ORIGINAL ARTICLE

RESULTS OF UNREAMED INTERLOCKING NAIL IN THE DIAPHYSEAL FRACTURES OF HUMERUS IN RESPECT OF WOUND INFECTION

Muhammad Khalid Khan[1], Muhammad Shoaib[2]

[1] Department of Orthopaedic DHQ Hospital Swabi - Pakistan

[2] Department of Orthopaedic Khyber Teaching Hospital Peshawar - Pakistan

ABSTRACT

Objective: To find the results of unreamed interlocking nail in the diaphyseal fracture of humerus in our setup with studying wound infection and union after fixation.

Material and Methods: We applied this prospective study in Orthopaedic and Trauma Unit Khyber Teaching Hospital Peshawar-Pakistan from Feb 2014 to August 2016. We included 75 patients with diaphyseal fractures of humerus shaft. All these patients were treated with unreamed interlocking nail. All these patients were examined Two weeks and Four weeks postoperatively for infection and at 20th weeks for union in the OPD.

Results: In our study male patients were 57(76%) and females were 18(24%).The mean age of all patients were 40.50years ± 14.89SD. At two weeks,97.33% patients i.e 73 were having no wound infection and 2.66% patients i.e 2 were having wound infection. These 02(2.66%) patients were again examined at further two(four) weeks, where 1(1.33%) patients got infection free and 1(1.33%) were still having infection. 74(98.66%) patients achieved union at 20 weeks while 1(1.33%) were not able to achieve solid unions when examined in OPD at this time period.

Conclusion: In humerus diaphyseal fractures Unreamed interlocking nailing has good outcomes in terms of wound infection and union of fracture.

Key Words: diaphyseal fracture, unreamed interlocking nail, Infection, Fracture union.

This article may be cited as: Khan KM, Shoaib M. Results of unreamed interlocking nail in the diaphyseal fractures of humerus in respect of wound infection. J Med Sci 2018; 26: (2) 137-140.

INTRODUCTION

Shaft or diaphysis of humerus starts from the lower end of pectoralis major tendon insertion on the humerus head to the distal humerus till supra condylar ridge. Diaphyseal or shaft fractures occur in this area[1].

Humeral diaphyseal fractures have impact on the morbidity in patients with trauma[2]. 20% of humeral fractures are diaphyseal fracture as per site percentage[3]. In adults 5%-8% of all fractures are humerus fractures[4]. Healing failure of less than 13%and 10%[5,6] is reported. Humeral shaft fractures in the young adult population occur with male predominance while in older age female predominate[7] In young patients the cause is usually high energy impact, like sports or car accidents, while in older patients there is low energy impact such as just accidental fall on ground[8]. These fractures were first recorded during B.C., 17th century in the oldest Egypt. Paintings and writings on the papyrus indicate these fractures and conservative treatment[9]. Different modalities of managing humeral diaphyseal fractures are mentioned in the literature. Different results of treatment ranging from good to excellent have been reported for closed and open procedure[10]. Evolution of managing humeral shaft fractures occur as advances are made in conservative and operative treatment[11-12] but conservative management is still used for majority of these fracture with reported excellent results[13-14] Shaft of humerus is enveloped by bulky muscles and the fractured area has good blood supply and good healing[15-16], and there is more chances of harming the blood supply at the middle and distal third junction during open fixation[17]. Union of humeral shaft fractures

Dr. Muhammad Khalid Khan (Corresponding Author)
Associate Professor
Department of Orthopaedic DHQ Hospital Swabi - Pakistan
Email: drkkafridi@gmail.com
Contact no: +92-321-9081319
Date Received: August 26, 2017
Date Revised: April 10, 2018
Date Accepted: May 20, 2018

with conservative option is also acceptable due to divers acceptability criteria. The criteria is " shortening 3cm, varus angulation 30°, anterior bowing 20°, and mal rotation 15°. Because of the demands of the patient in the this fast era like, early pain relief, faster recovery and return to function and enhanced union surgery is advised.

