MANAGEMENT OF TRANSVERSE FRACTURE OF PATELLA BY TENSION BAND WIRING

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ABSTRACT
Objective: *The purpose of study was to evaluate the results of operative management of transverse fractures of patella using tension band wiring technique, regarding the union, function, complication and cosmetics.*
Study Design: *Case series.*
Setting & Duration: *Department of Orthopaedics, Unit I, Dow University of Health Sciences and Civil Hospital, Karachi from June 2006 to December 2007.*
Methodology: *A total number of 45 patients with recent transverse fracture of patella were treated with tension band wiring technique. Those patients were selected in which fracture displacement was more than 3 mm.*
Results: *Mean time of union was 8-10 weeks, non-union occurred in two patients (4.4%). Postoperative infection was seen in five patients (11%). Range of movement was excellent in 30 patients of transverse fracture (66.6%) while 10 patients (22.2%) fractures with some communition element had good range of movement. Five had (11.1%) had poor result who failed to attend regular follow-ups and did not carry the proposed rehabilitation programme.*
Conclusion: *Tension band wiring in fracture of patella with greater than 3mm displaced fragments or articular surface disturbance allows early motion and rehabilitation.*

KEY WORDS: *Fracture Patella, Displacement, Tension Band Wiring*

INTRODUCTION

The Patella, or knee cap, is a triangular seasamoid bone about 5 cm in diameter, which is embedded in the tendon of insertion of quadriceps femoris muscle. The tendon of quadriceps femoris in continuation from lower pole is inserted to upper tibia.[1] Patella is an important component of extensor mechanism of knee.[2] It serves to increase the mechanical advantage of quadriceps muscle. Patella not only provides beauty and mechanical support to extensor mechanism but safety to knee cartilage also while kneeling.

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Fracture of patella disrupts extensor mechanism and it is not uncommon (1% of all fractures). Transverse fracture of patella is common.[3] Patellar fracture results from direct or indirect forces. The majority of patellar fracture results from direct injuries[4], a fall on knee or a direct blow sustained in vehicular trauma are common aetiologies. Patellar fracture from indirect forces occurs when the intrinsic strength of patella is exceeded by the pull of musculotendinous and ligamentous unit attaching to it. This typically occurs in the act of stumbling or partial falling when knee is rapidly flexed against fully contracted quadriceps. The treatment of fracture of patella is subject of controversy. Options available are conservative management, open reduction and internal fixation by different methods. If fracture fragment shows less than 3 mm separation and no displacement in articular surface, it can be treated conservatively in Plaster of Paris cylinder cast. While in communited fracture of patella where repair is not possible, patellectomy[5,6] is an option. Fragments displaced more than 3 mm, should be fixed in patella fractures. Different options are available[7] but recently A.O anterior tension band wiring of figure of 8 has been proven effective of

all.[8] The study was done to find out efficacy of tension band wring in patella fracture in the local setup.

METHODOLOGY

This prospective case series was carried out in Orthopaedic Unit I, Dow University of Health Sciences, Civil Hospital Karachi from July 2006 to December 2007. Total of 45 patients with transverse fracture of patella who attended the accident and emergency department within 2 days of injury were included which were all adults irrespective of age or sex with close transverse fracture of patella, with fragments separated more than 3mm. Exclusion criteria were open fractures, communited fractures and transverse fractures of less than 3mm displacement. Children were also excluded. All the cases were operated within 1 week with open reduction and internal fixation. A O tension band wiring was done.

Post-operatively, the limbs were placed in extension with the plaster back slab. Isometric and stiff leg excercises were encouraged from 1st post-operative day. In patient with stable fixation and limited retinacular tear, continuous passive motion was started just after 1 day of surgery. Active range of motion started after 3 weeks. After 18 weeks unrestricted activities started when full quadriceps strength was returned. In patients with less stable fixation and extensive retinacular tear, active motion was delayed until fracture healing occurred. The results were assessed on the basis of clinical and radiological evaluation and parameters of:

