

Local Infection is the Most Common Complication after the Using of Modified Tension-Band Wiring in the Treatment of Close Patellar Fractures

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ABSTRACT

Introduction: Patellar fracture is about one percent of all the skeletal fracture. It is problematic due to the loss of extensor mechanism of the knee joint, loss of articular congruity and stiffness of the knee joint. Now a days MTBW Modified tension band wiring is the best procedure for patellar fracture due to the dramatic decrease in post operative complications with said procedure. The most common complications noted in the early post operative period are knee stiffness, prominence of hardware, loss of reduction, and local infection.

The rationale of the study is that, not many studies from this region have focused on the early outcome following this surgical intervention for the treatment of patellar fracture. Based on this study data post operative care will be provided to reduce the complications i.e. stiffness of knee joint and will help to improve the overall management of our patients.

Objective: To determine the frequency of local infection (Most common complication), after the using Modified Tension Band Wiring for closed patellar fractures.

Materials and Methods: This study was started in June 2024 to May 2025 in the department of orthopedic surgery at LRH Lady Reading Hospital, Peshawar. It is a descriptive cross-sectional study, in this study 100 patients of closed patellar fractures were selected from the OPD and also from ER department. These patients were subjected to modified tension band wiring under general anesthesia by orthopedic surgeon and data was also collected at 1st week, and then after 1st, 3rd & 6th months regarding early post operative complications like loss of reduction, local infection, prominence of hardware and knee stiffness.

Results: There were sixty (60%) males and forty (40%) were females. Mean age of the patients was 43.82 years + 14.3SD years (range 20-85 years). Overall complication rate by the end of 6 months was decrease in complication rate i.e. 25%. In which loss of reduction was reduced to 4%, hardware prominence 6%, stiffness 11%, local infection 21% and no complication rate was 75% observed.

Conclusion: The frequency of early post operative complication local site infection following by modified tension band wiring for closed patellar fractures was higher than previously reported studies. There for further research work should be needed to identify the main factors responsible for such complications and to reduce the frequency of MTBW complications.

KEYWORDS: Patellectomy (removal or replacement of patella), Closed patellar fracture, Modified Tension Band Wiring, RTA, early post operative complications, skeletal fracture.

INTRODUCTION

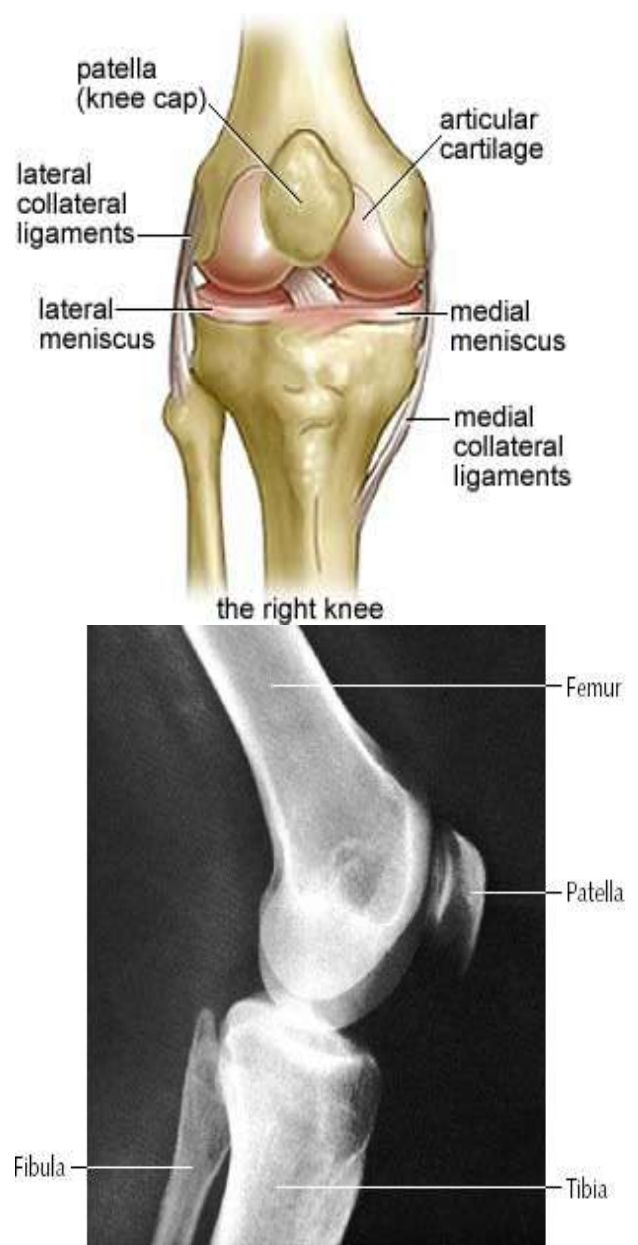
Patellar fractures account about 1% of all skeletal fracture^{1,2}. They are caused by either direct injuries such as road traffic accident or falling on the knee or by indirect injuries from hyper contraction of the quadriceps muscles³. Patellar fractures are problematic because the loss of the extensor mechanism of the knee joint occur, loss of articular congruity and stiffness of the knee joint and wound site infection⁴. In order to reduce these problems, the surgical goals are proper anatomic reconstruction of the articular surface and stable fixation to allow early motion⁴. Surgical methods of treatment for patellar fracture includes, screw fixation, partial patellectomy, modified tension band wiring, and patellectomy. Modified tension band wiring is the updated procedure for patellar fracture these days because of the dramatic decrease in post operative complications with MTBW procedure^{5,6}.

