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STUDY OF TRANSVERSE PATELLAR FRACTURES TREATED WITH MODIFIED TENSION BAND WIRING

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Abstract

Back Ground:*A Patellar fracture constitutes about 1% of all skeletal injuries resulting from either direct or indirect trauma. Patella is of importance for the extension of knee joint, which increases the force of quadriceps apparatus by improving the leverage. This study directed towards the functional results and complications of modified tension band wiring for patella fractures.*

Any improper and inadequate treatment would inevitably lead to a greater disability especially squatting.

Materials and Methods: *The study consists of 20 cases of displaced transverse fracture patella treated by modified tension band wiring. The patients were followed up for six months and the clinical and functional outcome were evaluated using the modified scale of bostman.*

Results: *In this study, average age was of 39.7 with male patients outnumbered the females by more than double. Right sided patellar fractures were predominant, 70% of our patients had no pain or only mild pain. Only 20%of our patients had significant extensor lag and nearly 80% had normal quadriceps strength. We had 70% excellent, 20% good and 10% poor results according to modified scale of bostman.*

Conclusion:*Our study shows that modified tension band wiring is a definitive procedure in management of displaced transverse patellar fracture with least complications. This surgery helps for early mobilization post-operatively which plays an important role in final outcome. Early and continuous physiotherapy following surgery is a paramount importance in determining the end results.*

Key Words: Modified Tension Band Wiring, Fracture Patella, Knee Joint.

Introduction

The patella is the largest sesamoid bone in the human body situated in front of knee in the tendon quadriceps femoris muscles. It is flattened, triangular distally and curved proximally with the thickness between 1.5cm and 2cm.[1]

The patella is of importance for the extension of knee joint. It increases the force of the quadriceps apparatus by improving the leverage. In addition, it protects the anterior articular surface of distal femur against external violence.

Fractures of the patella constitute almost 1% of all skeletal injuries, resulting from either direct or indirect trauma.[2]
Most are transverse fractures involving the middle third of the patella in patients aged 20 and 50yrs, and affect almost twice as many men as women.

The anterior subcutaneous location of the patella makes it vulnerable to direct trauma as in dash board injuries or fall on flexed knee. Fractures caused by indirect mechanisms result from a violent contraction of the quadriceps with the knee flexed. These fractures usually are transverse and may be associated with tears of the medial and lateral retinacular expansions.

Most patellar fractures are caused by a combination of direct and indirect forces. The most significant effects of fracture of the patella are loss of continuity of extensor mechanism of the knee. Any improper and inadequate treatment inevitably lead to great deal of disability which would be perceptibly felt in a country like India, where squatting is an important activity in daily life.

Modified tension band technique is currently the most widely accepted and several studies have shown a high percentage of good results. Several methods of internal fixation of fractured patella have been advocated. This dissertation is directed towards the clinical evaluation of patella fractures treated with modified tension band wiring.[1, 2, and 3]

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Aims and Objectives

Aim of the Study

- To evaluate the clinical and functional outcome of modified tension band wiring for fractures of patella.

Objectives

- To assess the functional results of modified tension band wiring in patellar fractures.
- To assess the complications of modified tension band wiring in patellar fractures.

Materials and Methods

This study consists of 20 cases of displaced transverse fracture patella treated by modified tension band wiring. The cases were selected based on inclusion and exclusion criteria. This prospective study was conducted at Sri Siddhartha Medical College &Research Centre, Tumkur.

Inclusion criteria:

All closed and type 1open displaced transverse patellar fractures.

1. Age >16 years < 60 yrs.
2. Sex: both male and female
3. Patient who are medically fit for the surgery

Exclusion criteria:

1. Type II and type III compound fractures
2. Grossly comminuted, vertical or marginal fractures.
3. Old fractures (more than 2-3 weeks).
4. Undisplaced transverse fractures.

Pre Operative Procedures

Once the patient were admitted ,the details of the cases were recorded including name, age, sex, occupation, address detailed clinical history, past history, family and personal history clinical history were taken. Thorough general and clinical examination was carried out .Routine blood investigation and Radiological investigations was done.

The limb was immobilized by an above knee plaster of Paris posterior slab.

Patients were explained in detail about surgery, possible complications and limitations to be followed after surgery.

Operative Procedure

The fracture site was exposed through transverse incision/ midline longitudinal incision in front of the knee; the fragments were reduced and held in position with the help of patellar clamp or towel clips. Two Kirschner wires of 2 mm thickness were passed parallel to each other from above down wards starting at its superior border till lower pole of patella is reached. 18 G stainless steel wire was taken and passed deep to ligamentum patellae inferiorly and behind the quadriceps tendon superiorly making a figure of “8” in front of the patella sufficient tension is given. Tear in the quadriceps expansion was sutured with vicryl and wound closed in layers. Above Knee slab or pressure bandage was given as a temporary immobilization. Check X-Rays were done post operatively. The operated knee was immobilized in extension in an above knee posterior slab, and advised to do straight leg raising and weight bearing from third post-operative day. Sutures were removed from 12^{th} to 14^{th} day and knee flexion exercise were started with quadriceps board and with continuous passive motion machine.

