ORIGINAL ARTICLE

Functional outcome of tension band wiring in closed patella fractures

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Abstract

Objective: The purpose of this study was to find out the results of operative treatment of transverse fractures of patella with tension band wiring.

Study Design: Case series

Setting and Duration: Orthopaedics and Trauma Unit, Khyber Teaching Hospital and Orthopaedics and Trauma Unit, Hayatabad Medical Complex, Hayatabad, Peshawar from January 2008 to June 2009.

Results: Mean time of union was 8-10 weeks, non-union occurred in 3 patients (10%). Post-operative infection was seen in 3 patients (10%). Range of movement was excellent in 20 patients (66.6%) while 7 patients (23.3%) having fractures with comminution element had good range of movement. 3 had (10%) poor result who failed to follow up.

Conclusion: Tension band wiring in fracture of patella with greater than 2mm displacement or articular step 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 5cm 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]. Patellar fractures account for approximately 1% of all fractures, present a higher prevalence within the age group of 20 to 50 years old and males are twice more affected than females. The injury mechanism may be either direct – the most common – or indirect[2]. Patellar fractures are classified regarding trace as: transversal, apex, basis, comminuted, vertical and osteochondral, and regarding degree as: deviated and non-deviated. Transverse fractures are the most common ones, accounting for 50 – 80% of the patellar fractures, comminuted fractures account for 30 -35%, and the vertical ones for 12 – 17%[3]. Patellar fractures result from direct or indirect forces. The majority of patellar fracture results from direct injuries, a fall on knee or a direct blow sustained in vehicular trauma are common aetiologies. Patellar fractures from indirect forces occur when the intrinsic strength of patella is exceeded by the pull of musculotendnous 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[4]. Although patellar fractures appear to be simple injury they do have an important bearing on subsequent knee function. There is no universally accepted treatment for patellar fractures. Treatment options include reconstruction of the entire patella, partial patellectomy and tendon repair or total patellectomy with extensor mechanism repair. Despite advances in surgical techniques, the basic treatment options have not changes significantly and are similar to those available in the early years of patellar fracture surgery. However, the preference is being shifted from patellectomy to reconstruction and preservation of patella and restoration of extensor mechanism[5].

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Material and method:
This study consists of prospective analysis of the result of TBW of 30 cases of transverse close fractures of patella.

The indications for surgery included fracture fragment displacement of >2mm and articular surface incongruency of >2mm. Open fractures, comminuted fractures, transverse fractures with fragment displacement of >2mm, articular surface incongruency of >2mm and children are excluded from the study. Also cases were operated within one week of trauma with AO tension band wiring.

Post-operatively, patients having fractures with stable fixation and limited retinacular tear were encouraged to have continuous passive motion from 1st post-operative day while those with unstable fixation and extensive retinacular tear were placed in a plaster back slab. Active knee motion was allowed only when healing occurred both clinically as well as radiologically.

The results of surgery were evaluated using the Gaur criteria for knee function. Evaluation based on quadriceps wasting, quadriceps power loss, extension lag, knee range of motion, knee pain and functional status and results were graded as excellent, good, fair, poor (Table-I).

Quadriceps wasting was measured by measuring thigh circumference 15cm above knee joint level on both sides and deficit noted in centimeters. Quadriceps power was tested by using spring dynamometer. Quadriceps power of both the knees was calculated and the amount of power loss was calculated as the percentage of quadriceps power loss. Extension lag was calculated by actively extending the knee and noting the amount of loss of active extension knee pain and function were evaluated subjectively.

Table 1: *Gaur criteria for knee function evaluation*

Parameters	Excellent	Good	Fair	Poor
Quads wasting	Nil	<1.5cm	Up to 2.5cm	>2.5cm
Quads power loss	Nil	<10%	Upto 25%	>25%
Extension lag	No	No	<10	>10
Knee ROM	Full	0-110	Up to 90	<90
Knee pain	No	Min	Mod	Severe
Function	Normal	Normal	Restricted	Incapacitated

Table 2: *Final Outcome*

No. of Patients	Range of motion	Status	%
20	100-110	Excellent	66.6
7	80-90	Good	23.3
3	50-55	Poor	10

Results:
In this study 30 patients were included, 20 were males and 10 were females. Age at the time of fracture was from 25 – 55 years. The mean age was 40 years. The main case of injury was RTA in 20 (66.6%) and 7 cases (23.3%) were direct injuries due to slip while climbing stairs. 3 cases (10%) were due to assault, hit with a rod.

There were 3 (10%) cases of non-union. All of them were fibrous and were well tolerated by patients due to limited activities as all of them were above 50 years of age. One patient (3.3%) was in non-union and feeling pain at fracture site. He was offered total patellectomy but he refused.

Range of motion was excellent in 20 patients (66.6%) while 7 patients (23.3%) fractures with some comminution element had good range of motion. 3 patients (10%) had a poor result regarding motion as they were non co-operative came for follow up after 3 months. There was marked atrophy of quadriceps and stiffness of the knee joint. There were 3 (10%) post-operative wound infection which responded to antibiotics and wound dressing.

Discussion:
Patella fracture may be treated either conservatively or operatively. Non-operative treatment is recommended for those cases in which the displacement is less than 2cms with intact extensor mechanism. If the displacement is more than 2cms, than it needs open anatomical reduction and internal fixation[6,7]. In this study, we fixed all displaced fractures with open reduction and internal fixation by Weber's technique of tension band wiring[8].

Union was achieved between 8-12 weeks time which is comparable with national and international studies[9,10]. Three patients end up with fibrous nonunion which was well tolerated because of limited activities and age. One patient was feeling pain at the non-union site because of patellofemoral arthritis; this has been reported in other series also[10, 11, 12].

Rehabilitation for return of quardricep strength and knee range of motion is absolutely necessary after surgery. In our study quardricep strength and knee motion was excellent in 20 (66.66%) patients while seven patients had good results because of comminution and other elements and three patients had poor results because of nonefficient physiotherapy.

Levack reported similar result in his 14 patients study.

Three patients had superficial infection which responded to wound care and antibiotics while Awais from Pakistan reported no infection in his 16 patients study.[8]

The commonest reason for implant removal is persistent pain and infection in the implant [8,13]. In our study two patients needed removal of implant because of pain at the implant site.

Conclusion

Tension band wiring in fracture of patella with greater than 2mm displacement or articular step allows early motion and rehabilitation.

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