



Original Research Article

An Observational Study on the Modified Tension Band Wiring Technique for the Management of Patients with Patella Fracture

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Abstract

Objectives: *Our study was to evaluate the clinical and functional outcome of patients with patella fracture by the use of modified tension band wiring technique.*

Methodology: *A total of 20 patients with patella fracture were taken. A detail history, examination and relevant investigation were done to all patients. Modified tension band wiring procedure was performed for the management of patients with patella fracture.*

Results: *Data was analyzed by using simple statistical methods with the help of MS-Office software.*

Conclusions: *Middle age group patients were more prone to patella fracture. Common mode of patella fracture was accidental fall on the same plane. Gold standard technique for the management of the transverse fractures of patella was modified tension band wiring. Early mobilization of joint after the procedure was most effective for achievement of good functional outcome.*

Keywords: *Patella fracture, modified tension band wiring technique, outcomes.*

Introduction

Patella is the largest sesamoid bone in the body situated in front of knee. Fracture patella can occur either by direct or indirect force^[1]. The direct force often results in comminuted or displaced fractures. Transverse fracture of patella is usually due to violent contraction of quadriceps muscles with knee flexion^[2,3]. There are various

forms of surgical treatment for fracture patella. They are open reduction and internal fixation with inter fragmentary screws, tension band wiring, cerclage wiring, combined tension band wiring and cerclage wiring, partial patellectomy, total patellectomy^[4]. Modified tension band wiring is the best treatment for displaced transverse fractures. The principle of TBW is distractive

forces at fracture site are converted to compression force. The implant absorbs the tension and bone compression [3,4,5]. Weber et al [4] reported that modified TBW is the most secured fixation for patella fractures.

Knee joint and was responsible for improving its efficiency. It is because of this that the need to preserve the whole or part of the patella becomes imperative, especially in a country like India where social habits and needs require a full range of knee flexion. Several methods of internally fixing the fractured patella have been advocated. This dissertation is directed towards the clinical evaluation of the modified tension band wiring technique for the fractured patella. Aims of our study was to evaluate the mode of injury for fracture of patella, assess knee joint motion and stability after the procedure, clinically evaluate the modified tension band wiring technique for management of fracture patella and to evaluated the functional outcome by early mobilization.

Materials and Methods

This study was conducted in department of Orthopedics, Katihar Medical College, Katihar, Bihar, India during a period from January 2016 to June 2017. Attendants/patients signed an informed consent approved by institutional ethical committee of Katihar Medical College, Katihar, Bihar, India was sought.

A total of 20 subjects (15: males & 5: females) with fractured patella were included in this study.

Inclusion Criteria of this study was age more than 20 years, all Closed displaced transverse fracture of patella with displacement of more than 3 mm, open transverse fracture of patella (gustillo type 1) with displacement of more than 3 mm. Exclusion Criteria was age <16 years, old united fractures, compound fracture, gustillo type 2 and 3 and comminuted fracture patella.

Methods

A total of 20 patients who had fractures were enrolled. All patients were followed up for duration of 6 months. A detail clinical history and examination were performed to all patients. The

name, age sex, occupation, address, family history and past history were noted. The history was elicited from the patients. The nature of trauma, whether due to direct or indirect violence were noted. Whether trauma due to road traffic accidents, assault, fall in the same plane or fall from a height were specifically asked. Enquiry was made to note pain, swelling its rate of increase and if the patient was able to bear weight on the affected limb and was able to do active movements of the affected joint. General condition was examined as to his build. Nutritional status, the condition of respiratory and cardio-vascular system, central nervous system, abdomen and for associated injuries. Local examination of the knee joint was done thoroughly.

Routine examination of blood and urine were done for hemoglobin percentage, total and differential WBC count, bleeding and clotting time and presence of albumin and sugar in urine tests.

X-rays in lateral and antero-posterior views were taken for confirmation of diagnosis. X-rays in skyline view were taken in cases suspected to have longitudinal and marginal fractures. After the X-rays the limb was immobilized by an above knee (A/K) POP posterior slab. Operations were done at a later date. If abrasions were presents in the skin they were cleaned, dressed and antibiotics given. Patients were prepared for surgery during this period. On the day before the surgery the part was prepared and antibiotics started. Patients were taught static quadriceps drill and straight leg exercises. All the cases were assessed based on West's Criteria. Which is graded as- Excellent:- 1: Patient do not have any limitation of activities. 2: No loss of flexion. 3: No extensor lag. 4: No subjective complaints. 5: No quadriceps wasting or subsequent reduction in power. Good (1 OR >1 Criteria):- 1: Moderate limitation of activity. 2: Extensor lag of 5-10 degrees. 3: Minimal wasting of quadriceps and power of grade 4. 4: Some subjective symptoms. 5: Flexion loss not >30 degrees. Poor (1 or>1 Criteria:- 1: Marked

limitation of activities with significant. 2: Complaints of pain and weakness. 3: Marked quadriceps wasting and power <3. 4: Extensor lag >10 degrees. 5: Flexion loss >30 degree.

