Original Research Paper

Volume-7 | Issue-12 | December-2017 | ISSN - 2249-555X | IF : 4.894 | IC Value : 86.18

Clinical Research

STUDY ON SURGICAL MANAGEMENT OF FRACTURE SHAFT OF HUMERUS BY INTERLOCKING NAIL

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ABSTRACT

BACKGROUND:- Fracture shaft of humerus can be operated with plate osteosynthesis or with intramedullary nailing. In the present study we have tried to analyze the outcome interms of consolidation, union rate, functional outcome and complications of fracture shaft humerus, treated with closed antegrade interlocking nailing, in Tripura Medical college, Hapania, Agartala.

METHODS:- 28 patients with recent fracture of shaft of humerus were treated with antegrade interlocking nailing from a period of January 2013 to January 2015. There were 17 males and 11 female with an average age of 38.06 years(22-62 years). All the patients were follow up for an average period of 8.52 months and result were analysed.

RESULTS:- 27(96.42%) Fractures united with an average period of consolidation 12.52 weeks (10-16 weeks). 1(3.57%) fracture had nonunion , Nail impringement was seen in 2(7.14%), shoulder stiffness in 1(3.57%).

Functional result were excellent in 24(85.71), moderate in 2(7.14%) and poor in 2(7.14%).

CONCLUSION:- Closed antegrade interlocking nailing is a safe and reliable method of operation of fracture shaft of humerus, with early fracture consolidation and higher union rate.

KEYWORDS : Fracture shaft of humerus, Interlocking nailing.

INTRODUCTION:-

Fracture shaft of humerus represent 3% to 5% of all fractures[1]. Common operative management in fracture shaft of humerus are plate osteosynthesis and intramedullary nailing.Open reduction internal fixation(ORIF) with a plate & screw provides direct fracture exposure & near anatomic alignment.The rate of nonunion & hardwire failure requires revision, range from 0% to 7%[2].Intramedullary nail is better implant biomechanically. Nails are subjected to smaller bending loads and are less likely to fail due to fatigue, they act as load sharing devices. Cortical osteopenia that occurs right adjacent to the end of plates is rarely seen with intramedullary interlocking nails, thus, refracture after implant removal is seen less often[3].IM nails can be placed without direct fracture exposure & with less soft tissue dissection.Additionally, cortical osteopenia caused by stress shielding as seen with plates & screws is less likely noted [4].The antegrade insertion is known to have a fewer problems than the retrograde technique if the rotator cuff is not violated[5].It has got advantages over other operations as it is biological fixation. This treatment has been subjected to controversy since its inception, because of lack of understanding of the biomechanical principles, over concern of damage to medullary circulation and possibilities of fat metabolism. For these reasons we took up the study to evaluate the end results of 28 cases, identify the advantages, difficulties, complications, pit falls and to prepare guidelines for the treatment of fracture shaft humerus.

MATERIALAND METHODS:-

This prospective study was conducted at the department of orthopedics, Tripura Medical College &Dr.BRAM Teaching Hospital, Hapania ,Agartala over a period of 2 years, from january 2013 to january 2015. 28 patients, adult, with fracture shaft of humerus due to trauma, treated with closed antegrade intramedullary interlocking nailing were studied with the objective of study the functional outcome after interlocking nail for fracture shaft of humerus, the time of union and the rate of union and to study the complications after treatment. Patients having fractures classified into type-II and type-III compound by Gustilo Anderson and /or those having associated radial nerve palsy were excluded from this study. All the cases were treated by antegrade intramedullary interlocking nailing. Assesment of the patients were done on the basis of clinical and radiological union, range of motion at shoulder and elbow joints and subjective complaints like pain in the shoulder and elbow joints. Shoulder and elbow functions were graded excellent, moderate or poor upon the loss of motion and subjective complaints like pain. To assess function, we used the American shoulder and elbow surgeon (ASES) shoulder score for 13 activities of daily living requiring full shoulder and elbow movements (Table-1). The maximum possible score is 52points. The average score was 48.5 (range 40-52). We quantified pain using visual analogue scale with zero having no pain and 10 having extreme pain.