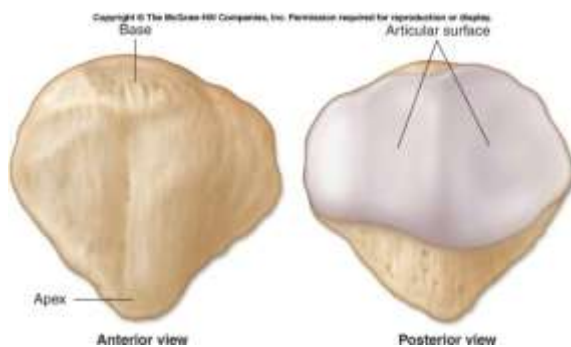
The most common complications after MTBW for patellar fractures includes, infection, prominence of hardware, loss of reduction, stiffness of knee joint, vascular necrosis, nonunion, and post traumatic arthritis^{7,8}. Amongst these the complications the localised infection is heigher then the prominence of hardware, loss of reduction, and knee stiffness^{9,10}.

The over all prevalence of post operative complications with MTBW reported in some previous studies and literature is 15% hardware prominence, 18% infection, 20% for knee joint stidffness and 22% for loss of reduction^{11,12}. This study will furnish important local epidemiological data and based on this data post operative care will be provided to decrease these complications and will help to improve the treatment of our patients.

Basic Anatomy: The knee joint is a synovial condylar joint. The knee is the largest joint in the body and is often the site of pain and injury. The joint is made up of the lower end of the femur (thigh bone) and the upper end of the tibia (shin bone). The patella (kneecap) slides along a groove on the femur, and covers the front of

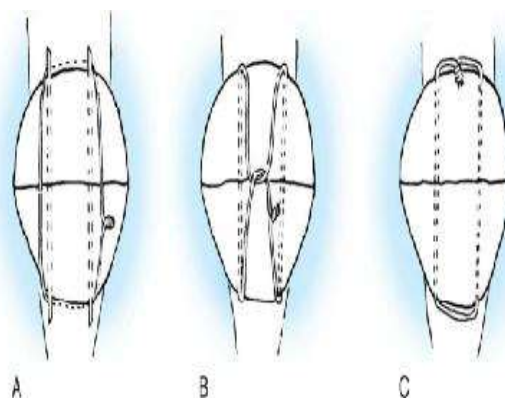
the joint. The meniscus and cartilage cushion the spaces between these bones, and act as shock absorbers during movement¹³. Branches of the femoral nerve, obturator nerve and the medial and lateral popliteal nerves. Movements: Flexion involving hamstring, gastronemius and sartorius muscles. Extension by the quadriceps femoris muscle. Medial rotation and lateral rotation only occur when there is some degree of flexion¹⁴.





