

Study of Closed Patellar Fractures Treated by Modified Tension Band Wiring



Medical Science

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ABSTRACT

Patellar fractures constitute about 1% of all skeletal injuries resulting from either direct or indirect trauma. Any improper and inadequate treatment would inevitably lead to a great deal of disability. Various treatment modalities are used in the management of this fracture including conservative management with cast to internal fixation with wire along with k-wire or without it. We have studied outcome of 30(22 male and 8 female) patients with transverse fracture of patella treated with modified tension band wiring(T.B.W.) using ss wire along with k-wire. All patients with average 6 months follow up were assessed clinically and radiologically and based on WEST'S Criteria results were excellent in 26(86.6%), good in 3(10%) and poor in 1 case(3.3%). We concluded that modified T.B.W. is a definitive procedure in management of displaced transverse patellar fracture with least complications. This technique helps for early mobilization post-operatively which plays an important role in final outcome.

INTRODUCTION

Patella is the largest sesamoid bone situated in quadriceps tendon. Function to improve the efficiency of quadriceps muscle by improving the mechanical leverage of quadriceps muscles.

Patellar fractures constitute about 1% of all skeletal injuries resulting from either direct or indirect trauma. The subcutaneous location of the patella makes it vulnerable to direct trauma. Violent contraction of quadriceps muscle results in indirect fracture of patella, which generally leads to greater displacement and transverse type of fracture with less comminution and more association with tears of medial or lateral retinacular expansion.

Any improper and inadequate treatment would inevitably lead to a great deal of disability which would be most perceptibly felt in a country like India where squatting is important activity in daily life. Various treatment modalities are used in the management of this fracture including conservative management with cast for undisplaced fractures¹ and for displaced fractures internal fixation² with cerclage wiring³ or screw fixation⁴ or tension band wire⁵ alone or along with kirschner-wire which is known as modified tension band wiring⁶.

The principle of tension band wiring is to convert the tensile forces generated from the quadriceps complex at the anterior cortical surface of patella into compressive forces at articular surface. With progressive knee flexion, the passive tensile forces in the extensor mechanism in addition to the pressure of the femoral condyles against the patella increase the interfragmentary compression at articular surface.

The advantages of this T.B.W. technique are:

- Early fracture union with minimum complication
- Better rehabilitation with improved range of motion
- Early ambulation and weight bearing

MATERIAL AND METHOD

We have done a study to evaluate the results of modified tension band wiring in management of displaced transverse fracture of patella. Our study included 30 patients (22 male and 8 female). Diagnosis is confirmed by the Antero-posterior and Axial radiograph of involved patella as seen in fig I. We have used descriptive classification to classify the fractures.

Figure I: Pre operative radiographs

PRE-OP X-RAY



After general assessment of the patient routine blood investigation that include complete blood count, serum urea and creatinine, blood sugar and blood group are done as part of preoperative workup. Patient is taken in operation theatre and anaesthetised and shifted to operative table in supine position with hip and knee in extension. After thorough antiseptic wash, painting and draping of operative area done. The procedure is done under tourniquet to achieve bloodless operative field and to decrease blood loss.

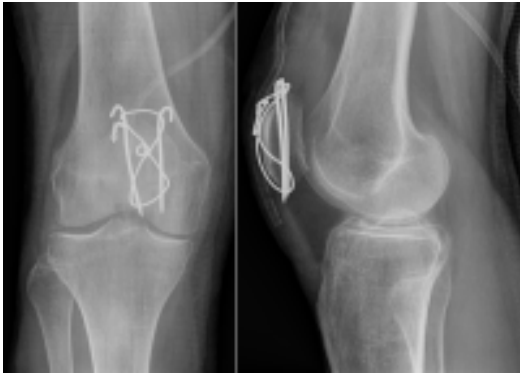
The fracture site is exposed through transverse or midline longitudinal incision over patella. The fracture fragments are reduced and held in position with help of patellar clamp or towel clip. After that two k-wire of 2mm thickness are passed parallel to each other from inferior pole of patella to superior border through each fragment. These wires are placed about 5 mm deep to the anterior surface of the patella

Then an 18 gauge stainless steel wire is passed in figure of 8 fashion by passing it through quadriceps tendon attachment and through the patellar tendon attachment on inferior fragment.

Bend the upper ends of two k-wire acutely anteriorly and cut them short and then rotate the k-wires to 180° and with an impactor bury the bent ends into superior margin of patella. (Fig II)

Tear in the quadriceps expansion is sutured with absorbable sutures and wound closed in layers.

Figure II: Modified tension band wiring(postoperative radiograph)



Postoperative protocol:

- Immediately after surgery, limb is supported by above knee slab for temporary immobilization.
- Analgesic is given as and when required.
- Quadriceps muscle strengthening exercise is started as soon as possible after surgery.
- Sutures are removed on the 12th postoperative day.
- Hospital stay: Patient is discharged as soon as the wound and general condition of the patient is satisfactory- usually in 4 to 5 days.

OBSERVATION AND DISCUSSION

In our study of 30 patients, the age of the patients ranged between 14-72 years with the mean age 42.05 years and the incidence of patellar fracture was found to be high in the age group

of 41-50 years.

Out of 30 fractures, 22 fractures were found in men and 8 fractures were in females.

Indirect mechanism was responsible for 20 fractures while 10 cases were due to direct trauma to the patella as in road traffic accident. 17 patients had fracture on the right side and 13 patient had fracture on the left side.

Bed side knee bending was started in all patients as soon as possible; mostly by second or third postoperative day

The union occurred in mean period of 10 weeks.

The results were analysed by Wests criteria which includes the range of motion and its compromise if any, subjective symptoms and quadriceps wasting and according to it the result was excellent in 26 cases (86.6%), good in 3 cases (10%) and poor in 1 case (3.3%).

CONCLUSION

From our study of modified tension band wiring in transverse fracture of patella we come to the following conclusions.

- It is a definitive procedure for displaced transverse fracture of patella
- To achieve near normal range of motion with least complication the principle of tension band wiring should be used
- Early knee bending helps to achieve the goal of tension band wiring
- Modification of T.B.W. with addition of K-wire improves the stability of fixation which ultimately helps in earlier rehabilitation.

REFERENCE

1. Bostrom A : fracture of patella, Acta Orthop Scand Suppl 143:1, 1972 | 2. Anand J Thakur: The element of fracture fixation, 2nd edition, 2007:10-15 | 3. Anderson LD: Campbell's Operative Orthopaedics. 5th ed. St. Louis: Mosby, 1971 | 4. Weber M et al : efficacy of various form of fixation of transverse fracture of patella. J Bone Joint Surg Am 1980;62A:215-220 | 5. Muller ME et al : Manual of internal fixation. Techniques recommended by AO group. Berlin: Springer 1979 | 6. Benjamin J: biomechanical evaluation of various form of fixation of transverse fracture of patella. J Orthop Trauma 1987