In the operative modality of internal fixation,there are usually two choices, intramedulary devices which is a closed procedure and plate fixation which is open procedure. Biomechanically the intramedullary implant is more better than the plate as, these are load sharing and stress shielding devices, there is less fatigue failure, refracture after implant removal is less. It is closer to the normal mechanical axis of humerus, more biological with no harm to blood supply at fracture site and no iatrogenic nerve damage.

A new operative approach for the humeral shaft fractures treatment is Unreamed intramedullaryinterlocking nail which avoids damage to intamedullary circulation, the drawback of intramedullary reamed interlocking nail.

MATERIAL & METHODS

This prospective study was applied in Orthopaedic and Trauma Unit Khyber Teaching Hospital Peshawar from Feb 2014 to August 2016 with the permission of hospital ethical committee. 75 patients of both gender, of more than 17 years with humeral shaft fractures fulfilling the inclusion criteria were studied. Written informed consent was taken from all patients. All patients were explained the procedure and its cost. We offered noncomercial, beneficial, non harmful and according to medical ethics treatment in the hospital. Elaborated history and full clinical examination was done of all patients. All patients were screened for virology and with preoperative baseline investigations like, FBC, ESR, CRP, Urine R/E, Sugar and Serum Albumin. Surgery was done within 24hrs after admission by two well trained surgeons. General anasthesia was used for all patients and same preoperative and postoperative antibiotics were given.All patients were treated with antegrade unreamed interlocking nail. Regular dressing change was done after each 24hrs for 48hrs. On 3rd postopday the patients were discharged home.Follow up was on two weeks and four weeks for infection and at 20th weeks for union.

No pain at fracture site, No pain on limited weight lifting and obliterationof fracture with callus formation on x rays, was accepted as union.Any collection, discharge or pus formation was accepted as infection. Those cases with Humeral shaft fractures requiring intramedullary fixation,age more than 17 years ,both genders.were included in the study. Those patients whose age was less than 18 years,with Pathological fractures,Segmental fractures,Open fractures, Periarticular fractures., Non unions. were excluded from the study.

With general anasthesia all patients were put in supine position with head rotated to the other side. The patient was put on the edge of the table. Incision was made at the corner of acromion anterolaterally. Bone was exposed. Awl was passed posterior to the bicepital grove and medial to greater tubrosity for entery point. Under C arm closed reduction was done. Guide wire was passed. Nail size measured and appropriate size nail inserted, proximal and distal locking done. Dressing was done and the arm was kept in a polysling. All patients were kept on same antibiotic for 1 week postoperativelly. Postop xray were done before discharging the patient and kept for comparison with future xrays for healing of fracture.

Confounding variables causing bias in the study were controlled by following the exclusion criteria. SPSS 10 was used for data analysis. Descriptive statistics were calculated for all the variables. Mean and standard deviation was calculated for quantitative variables like sex and union of fracture.

RESULTS

Fifty seven (76%) male and 18 (24%) female constituted our study(pie diagram). 40, 50 years ± 14.89SD was the mean age. At two weeks, 97.33%patients i.e 73were having no wound infection and 2.66% patients i.e 2were having wound infection, one superficial and one deep when examined in OPD Table1. These 02(2.66%) patients were again examined at further two(four) weeks,where 1(1.33%) patients got infection free and 1(1.33%) were still having infection which was deep infection, Table 2. This one patient was treated with protocol as, implant removal, infection control, bone grafting and Open reduction internal fixation.

Seventy four (98.66%) patients achieved union at 20 weeks while 1(1.33%) were not able to achieve solid unions when examined in OPD at this time period Table 3.

