Volume : 3 | Issue : 8 | Aug 2014 • ISSN No 2277 - 8179

Comparison of Results of Intramedullary Nailing with Plate Osteosynthesis in the Treatment of Fracture Shaft of Humerus

Medical Science

KEYWORDS : Humerus Diaphysis, TEN nail , plate osteosynthsis ,ASES shoulder assessment score

Dr Dhaval R. Modi	M.S. Ortho, Professor and head of unit, Department of orthopaedic surgery, Smt. NHL Municipal Medical College, V.S. Hospital, Ellisbridge, Ahmedabad, Gujarat, India
Dr Rukesh R. Patel	M. S. Ortho, Associate Professor, Department of orthopaedic surgery, Smt. NHL Municipal Medical College, V.S. Hospital, Ellisbridge, Ahmedabad, Gujarat, India
Dr Rushi R Solanki	M. S. Ortho, Senior Resident, Department of orthopaedic surgery, Smt. NHL Municipal Medical College, V.S. Hospital, Ellisbridge, Ahmedabad, Gujarat, India
Dr Manthan Mandalia	3rd Year Reside nt, MS Ortho, Department of orthopaedic surgery, Smt. NHL Municipal Medical College, V.S. Hospital, Ellisbridge, Ahmedabad, Gujarat, India
Dr Ankit Chaudhary	2nd year resident, MS Ortho, Department of orthopaedic surgery, Smt. NHL Municipal Medical College, V.S. Hospital, Ellisbridge, Ahmedabad, Gujarat, India

ABSTRACT

• Aims : To compare the outcomes of intramedullary nails with plate osteosynthesis for the treatment of fracture shaft of humerus.

• Introduction: Humerus is the single long bone of upper arm. There has been considerable controversy about the optimal mode of management for fracture of humerus shaft,as it can be treated both conservatively or operatively. Encouraging results with recent advances in internal fixation techniques and instrumentation have led to an expansion of surgical indications and a dilemma about the procedure of choice between nailing vs. plating.

• Materials and methods: : We have done retrospective study of 30 patients with humerus shaft fractures with follow up of 12 to 20 months in which 14 cases were operated with plate osteosynthesis & 16 cases operated by intramedullary fixation by TEN nails. We included all acute shaft humerus closed as well as open grade-I &II fractures except 1.open grade-III (Gustilo and Anderson fractures classification) 2.delayed union 3.Nonunion 4.fractures other than within 2 cm of surgical neck to 3 cm above olecrenon fossa . Final out comes were assesed according to ASES Score and results of platting and nailing compared.

• Results: Fracture union:50% of patients treated with nails and 75% of patients treated with plates showed evidence of union on or before 16 weeks Functional Outcome: nail group and plating group had similar results at the final follow up. Superficial infection occurred in 2 patients treated with platting.

• Conclusion: We conclude from the study that plating is the preferred method in the majority of fractures of the shaft of the humerus with better preservation of joint function and better stability of the fracture. The long term results of nailing is almost equal to plating, if done with proper technique and followed with early rehabilitation.

INTRODUCTION:

Humerus fractures are one of the commonest fractures occurring in the skeleton. accounting for approximately 3% of all fractures in adults. They occur more commonly in elderly patients, the most serious fractures are often seen in active, middle aged patients. It has been always enigma of management because of numerous muscles attachment and paucity of space for fixing implant in fracture of shaft humerus.

Fractures of the shaft humerus have not been given their share of attention as compared to that of the other injuries in the body. The preferred treatment varies depend on the patient's age and bone quality, the expertise surgical team and the patients expectations. Not much work has been done on the surgical management of shaft humerus fractures. The reason for this appears to be that most of these fractures were doing well even after conservative treatment.

The factors responsible for such an observation are:

1. Even a great degree of malunion and restricted mobility does not produce much disability because,

(a) Shoulder joint being a poly-axial joint, restricted mobility at one plane may be compensated by over mobility at some other plane.
(b) Scapulo-thoracic joint movements compensate for restricted movements at scapulo humeral joint.
(c) Some shortening of the upper limb does not create much disability as compared to that in the lower limb.
(d) Day to day activities can be taken care of by minimal mobility at the shoulder joint.

2. Osteoporotic nature of the bone in this region does not allow stable fixation with the implants to allow early mobilization (aim of the surgery).

The objective of the operative management is to reduce the displacement (usually rotation) of each fragment and hold it in place with an implant.

CLASSIFICATION

Humerus fractures are classified in various ways

1. Site of injury

A. proximal one third
B .middle one third
C. distal one third

2. Fracture line configuration

A. oblique
B transverse
C.spiral
D.comminuted
E.segmental

3. AO classification (image 1)

MATERIALS AND METHODS

We have included 30 patients of fracture involving shaft humerus after applying inclusion and exclusion criteria.

