridge plating with mini incision MIPO technique for humeral diaphyseal fractures; Indian Journal of orthopaedics surgery. 2015; 1(3):171-175.
10. JI Wan Kim, Chang-Wug Oh, Young-Soo Byun, Jung Jae Kim, Ki Chul Park. Open Plating vs MIPO for simple humeral shaft fracture; J Orthop Trauma. 2015; 29:189-194.
11. An Zhiquan, Zeng Bingfang, Wang Yeming, Zhang Chi, Huang Peiyan. MIPO of humeral Shaft fractures J Orthop Trauma. 2007; 21:628-63.