Table No 1. Wound infection At Two Weeks

	No of cases and %ages
No Wound infection	73 (97.33%)
Wound infection	02(2.66%)

Table No 2. Wound infection at 4 weeks

	No of cases
No Wound infection	1 (1.33%)
Deep infection	1 (1.33%)

Table No 3. Union of Fracture after 20 weeks

	No of Cases
Union in 20 weeks	74(98.66%)
No union in 20 weeks	01(1.33%)

DISCUSSION

Humerus fractures are encountered by orthopaedicians in daily practice, although not most common but is frequent fracture in the trauma patients. Frequently occurs in the adults due to trauma as road traffic accidents and in the elderly due to simple reasons just like a fall on ground[18]. Most fractures of the humerus can be managed conservatively, but problem of decision making ocuur when surgery is required[19]. Usual indications of surgery for humeral shaft fractures are, associated vascular injury, segmental fractures,unsatisfactory alignment or reduction, poly trauma patient floating elbow[23].

Surgical options for humeral shaft fractures are; external fixator, plating and intramedullary devices. External fixator is usually used in open fractures and in unstable patients. The option for internal fixation are either plating or intramedullary IMN,or ILN. Results of plating have been reported in high percentage for union in humeral fractures but it requires extensive soft tissue manipulation, periosteal damage occurs and there is danger of harming blood supply and nerve[13]. Plate fixation is non biological, load bearing and less secure especially in osteoporotic bone[14]. Now intramedullary device especially interlocking nail is considered standard by some class with excellent results[15,16], while some studies have reported shouldre damage[17] and failure of healing[18] so the superiority of plate or nail is still debated in humerus fractures.

We performed interlocking nail in 75 patients with male predominance which is comparable to the study by Chaudhary P[24] and Changulani M et al[25]. The mean age of the patients in our study was 40 which is also comparable to Chaudhary P[24] and Changulani M et al[25]. In their studies they reported 34.6 and 39 respectively. In our study only one i,e 1.33% patient got infection at four weeks which is comparable to the study by Hashib G[10] who also reported only one infection of interlocking group in his study. Muzzafar N et al[21] have reported 1-7% infection rate in humerus interlocking nail while Reddy J B, Athmaram M[20] have reported 0% infection in interlocking nail. We achieved union in 98.66% patients while only 1.33% nonunion in our study. These results are comparable to other international studies. FanY, LiYW[2] have reported 96.7% union rate at 6.7 weeks. Reddy J B, Athmaram M[20] have reported 18 (90%) unions out of 20 fractures and 2(10%) out of 20 nonunion. Sahu RL, Ranjan R, Lal A 22have reported 100% recovery in function and union after 9 months

CONCLUSION

In humerus diaphyseal fractures Unreamed interlocking nailing has good outcomes in terms of wound infection and union of fracture.

REFERENCES

1. Fernandez F. Five Years' Clinical experience with unreamend humeral nail in the treatment of humeral shaft fractures.Injury 2004;35(3):264-71.
2. Fan Y, Li W Y, Zhang B H, Liu FJ,Han M X,Chang X, Weng SX, et al Jin Lin, Management of Humeral Shaft Fractures With Intramedullary Interlocking Nail-Versus Locking Compression Plate, Orthopedics. 2015; 38(9):825-829.
3. Rose SH, Melton LJ III, Morrey BF, IlstrupDM, Riggs BL. Epidemiologic features of humeral fractures. Clin Orthop Relat Res.1982; 168:24-30.
4. Kui L X,Qiang H W,Yong Y W andXiang Z W,Treatment of nonunions of humeral fracture with interlocking intramedullary nailing ,Chin J Traumatol 2008; 11(6):335-40
5. Beguin JM, Plenevaux P, Poilvache G. Considerations concerning the treatment of pseudarthrosis of the humerus. Acta Orthop Belg 1991; 57(2):114-23.
6. Foulk DA, Szabo RM. Diaphyseal humerus fractures: natural history and occurrence of nonunion. Orthopedics1995; 18(4):333-35.
7. Ekholm R, Adami J, Tidermark J et al Fractures of the shaft of the humerus. An epidemiological study of 401 fractures. J Bone Joint Surg Br,2006; 88:1469-73
8. Campochiaro G,Baudi P , Loschi R, Serafini F, Catani F,Complex fractures of the humeral shaft treated with antegrade locked intramedullary nail: clinical experience and long-term results, Acta Biomed 2015;86,. 1: 69-76
9. Choudhari P, Baxi M, Patidar S.Fracture Shaft Humerus: Plating OR Nailing? Orthop JMPC 2016;22(1):8-13.
10. Hashib G Management of humeral shaft fracture: a comparative study between interlocking nail and dynamic compression platingInt J Res Orthop. 2016,2(2):40-47
11. Bailfour GW, Mooney V, Ashby ME. Diaphyseal fractures of the humerus treated with a readymade fracture brace. J Bone Joint Surg. 1982;64:11-3.
12. Brumback RJ, Bose MJ, Poka A, Burgess AR. Intramedullary stabilisation of humerus shaft fractures in patients with multiple trauma. J Bone Joint Surg. 1986;68:960-70.
13. Mast JW, Spiegel PG, Harvey JP, Harrison C. Fractures of the humeral shaft. Clin Orthop. 1975;12:254-62.
14. Sarmiento A, Kinman P, Galvin E. Functional bracing