INCLUSION CRITERIA:

· all adults admitted with fracture which requires surgical intervention.

EXCLUSION CRITERIA:

· Fracture in paediatric age group
· open grade
· fractures other than within 2 cm of surgical neck to 3 cm above olecrenon fossa.

SAMPLE SIZE: 30

All the routines investigations were done and after radiographic evaluation according Neer's trauma series consisting

· AP SCAPULAR VIEW
· LATERAL VIEW

IMPLANTS AND INSTRUMENT

Plate osteosynthesis

- AO group recommends a 4.5 mm broad dynamic compres sion plate with a minimum of 6 (preferably 8) cortices both proximal and distal to the humeral shaft fx

Intramedullary nailing

- *Titanium elastic nails were used for this.

OPERATIVE TECHNIQUES

Surgical approach

- Humerus fracture requiring ORIF, best approach by posterior or anterolateral approach .

Posterior approach

- Interval between long and lateral heads of triceps, medial head divided
- Dangers: damage to radial n. /profundus brachii a.
- These two must be identified and protected

Anterolateral approach

- Between deltoid m. and pectoralis major m. proximally and through brachialis m. distally
- Ant. Humeral circumflex a. may needed ligated
- Dangers: damage to radial n./axillary n.

Intramedullary nailing

- Ante grade – Entry site is about 1-1.5 below he tip of greater tuberosity on lateral aspect so as to save rotator cuff from injury. It may be used with effect in proximal and middle shaft fractures.
- Retrograde – Entry from lateral epicondyle may be taken blindly, while that from medial requires dissection of ulnar nerve, This may be used for lower third shaft fractures.Dangers include decreased elbow extension, heterotopic ossification, risk of supracondylar humeral fx

OBSERVATION AND DISCUSSION :

- We have studied 30 patients , out of which 16 were treated with intramedullary nailing while 14 were treated with plating.
- Most of the patients were younger age group (20-40) and 2/3rd of patient were male .major cause of fracture was RTA.
- More than 56% had simple fracture (type A).only 3% had complex (type C) fracture pattern.
- Most of the fractures (54%) were in middle third shaft and (37%) were in lower shaft.
- In plating group all the fractures were united.
- In nailing group all the fractures were united except 1 patients who required removal and plating and bone graft.
- Superficial infection occurred in 2 patients of nailing which subsides after antibiotic coverage.
- Though ten nail had lower rate of joint stiffness as their entry portals relatively spared the rotator cuff, 5 patients in this group had joint stiffness.
- Joint stiffness in ten nail can be minimized by burying of nail flush to the bone at the time of surgery as nail's upper end were found above bone surface in patients having joint stiffness at the time of follow up.
- Average time for union in intramedullary nail group was 6.4 month compared to 5.14 for extramedullary group.
- At the time of revision surgery for fracture non union in the intramedullary group was found rotationally unstable .so if care is taken at primary surgery to make the fracture rotationally stable, chance of non-union can be decreased.
- It can be achieved by following measures

1. Jamming of canal both distal and proximal to fracture
2. Fanning: passing TEN nail in both the pillar of lower humerus to achieve three point fixations.
3. cheaking the rotational stability by rotating forearm with elbow 90 flexion and checking whether shoulder and proximal arm is moving with it or not under IITV guidance.

- We have assessed p value by unpaired t testing our study for fracture healing (p=0.41). patients status for returning to his previous work(p=0.12),joint stiffness(p=0.5) and for ASES score (p=0.049), which suggest that there is no statistical significance in fracture healing ,patients status for returning to his previous work or joint stiffness treated by plate or by nail but there is significance in ASES in both the group
- So plate osteosythesis is better for shoulder and elbow movement and patients overall daily work capacity but not for fracture healing or his status of returning to previous work

CONCLUSION

From our study we conclude that

- RTA is the major cause of injury and young males are the common victims.
- Type of fracture fixation depend on variety of fracture including age of the patient, type of the fracture ,level of the fracture ,morphology of the fracture ,skin and soft tissue condition ,amount of combination as well as distal neurovascular status of the limb.
- We prefer plate osteosynthesis in transverse or short oblique fracture of humerus shaft ,whenever skin condition permits .we strongly recommend to fix 6 or more cortices on either sides of fracture taking care of compressing fracture site without leaving any visible gap and 8 or more cortices when there is comminution .
- The results of plating are superior in all aspects to other models of internal fixation but statistically significant only in ASES score
- TEN nail is preferred whenever problems like poor skin and soft tissue condition or patients is having other associated injuries.
- Proximal entry ten nails are useful upto middle third shaft fractures with effect.
- Distal entry is for lower third shaft fractures.
- Results of ten nailing depend greatly on jamming of canal, control of rotation, and proximity of fracture to entry point.
- Results of TEN nail are good but not superior to plating .
- Joint stiffness is though not statistically significant but is a problem due to probable injury to rotator cuff and prolonged immobilization in intramedullary group.
- Middle shaft fractures have good results with both nails and plate, while proximal or distal shaft fractures have