Statistical Analysis

Data was analyzed by using simple statistical methods with the help of MS-Office software.

Results

This study was conducted in department of Orthopedics, Katihar Medical College, Katihar, Bihar, India. In this we were taken a total of 20 patients (15: males & 5: females) with fractured patella were treated by the modified tension band wiring technique, special attention was given to mobilize the knee early as it helps to regain the quadriceps power. Male and female ratio was 3:1.

Table.1. Sex incidence of patients with patella fracture.

Sex	No. of cases	Percentage
Male	15	75%
Female	5	25%

In this we were taken of patients with age group of 20 to 70 years. Majority of cases 8(40%) were in age group of 31-40 years.

Table.2. age group of patients with patella fracture

Age in years	Number of cases	Percentage
20-30 years	4	20%
31-40 years	8	40%
41-50 years	3	15%
51-60 years	3	15%
61-70 years	2	10%

In this study, we were seen that majority of cases 12(60%) had patella fracture by the fall in same plane, 8(40%) had patella fracture by the road traffic accident.

Table.3. Mode of injury of patients with patella fracture

Nature of trauma	Number of cases	Percentage of cases
Fall in same plane	12	60%
Road traffic accident	8	40%

In this study, we were found that 4(20%) cases were mild difficulty in squatting. None of the

patients had pain, difficulty in climbing stairs, difficulty in squatting down stairs and sense of weakness or giving away of knee.

Table 4. complains of the patients with fractured patella

Complaints	No. of cases	Percentage
Pain		
Mild difficulty in squatting	4	20
Difficulty in climbing stairs	None	None
Difficulty in squatting down stairs	None	None
Sense of weakness or giving away of knee	None	None

In this study, after the treatment by the procedure of modified tension band wiring technique. 4(20%) patients were limitation of flexion, 4(20%) were minimal quadriceps wasting and 4(20%) cases were quadriceps power of grade 4. None of the cases were extension lag.

Table 5 Outcome after modified tension band wiring

Deficiency	No. of cases	Percentage
Limitation of flexion	4	20
Minimal quadriceps wasting	4	20
Quadriceps power of grade 4	4	20
Extension lag	None	None

After the procedure of modified tension band wiring technique and early mobilization of knee, we were seen that 15(75%) cases were excellent results.

Table 6 Functional outcome of patients after 6 follow up

Result	No. of cases	Percentage
Excellent	15	75%
Good	5	25%
Poor	0	

Discussion

Modified tension band wiring technique is surgical procedure. This technique is performed for the anatomic reduction, restore articular congruity, preservation of patellar bone stock, and repair of extensor mechanism. Modified tension band wiring is most widely used technique in

patella fracture fixation^[6]. Fracture patella can occur at any age. But the frequency in children and adolescents under 20 years of age is low. In this study the minimum age was 21 and maximum age 70 years. The mean age was 39 years and maximum incidence was seen in between 31 to 40 years. Levack B et al^[7] conducted study on patellar fracture and observed 49 years was average age for patellar fracture. In Bostrom (1972) series, the mean age was 48 years ranging between 16 to 89 years.^[8]

In this study 15 patients (75%) were males and 5 (25%) were females. In the series of S.K. Basu Ray the incidence was 71% males and 29% females^[9]. In Jonathan Wilkinson series, the incidence was 68% males and 32% females.^[10]

In the present study Indirect trauma (12 cases (60%)) was more commonly associated with patellar injury compared to (8 cases (40%)) direct trauma (RTA). which were comparable with study conducted by Maini PS et al^[11] they observed 65% direct trauma was associated with patellar fractures.

In the present study included only Transverse fracture pattern of patella, which were displaced. Present study indicating indirect trauma and transverse fractures go hand in hand most of time and this type of fracture pattern showed excellent result with modified tension band wiring irrespective of the subject. Which were comparable with study conducted by Maini PS et al^[11] observed 70% of Transverse fractures in their study.

In our study, quadriceps strength was graded 0-5 from no muscle activity to full strength. It was assessed by comparing with the normal side. In this study only 4 cases (20%) had grade IV strength. All the other cases (80%) had grade V.

In Srinivas et al^[12] (1984), series, normal power was in 93% of patients. In the study of Jakobsen et al^[13] (1985) and Edwards et al^[14] (1989) reduction in quadriceps strength was seen in 33% and 44% cases respectively.

In this study 4 cases (20%) had limitation of flexion of only 20 degree of knee flexion. All the

other cases had complete range of knee movement. whereas in Srinivas et al^[12] (1984), series, all cases (100%) had full range of movements.

None of the patients had extension lag at the end of 6 months in the present study.

At final assessment, the functional outcome in the present study were graded according to the west criteria out of 20 cases 15 (75%) cases were excellent, 5 (25%) cases were good. None of the cases were any poor result.

Conclusion

Our study concluded that middle age group patients were more prone to patella fracture. Common mode of patella fracture was accidental fall on the same plane. Gold standard technique for the management of the transverse fractures of patella was modified tension band wiring. Early mobilization of joint after the procedure was most effective for achievement of good functional outcome.

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