of fractures of the shaft of the humerus. J Bone Joint Surg. 1977;59:596-601.

15. Stewart MJ, Hundley JM. Fracture of the humerus: A comparative study in methods of treatment. J Bone Joint Surg. 1955;37:681-89.

16. Bhandari M, Devereaux PJ, McKee MD. Compression plating versus intramedullary nailing of humeral shaft fractures-a meta-analysis. Acta Orthop. 2006;77:27-29.

17. Tom EJ, Carsi D, Garcia C, Marco F. Treatment of pathologic fractures of the humerus with seidel nailing. Clin Orthop. 1998;350:51-55.

18. Klenerman L. Fractures of the shaft of the humerus. Journal of Bone & Joint Surgery, British Volume 1966; 48(1):105-11.

19. Denard A, Richards JE, Obremskey WT, Tucker MC, Floyd M, Herzog GA. Outcome of nonoperative vs operative treatment of humeral shaft fractures: a retrospective study of 213 spatients. Orthopedics. 2010; 33(8).230-34.

20. Reddy J, Athmaram M, Swaroop SV. "A Clinical Study of Fixation of Fracture of Shaft of Humerus with Interlocking Nail". Journal of Evolution of Medical and Dental Sciences 2015; 41(3); 2172-79.

21. Muzaffar N, Bashir N, Moosa M, Singh S, Rawa S, Ahmad N, Ahmad A,Hafeez A. Complications In Intramedullary Nailing Of The Humerus; A Beginner's Review. The Internet Journal of Orthopedic Surgery. 2009 ;18 ; 1-5.

22. Sahu RL, Ranjan R, Lal A. Fracture Union in Closed Interlocking Nail in Humeral Shaft Fractures. Chin Med J 2015;128:1428-32.

23. Singisetti K& Ambedkar M, Nailing versus plating in humerus shaft fractures: A prospective comparative study International Orthopaedics (SICOT) (2010) 34:571–76.

24. Chaudhary P, Karn NK, Shrestha BP, Khanal GP, Paneru S, Kalawar RP. Dynamic Compression Plate Versus Intramedullary Interlocking Nail for Managemaent of Humeral Shaft Fractures. Nepal Orthopaedic Association Journal. 2014 ;3(2):10-13.

25. Changulani M, Jain UK and Keswani T. Comparation of use of the humerus intramedullary nail and dynamic compression plate for the management of diaphyseal fractures of humerus, A randomised controlled study, InternationalOrthopaedics, Springer- Verlag 2007; 13 (3). 391-95.

26. Arun K N, PaladuguK and Reddy KP Study on Surgical management of fracture shaft of Humerus by interlocking nail IJBAR 2014 :5 (04) 45-51.

CONFLICT OF INTEREST: Authors declare no conflict of interest
GRANT SUPPORT AND FINANCIAL DISCLOSURE NIL

AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Khan KM: Main idea, operating surgeon
Shoaib M: Overall supervision

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.