Table-1:-

Details of the American shoulder and elbow Surgeons (ASES) score (4=normal; 3=mild compromised; 2=difficulty; 1=with aid; 0=unable; NA= not available).

***Back pocket**

- Wash opposite axilla
- Comb hair
- Carry 10 lb at side
- Sleep on affected side
- Use hand over head
- Lift
- Perineal care
- Eat with utensil
- Use arm at shoulder level
- Dress
- Pull
- Throw

STATISTICALANALYSIS:-

Mean values of operation time, time to union, shoulder functional score (ASES) and visual analogue pain score.

RESULTS:-

This study had 28 patients of fracture shaft humerus, treated by antegrade close intramedullary interlocking nail. Patients were followed up for a minimum period of 8 months. Age, range of patients were from 22 years to 62 years, with an average of 38.06 years. The majority of patients 17(60.71%) were male and 11(39.28%) were female. Right side were involved in 15(53.57%) patients and left side in 13(46.42%) patients. Road traffic accident was the commonest type of injury 19(67.85%) patients, remaining 9(32.14%) patients suffered from history of fall. In the present study 19(67.85%) patient had fracture at the middle third of shaft of humerus 5(17.85%) patients had fracture at proximal third and 4(14.28%) patient had fracture at distal third. 17(60.71%) patient had transverse fracture, 6(21.42%) patients had oblique fracture, 4(14.28%) patients had comminuted fracture and 1(3.57%) patient had spiral fracture. Most of the patient were operated within a week of trauma on an average, time interval was 6 days. The delay in surgery was due to late presentation and managing associated injuries.

The period of fracture union ranged from 10 weeks to 16 weeks with an average period of 12.52 weeks, except one case which went to non-union. Functional assesment of patients, shoulder function was excellent in 24(85.7%), moderate in 2(7.4%) and poor in 2(7.4%) patients. Elbow function was excellent in all patients. The overall functional results was excellent in 24(85.71%) patients, moderate in

2(7.14%) and poor in 2(7.14%) patients.

Complications found in this study were, impingement-2, joint stiffness-1, non-union-1 (which was later treated with LCDCP with bone graft).

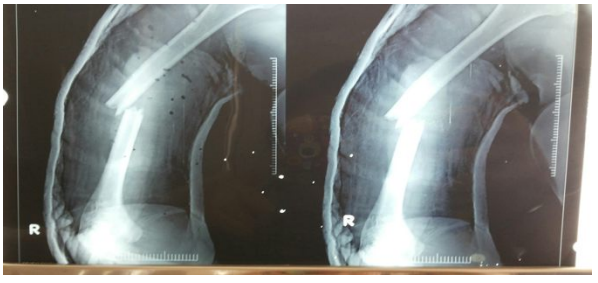
Table no.2:Comparison of commonest level of injuries in various studies.

Study	No.of Patients	Commonest site affected	No. of Cases	Percentage
Griend et al6	36	Middle third	23	63.9%
Rommens et al7	39	Middle third	14	35%
Rodriguez8	20	Middle third	10	50%
Present Study	28	Middle third	19	67.85%

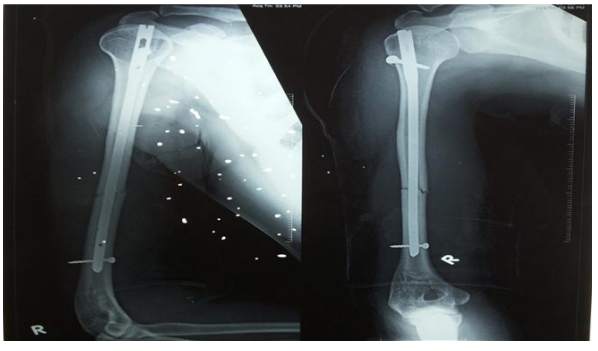
Table no.3:Distribution of cases according to type(pattern)of fractures.