ANATOMY OF PATELLA

Fracture of the Patella: Fractures of the patella or “kneecap,” are relatively common in adults¹⁵. A patella fracture (PF) occurs most commonly in a fall against a hard surface, with direct impact of the hard surface against the patella with the knee bent. Often it is associated with abrasions or lacerations of the skin over the patella. Occasionally the patella can be fractured simply from very forceful contraction of the muscles of the thigh, when the force of the muscle pull exceeds the strength of the patella¹⁶. Diagnosis of a patella fracture is made in the hospital Emergency Room. X-ray images of the patella bone are obtained which may demonstrate fracture lines on the patella. Also, the knee is typically swollen and quite painful, and the patient is unable to do a straight leg raise. If the patient is able to straight leg raise without assistance, then patella¹⁷.



Types of Patellar Fixation

A, Modified Tension Band

B. Lotke Longitudinal Anterior Band (Lab) Wiring

C. Magnusson Wiring.



X Ray View of Patella Fracture Fixed with Tension Band

Objective: To determine the frequency of early pre-operative complication following modified tension hand wiring for closed patellar fractures.

MATERIALS AND METHODS

Study Design: Cross sectional study.

Setting: Orthopedic department PGMI/ Lady Reading Hospital Peshawar

Duration of Study: Minimum of 12 months after approval of synopsis. The data was collected between June 2024 to May 2025.

Sample Size: The sample size was 100, using 15% prevalence, 95% confidence level and 7% margin of error, using WHO software for sample size calculation.

Sample Technique: Non-probability consecutive sampling.

Sampling Selection

Inclusion Criteria

- Patient aged 16 years are above
- Closed patellar fracture: displaced, un-displaced or comminuted.
- Both sexes.

Exclusion Criteria

- Evidence of previous knees surgery, because this will affect knee stiffness and infection rate.
- Open fractures, because in these cases the infection rate is high.
- Any other debilitating disease, in which patient fitness for anesthesia is at high risk.

Data Collection Procedures

All those patients presented to the accident and emergency department with history of trauma to knee and confirmation of patellar fracture by radiology, fulfilling the inclusion criteria were included in study after taking permission from the hospital ethical committee. Informed written consent was taken from patient after explaining the cost and complication of the procedure. Confounder and bias in the study was controlled by following the exclusion criteria. After initial resuscitation and stabilization of fracture site these patient were admitted in orthopaedic unit. In ward these patients were assessed through detailed history, mechanism and type of injury and thorough physical examination. Then after preoperative evaluation and fitness for anesthesia, these patients were operated on the nearest possible list. Modified tension band wiring surgical procedure was applied on these patients. Post-operatively all patients were advised a check X-ray after recovery from anesthesia. Following a hospital stay of few days, patients were discharged on decision of the attending surgeon. Follow up visits were conducted in the out-patient department at 10 days; 1 month, 3 months and 6 months post operatively. The check list Performa containing the entire necessary variable (complication) was followed upon advising investigations as depicted by the operational definitions mentioned.

Statistical Analysis: The data was analyzed using SPSS version 11. Variables under study for descriptive statistics were age, sex, and loss

of reduction, prominence of hardware, infection and stiffness. Frequency and percentages was calculated for categorical variable like sex, loss of reduction, prominence of hardware, infection and stiffness. Mean $\pm$ standard deviation was used for numerical variables like age. Data was presented in tables, charts and figures.

RESULTS

Patients age was divided in four categories, patients presented in age i.e less than or equal to 30 years which were 16(16%) while 42(42%) patients were in the age range of 31-45 years, 28(28%)were of age range 46-60 years and 14(14%) presented at age more than 60 years. The study included age ranged from 20 up to 85 years. Average age was 43.82 years $\pm$ 14.3SD. Early complication at 1st week shows that there were 35% of complications. In which loss of reduction was 6%, hardware prominence 10%, infection 12%, stiffness 7% noted. (Table 1)

Table No: 1. Early Complications at 1st Week

Complications	Frequency	Percent
Loss of Reduction	6	6.0
Hardware Prominence	10	10.0
Infection	12	12.0
Stiffness'	7	7.0
No Complication	65	65.0

Early complication at 1st month shows that there were 31% of complications. In which loss of reduction was 6%, hardware prominence 7%, infection 13%, stiffness 5%. (Table 2)