Volume : 3 | Issue : 8 | Aug 2014 • ISSN No 2277 - 8179

better results with plating as compared to nailing.

PLATE	TEN NAIL
Union early	Union late
Chances of union more	Chances of union Less
Joint stiffness less	Joint stiffness more
Chances of return to previous work more	Chances of return to previous work less
Weight lifting early	Weight lifting late
May not be done in anaesthetically high risk because of other co morbidities or associated injuries	May be done in anaesthetically high risk because of other co morbidities or associated injuries
Cannot be done in poor skin condition and soft tissue condition	Can be done in poor skin condition and soft tissue condition
Stitch line long	Stitch line small
Technically more demanding	Technically less demanding
More per operative blood loss	Less per operative blood loss
Chances of radial nerve damage	No chances of radial nerve damage

image 1

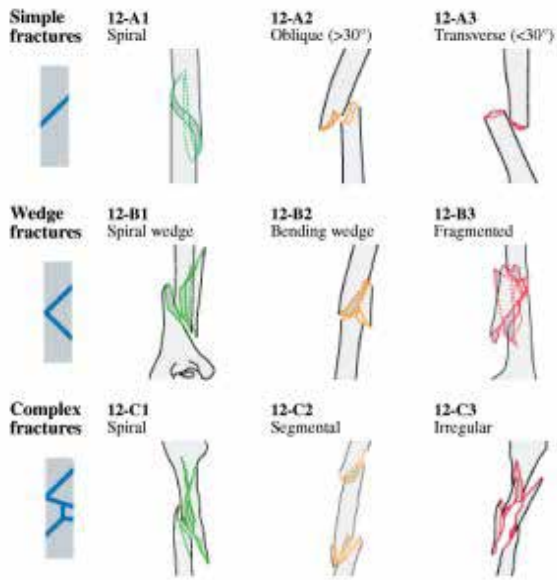

Fig. 1. AO-Classification of humerus shaft fractures according to Müller et al. (27)

REFERENCE

1. Netter's concise atlas of orthopaedic anatomy | 2. Rockwood and green fracture in adult and children | 3. AO system principle of fracture management | 4. Pozzi et al.: Surgical approaches for minimally invasive plate osteosynthesis | 5. International Orthopaedics (SICOT) (2007) 31:657–664 | 6.Collinge C, Sanders R, DiPasquale T. Treatment of complex tibial periarticular fractures using percutaneous techniques. Clin Orthop. 2000;(375):69-77. | 7. Collinge CA, Sanders RW. Percutaneous plating in the lower extremity. J | Am Acad Orthop Surg. 2000;8(4):211-216. | | 8 Jakob RP, Kristiansen T, Mayo K, Ganz R, Miller ME. Classification and | aspects of treatment of fractures of the proximal humerus. In: Bateman | JE, Welsh RP, eds. Surgery of the Shoulder. Philadelphia, PA: Decker; | 1984:330-343. | 9. Neer CS II. Displaced proximal humeral fractures: part I. Classification | 10. www.amjorthopedics.com March 2011 E41 G. T. Altman et al | 11. Shetty, et al.: Minimally invasive plate osteosynthesis for humerus diaphyseal fractures. | 12. Wagner M, Frigg R. AO Manual of fracture management: Internal fixators. Chapters 1.2: Concepts of fracture fixation, 2006. | | 13. Baumgaertel F, Buhl M, Rahn BA. Fracture healing in biological plate osteosynthesis. Injury 1998;29 (Suppl 3): C3-6. | | 14. Dickson KF, Munz JW. Locked plating: Biomechanics and biology. Tech Orthop 2007;22:4. | | 15. Wagner M, Frenk A, Frigg R. Locked plating: Biomechanics and biology and locked plating: Clinical indications. Tech Orthop 2007;22:4. | | 16. Camden P, Nade S. Fracture bracing of the humerus. Injury 1992;23:245-8. | 17. Hunter SG. The closed treatment of fractures of the humeral shaft. Clin Orthop Relat Res 1982;164:192-8.