Pattern of fracture	Number of patients	Percentage
Transverse	17	60.71%
Oblique	6	21.42%
Communited	4	14.28%
Spiral	1	3.57%

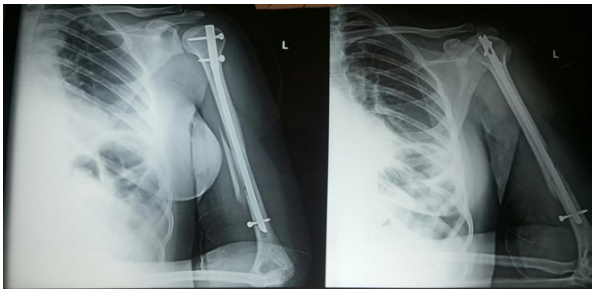
PRE-OPERATIVE XRAY OF 46 YEARS MALE



POST-OPERATIVE XRAY OF 46 YEARS MALE



POST- OPERATIVE XRAY OF 42YEARS FEMALE:-



DISCUSSION:-

The management of fracture of humeral shaft is a controversial subject till today. With conservative treatment in one end and the operative treatment in the other end of the operative group again controversy regarding plating or intramedullary interlocking nailing. These fracture often associated with multiple injuries, leading to complications like radial nerve injury shortening, mal-union, infection, delayed union, and non-union. Most of the acute humeral shaft fractures can be successfully treated by conservative methods.Antegrade locked nailing offers a dependable solution for the treatment of humeral shaft fractures,especially in polytrauma patients and cases of segmental or pathological fractures[14].Introduction of interlocking nailing has largely solved problems faced by the standard Dynamic Compression Plating[15,16]. Operative methods can be considered to avoid complications and to avoid psychological problems of long duration of treatment. Operative stabilization is required in certain fractures including patients with unsatisfactory close reduction and multiple injuries. Plate osteosynthesis, has got a high success rate but needs extensive dissection and there is a chance of radial nerve injury, and refracture after implant removal. Intramedullary nailing require less dissection, less soft tissue trauma and less chance of radial nerve injury. In addition Intramedullary interlocking nails gives rotational stability , which is not found with unlocked nails . Results of present study are comparable with other studies like Bell et al[9], Rodriguez[8] Rommens et al[7].

Table no 4:Comparison of commonest type of fractures in various studies.

Study	No. of patients	Maximum Fracture type	No. of cases	Percentage
Bell et al 9	38	Communited	20	51.3%
Griend et al6	36	Tranverse or short oblique	20	55.6%
Rommens et al7	39	Transverse	20	51.26%
Rodriguez8	20	Tranverse or short oblique	10	50%
Tingstad et al10	83	Tranverse or oblique	53	64%
Present study	28	Transverse	17	60.71%

Table no.5:Comparison of Union rate obtained in various studies.

Study	No. of Patients	Type of Reduction	Delayed Union	Non Union	Overall Union
Bell et al9	38	AO plating		1(3%)	33(97%)
Rodriguez8	20	I.M. nailing	1(5%)	-	19(95%)
Rommens et al 7	39	Retrograde I.M. nailing	-	1	38(95%)
Jinn Lin	48	I.M. nailing	-	-	48(100%)
Tingstad et al10	83	AO plating	-	5(6%)	78(94%)
Shyamasunder et al11	37	I.M. nailing	-	3	31(91.8%)
Present study	28	I.M. nailing		1	27(96.4%)

Table no.6:Comparison of Mobility of Shoulder & Elbow Joints in various studies.

Study	NO. of Patients	Excellent range of Mobility	Percentage
Bell et al9	38	38	97%
Griend et al6	36	30	85.4%
Rommens et al7	39	38	96%
Rodriguez8	20	19	95%
Gongol&Mracek12	32	31	97%
Bhat et al13	37	31	91.89%
Present study	28	24	85.7%

CONCLUSION:-

Based on the results of present study, we conclude that closed antegrade intramedullary nailing with interlocking nail is a safe and reliable method of treating fractures of shaft of humerus. All closed and grade-I open fracture of shaft of humerus extending between 2cm distal to surgical neck to 3cm proximal to the olecranon fossa can be stabilized with interlocking nail, also it is a good method of stabilizing comminuted and unstable fracture of shaft humerus. In short, closed antegrade interlocking nailing is an excellent, least invasive surgical operation to manage fracture of the shaft of the humerus.

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