Table No: 2. Early Complications at 1st Month

Complications	Frequency	Percent
Loss of Reduction	6	6.0
Hardware Prominence	7	7.0
Infection	13	13.0
Stiffness	5	5.0
No Complication	69	69.0

Early complication at 3rd month shows that there were 28% of complications. In which loss of reduction was reduced to 4%, hardware prominence 7%, infection 7%, stiffness 5% and

no complication rate was 72% observed. (Table 3)

Table No: 3. Early Complications at 3rd Month

Complications	Frequency	Percent
Loss of Reduction	4	4.0
Hardware Prominence	7	7.0
Infection	7	7.0
Stiffness	3	3.0
No Complication	72	72.0

Similarly Early complication at 6th month shows that there was decrease in complication rate i.e. 25%. In which loss of reduction was reduced to 4%, hardware prominence 6%, infection 21%, stiffness 11% and no complication rate was 75% observed. (Table 4)

Table No: 4. Early Complications at 6th Month

Complications	Frequency	Percent
Loss of Reduction	4	4.0
Hardware Prominence	6	6.0
Infection	21	21.0
Stiffness	11	11.0
No Complication	75	75.0

DISCUSSION

Fracture of Patella is a serious injury with the poor functional results. Because of conflicting report of postoperative morbidity, it is important to study the result of patellar treatment. As we know that the course of fracture healing and functional outcome is directly related to the method of treatment. It is a known that the expected result of the MTBW techniques is affected by some factors such as variety of patellae, surgical practice and traumatic damage¹³.

In this study One Hundred patients were included. Patients' age ranged from twenty to eighty five years. Majority of the injuries were in the 4th and 5th decade of life, which means working individuals who were more outgoing suffered the most.

The most common mode of injury was RTA road traffic accidents accounting for 74% of cases (74 out of 100). It signifies that high incidence of patellar fracture in high impact trauma and the same is reported by Torchia et al who reported 90% cases of patella fracture had history of road traffic accidents and same reported by Mehdi et al¹⁴ and 92.3% by [Ndiaye A et al¹⁵](#).

The complication rate in our study was little bit higher after 6th month of follow-up for what was previously reported. The overall rate of complications as reported in previous literature ranged from 0% to 15%^{16,17} which in our study was found to be a total of 25% (16 out of 100). This was very much higher from what was previously reported by Lotke 16%¹⁸, Chen A et al reported 5.2% and less than 5% by Bostman²⁴. Postoperative complications can be minimized by good attention to wound care, accurate fracture reduction, secure fracture fixation and an early range of motion. Despite the surgeon's best efforts, however, post-tension band complications can develop and may require additional treatment¹⁹. However Ha CW et al showed 0% complication rate in their study²⁰.

The incidence of symptomatic hardware is difficult to report because it is rarely reported in previous studies, Hunt reported 10% of patients in their series with hardware prominence within the first 12 months¹⁶, while Yum Tian reported it to be 15%.

The rate of infection after tension band wiring in our study was also found to be somewhat higher in the previous studies; this might be due to the fact about poor socioeconomic status of our population with poor nutritional status and also not forgetting poor attitude toward follow up and wound care. In our study it was observed to be in around 21% of patients which needs immediate considerations. The results of our study totally different from the study conducted by Shrestha B et al who showed that infection occurred only in 2.7% of patients¹³. However the study reported by Hunt showed somewhat closer to what we found in our study reporting 15% of patients who developed infection after tension wiring fixation for patellar fractures¹⁶. The loss of reduction was another early complication which was scrutinized in our study

after fixing patellar fractures with tension wire bands. In our study the overall complication rate though high, but the loss of reduction was minimal as compared to other early complications. The same was reported in other studies (though rare) in the literature.

Another complication noted in our study was stiffness of the knee joint. This complication is also very rarely reported in previous studies. Regular physiotherapy with other exercises greatly reduces the incidence of knee joint stiffness.

CONCLUSION

The study was conducted in view to the routine use of MTBW technique for closed patellar fractures. The post-operative complication rate was found to be higher than previously reported data which is addressed. The overall high complication rate may be because of various factors which should be studied to reduce the complication rate. Proper reduction and fixation of patella fractures is technically demanding and requires strict attention to detail.

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