Patients were discharged from the hospital once they are fully mobilized and advised to do dynamic quadriceps exercise.

Operative Procedures

Fig 1: After Spinal Anaesthesia

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Fig 2: Parts Painted and Draped

Fig 3: Skin Incision

Fig 4: Fracture Reduction

Fig 5: K-Wire Insertion

Fig 6: Circlage Wire Passing as Figure of Eight

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Fig 7: Skin Closure

Follow Up

The discharged patients were advised to report for follow up on every month, for 6 months, during each follow up the patients were examined for objective assessment including range of knee movement, extension lag, effusion, circumference of thigh, efficacy of quadriceps and questioned for subjective symptoms like pain, use of walking aid, giving away, stair case climbing, squatting which was recorded according to Modified Bostman scale.[5]

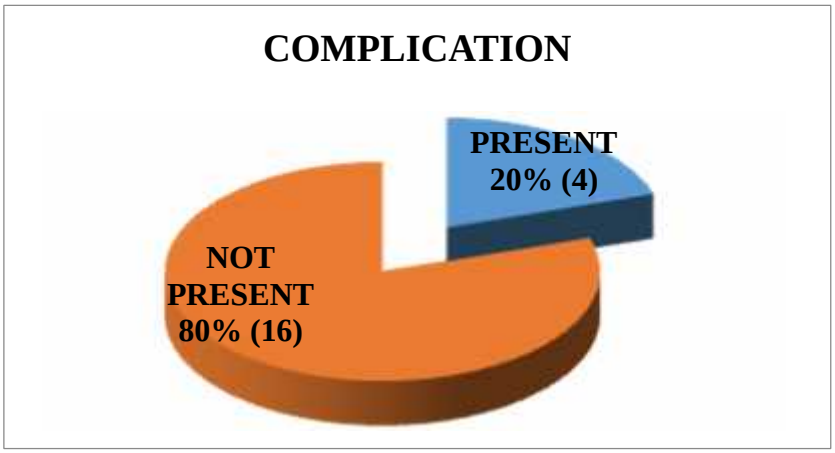
Observation

Table 1 Mechanism of Injury

Mechanism of Injury	No of Cases	Percent
Direct	8	40.00%
Indirect	12	60.00%
Total	20	100.00%

Complications

Complications	Cases	Percentage
Proximal migration of k wire with loss of complete flexion	1	5%
Superficial wound infection with extension lag	1	5%
Extension lag	1	5%
Loss of complete flexion with extension lag	2	10%
Mal union	0	0%
Non union	0	0%
No Complication	15	75%
Total	20	100%



Functional Outcome

Table 2 B: Knee Extensor Lag

Extensor Lag (In Degrees)	Cases	Percent
0 to 5^{o}	16	80%
6^{o} -10^{o}	3	15%
11^{o} -15^{o}	1	5%
Total	20	100%

Score Results

Results	Cases	Percentage
Excellent	14	70%
Good	4	20%
Poor	2	10%
Total	20	100%

Table - 3

Case 1


Fig 2 a.


Fig 2 b.

Pre Operative


Fig 2 c


Fig 2 d

Intra Operative **Immediate Post Operative**


Fig 2 e


Fig 2 f


Fig 2 g

Final Follow Up

Complications
Case 5

Fig 3 a **Fig 3 b**
Final Follow up - Extension Lag and Loss of Complete Flexion

Case 16,
Superficial Wound Infection

Fig 4 a **Fig 4 b**

Discussion

- In this study 26-35 and 46-55 age groups incidence were more with the mean of 39.7.
- In our study, male patients outnumbered the females by more than double.
- Right sided patellar fractures were predominant.
- All fractures selected were of transverse type.
- 10% of our patients had associated injury with extensor lag.
- Modification with longitudinal K-wires was the preferred tension band wiring technique.
- Longitudinal midline skin incision was used in all cases.
- 70% of our patients had no pain or only mild pain.
- Only 4(20%) of our patients had significant extensor lag.
- Nearly 80%our patients had normal quadriceps strength.
- In our study, 90% > 90 of knee flexion.
- The fixation technique did not affect the function of walking.
- 70% cases were excellent and 20% were good.

Conclusion

The study was conducted on 20 fresh patellar fractures during September 2013 and February 2015 with age group varying from 16 to 60yrstreated by modified tension band wiring technique.

In patella fractures the most significant effects are loss of continuity of extensor mechanism of the knee.

The study shows that treatment of patella fractures with modified tension band wiring is a definitive treatment with minimal complications and good functional outcome.

The surgery helps for early mobilization post operatively.

Modified tension band wiring technique, eventually results in a favorable outcome in terms of satisfactory return of knee function.

Early and continuous physiotherapy following the surgery is a paramount importance in determining the end results.

This study favours that modified tension band wiring is the better choice for treatment of transverse patella fracture.

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