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COMPARISON OF FUNCTIONAL OUTCOME OF MODIFIED TBW VERSUS MODIFIED TBW AUGMENTED WITH CIRCUMFERENTIAL CERCLAGE WIRING IN TRANSVERSE FRACTURE OF PATELLA

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ABSTRACT

Background: The most common fracture of patella is transverse fracture of body. The gold standard treatment for displaced fracture is by tension band wiring (TBW) technique, augmentation with circumferential cerclage ss wiring has been suggested to improve the strength of the fixation.

Methods: The study was conducted at Nalanda Medical College, Patna during the period 2018-2020, by treating 28 patients. Group 1 (n=15) treated with modified tension band wiring (TBW) alone while as Group 2 (n=13) treated by modified TBW along with augmented circumferential cerclage ss wiring. Outcome was studied, graded and compared using the Modified Bostman Scale, union rates, and complication rates.

Results: The results at final follow up in group 1 were excellent in 10(66.67%), good in 4(27.67%) and unsatisfactory in 1(6.67%). In group 2 the results were excellent in 8(61.54%), good in 5(38.46%) and no unsatisfactory results. Both groups have similar outcomes based on the scoring system used. The results were tested using t test and found to be different but not statistically significant(p value- 0.469). In group one, 1(6.67%) developed deep infection and 1(6.67%) developed superficial infection. In group 2 2(15.38%) developed superficial infection, however these results are not statistically significant (p value-0.432). Hardware irritation was seen in 3(20%) of group 1 and 3(23.07%) of group 2(p value>.05). 2(13.33%) of group 1 had implant removal during the course of follow up where as 2(15.38) in group 2 had hardware removal done.

Conclusions: Modified tensioned band wiring for displaced transverse fracture of patella is an inexpensive and excellent method of treatment and the use of circumferential cerclage ss wiring along with tension band wiring for displaced transverse fractures of patella seems to have no added advantage over fixation with tension band wiring alone.

KEYWORDS : Patella fracture, Tension band wiring, Cerclage wiring

INTRODUCTION:

Fracture of the patella constitute approximately 1% of all skeletal injuries. The transverse fracture through the body is by far the most common type[1,2]. The complications of malreduced fracture patella most commonly anterior knee pain, knee stiffness, early onset osteoarthritis of patellofemoral joint, etc. along with complications related to surgery viz. infection, hardware impingement, etc[3,4,5]. Modified anterior tensioned band wiring has been described as the gold standard for operative fixation of displaced transverse patellar fracture[6]. The AO group recommend anterior tensioned band wiring for fixation of these fractures[7].The most commonly reported scale for functional assessment has been that described by Böstman et al[8].

METHODS:

This study included 28 patients with displaced transverse patellar fracture admitted in wards of dept. of Orthopaedics Nalanda Medical College and Hospital, PATNA. Group 1 (n=15) Treated with Modified TBW : group 2(n=13) TBW augmented with circumferential cerclage wiring.

***Inclusion criteria*:** 1. All radiologically confirmed closed displaced transverse patellar Fractures AO/OTA CLASSIFICATION 34-C1 and 34-C2. 2. Sex: both male and female 3. Age >16 years and <60 years.

***Exclusion Criteria*:** 1. Open fractures 2.Patient not consenting for surgery 3.Patient not fit for surgery.

On admission a detailed history of the patient was taken including the mechanism of injury, occupation and a thorough physical examination was conducted. Plain radiographs were obtained and fracture pattern was classified. A posterior splint was applied on the day of presentation and adequate analgesia was provided. Patients were operated within 1 week of admission after routine blood investigations. Surgery was performed under spinal anesthesia, and tourniquet was used during the surgery. Through an anterior longitudinal placed incision over the knee, open reduction and internal fixation using modified TBW done with two 2mm parallel k wires and 18G stainless steel wire. Similarly in the cerclage group an additional circumferential cerclage wiring around the equator was done using ss wire loop in combination with modified TBW. Patient was placed in a posterior splint or a long knee brace post-operatively. Radiographs were obtained to check for proper reduction and adequate fixation in the immediate post operative period. Ambulation was allowed from the next day of operation or as pain allowed. Post operative rehabilitation was started as soon as possible. Knee flexion was started on second week. Antiseptic dressing was done on 2nd day and 7th day. Stitch removal was done on 14th day. The patients were followed up on 4 weeks, 6 weeks, 3 months then a final follow up for a duration of upto minimum 6 months. Clinical and functional outcome was studied, graded and compared on basis of Modified Bostman Scale and rates of complications.

Figure1: Surgical Exposure For Open Reduction And Internal Fixation. With Pre And Postoperative Radiographs In AP And Lateral View.

Table 1: Modified Bostman Scale

Total score	
Excellent	30 to 28
Good	27 to 20
Unsatisfactory	<20

RESULTS:

The results were compared using t test and other statistical methods. Significance was set at a P value of<0.05. In the present study 28 patients of displaced transverse fracture of patella Group 1(n=15) were treated with modified TBW and Group 2(n=13) were treated with modified TBW augmented with circumferential cerclage wiring.