1. Pain.
2. Limitation of activity.
3. Loss of quadriceps power.

Each patient was scored according to the system shown in Table I. Patients up to 9 points were considered to have good results, while patients with 6-8 points were considered as fair results and less than 6 points were considered as poor results. For the range of movement of knee joint, all the patients were evaluated after tension band wiring using the University Hospital of Cleveland Quantitative functional knee score, in which 100 points is the maximum score allowed.[9]

Depending upon the scoring system an excellent result is defined as 90-100 points, good result is 80-90 points and failure is any score from 50 points or less. Criterion for fracture union was assessed clinically and radiologically. No case was declared united unless it was fit on criteria of assessment. If healing did not happen after 6 months it was declared as non union. Co-morbids which could act as confounding variables are discussed in exclusion criteria.

Symptoms, Signs	Score
Pain	
No pain	3
Minimum pain	2
Constant severe pain	1
Limitation of activity	
Unlimited activity	3
Limitation of activities, especially sports	2
Greatly diminished activities	1
Loss of quadriceps power	
No loss of quadriceps strength	3
30-45% decrease in strength	2
Greater than 45% decrease in strength	1

Table I. Scoring system

RESULTS

In this study 45 patients were included, there were 35 men and 10 women. The age at the time of fracture ranged from 20-55 years. The mean ages were 37.5 years. Nine patients had associated injuries, six (13%) had fractures of patella with posterior dislocation of hip joint, while three (6.6%) patients had ipsilateral fracture of shaft of femur. The main cause of injury was road traffic accident in 40(88%) cases. Four cases (8.8%) were direct injuries due to slip while climbing on stairs. One case was (2.2%) due to assault, hit by rod.

There were two (4.4%) cases of non union seen in patients who were above 50 years of age and were females. Both were fibrous union and were well tolerated by patients due to limited activities. One patient (2.2%) was in non union and feeling permanent pain at site of fractures. Patient was advised for total patellectomy but refused.

Range of movement was excellent in 30 patients of transverse fracture (66.6%) while 10 patients (22.2%) fractures with some communition element had good range of movement. Five had (11.1%) had poor result who were non cooperative and came for follow up after 3 months, there was marked atrophy of quadriceps muscle and stiffness of knee joint, after prolonged rehabilitation programme maximum degree of 50-55% were found Table II. There were 5(11%) post-operative wound infection which responded to antibiotic and wound dressing.

No. of Patients	Range of Movements	Status	%
30	100 - 110	Excellent	66.6
10	80 - 90	Good	22.2
5	50 - 55	Poor	11.1

Table II. Final outcomes

DISCUSSION

Treatment of transverse fracture of patella may be either operative or non operative but in most reports non operative treatment has been limited to fracture that showed less than 2 mm of separation and no significant displacement of articular surface. If there is displacement more than 3 mm it should be openly reduced and internally fixed.[10,11] The same criteria was adopted in this study i.e. operative fixation of all fracture which are displaced more than 3 mm. There are several techniques for operative fixation of patella, but Weber technique of tension band wiring was used.[16] Union period in this study was 8-10 weeks while other studies reported union rate from 8-16 weeks. Non union and Malunion is not commonly seen, it was noted in three cases in this study, out of them two non union were fibrous type and were easily tolerated by the patients due to their age and less mobility. In one patient there was persistent pain at the place of the fracture and painful knee movements. Early patelofemoral arthritic changes were seen in some of this patients. This has been reported in other studies as well.[13,14,15]

Adequate rehabilitation for return of quadriceps strength and knee motion is absolutely necessary after surgery. In this study quadriceps power was assessed, 40 patients had good power while 5 had fair result, no poor result seen. Levack reported 7 good results 5 fair and 2 poor results in their 14 patients. Only 5(11%) cases of infection out of them three 6.6% were superficial infection were seen, while Awais from Pakistan reported no infection in his 16 patients study.

Routine implant removal is not widely recommended yet, in the patella and elbow the commonest reason for implant removal is prominent painful or infected implant.[16,17] In this study there were three patients who needed removal of implant because of prominence and soft tissue irritation.

CONCLUSION

Tension band wiring in fracture of patella with greater than 3 mm displaced fragments or articular surface disturbance allows early motion and rehabilitation.

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