The age ranged from 20 years to 65 years. The mean age was 42.10 years, 50% of the patients were above 40 years of age. In our study 68% were male and 32% were female. All the fractures and were either AO

34C1 or 34C2 closed fractures affecting the right side 32.14% and left side 67.86%.

Fractures resulted from direct trauma in 46.43% and indirect trauma in 53.57%. Road traffic accidents accounted for 42.86% of the cases and fall from standing height accounted for 57.14% of the cases**.** In the group 1 all but one fracture united whereas in group 2 all achieved union. The average union time in group 1 was 11.71 weeks and in group two 12.15 weeks but no statistically significant difference (p value-0.27)**.**The results at final follow up in group 1 were excellent in 10(66.67%), good in 4(27.67%) and unsatisfactory in 1(6.67%). In group 2 the results were

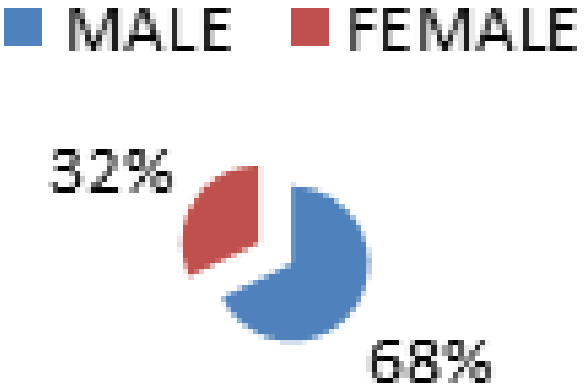

Figure:2 Age Distribution.

excellent in 8(61.54%), good in 5(38.46%) and no unsatisfactory results. Both groups have similar outcomes based on the scoring system used. The results were tested using t test and found to be different but not statistically significant(p value- 0.469).

Table 2: Results Based On Clinical And Functional Grading Of Outcome. (P Value-0.469)

Modified Bostman scale	MTBW	MTBW with cerclage	P. value	Statistical inference
Excellent	10 (66.67%)	8 (61.54%)	0.469	Different but not significant
Good	4 (26.67%)	5 (38.46%)		
Unsatisfactory	1 (6.67%)	0 (0%)		

In this study some complications were encountered, these are compared between the groups. In group 1 there was one (6.67%) case of non-union while there was no(0%) case of non-union in group 2. The case non-union developed in an elderly lady with diabetes, deep infection developed and there was wound dehiscence and osteomyelitis of patella. A revision surgery had to be performed and she was treated with total patellectomy after which she recovered, albeit poorer outcome.

In group one 1(6.67%) developed deep infection and 1(6.67%) developed superficial infection. In group 2 2(15.38%) developed superficial infection (p value 0.252), however these results are not statistically significant (p value-0.432). Hardware irritation was seen in 3(20%) of group 1 and 3(23.07%) of group 2(p value 0.184). 2(13.33%) of group 1 had implant removal during the course of follow up where as 2(15.38) in group 2 had hardware removal done.

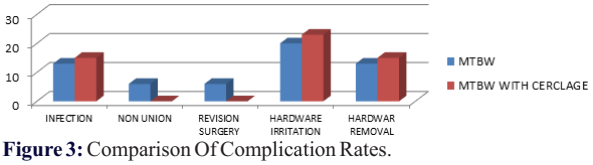

Figure 3: Comparison Of Complication Rates.

DISCUSSION:

The current gold standard treatment for displaced transverse fracture of patella is the Muller anterior tensioned band wiring technique given by the AO group[5,6,7]. Curtis et al in cadaveric study comparing the AO TBW Muller technique and the Pyrford technique proposed and propelled the concept of augmenting tbw with circumferential cerclage wiring to increase the strength of fixation[9]. Later Tien-yu Yang et al in their biomechanical study concluded that augmented circumferential cerclage wiring is not efficacious in fracture stabilization and healing[10]. Adherence to the correct technique such as proper placement of k-wires and securing both ends of the K-wires may be more important and help in securing better outcomes[10]. Hardware irritation is a significant complication and has ranged from 10% to 60%[11]. Our results for the MTBW group were excellent in 10(66.67%), good in 4(27.67%) and unsatisfactory in 1(6.67%). In the MTBW augmented with cerclage the results were excellent in 8(61.54%), good in 5(38.46%) and no unsatisfactory results. These findings are comparable to the series by Abed Falih Al-Sudani et al using Modified Bostman scale found 66.7% excellent results and 33.3% good results and no poor results[12]. Lone ZA Et Al found excellent to good scores in 73.90% in MTBW with Cerclage group and 70.96% in MTBW group based on knee pain, knee stiffness, quadriceps wasting, loss of flexion and loss of extension[13]. This study had several limitation: firstly the small sample size, short duration of study, only AO OTA type 34c1 and 34c2 closed fracture were included, the biomechanical analysis of the two groups was no included.

CONCLUSIONS:

Modified tensioned band wiring for displaced transverse fracture of patella is an inexpensive and excellent method of treatment and the use of circumferential cerclage ss wiring along with tension band wiring for displaced transverse fractures of patella seems to have no added advantage over fixation with tension band wiring alone.

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