



FUNCTIONAL RESULTS OF TENSION BAND WIRING IN TRANSVERSE PATELLAR FRACTURE CASES

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ABSTRACT

Background: Since the patella is the largest sesamoid bone, it is better mechanically advantageous to have more knee extension force because it is enclosed in the quadriceps tendon. It absorbs compressive stresses at the point where it connects to the femur and transfers tensile forces from the quadriceps to the tibia. About 1% of all fractures are patellar fractures, which mostly strike active people between the ages of 20 and 50 years. Transverse breaks are the usual presentation of these fractures. They frequently result from either direct or indirect trauma.

Objective: To analyze functional results of tension band wiring in transverse patellar fracture cases.

Study design: A cross-sectional study

Place and Duration: this study was conducted in Niazi Medical and Dental College Lahore Road Sargodha from July 2022 to July 2023

Methodology: A total of 40 patients were included in this study. All of the participants were having Transverse Patellar fractures and they were aged between 20 to 45 years. In order to confirm the fracture, the radiographs of the knee were obtained. A brace that was quite rigid was used to immobilize the fracture. Following the required assessments, all patients had their scheduled operation as soon as possible. The patient was placed supine on the operation table while under spinal anesthesia. The middle of the patella was the site of a midline longitudinal incision. The retinaculum's rips and the shattered patella surface were made visible by carefully removing the skin and surrounding tissue.

Results: A total of 40 people were involved in this study, out of which 30 were male and 10 were females. Overall 16 (40%) of the cases showed extension lag in the first follow-up. The average operation time was 90 minutes. A total of 24 patients had injury due to indirect trauma while 16

participants were those who had injury due to direct trauma. After 6 months follow-up, 32 (80%) of the participants showed excellent results.

Conclusion: Because the implant offers consistent support and makes the postoperative rehabilitation process easier, tension band wiring is a safe and effective way to treat transverse patellar fractures.

Keywords: transverse patellar fractures, tension band wiring, adults, postoperative rehabilitation

INTRODUCTION

Since the patella is the largest sesamoid bone, it is better mechanically advantageous to have more knee extension force because it is enclosed in the quadriceps tendon [1, 2]. It absorbs compressive stress at the point where it connects to the femur and transfers tensile forces from the quadriceps to the tibia [3, 4]. These forces vary with the degree of knee flexion, reaching their maximum at 45 to 60 degrees when the tensile force is at its highest [5]. Joint contact pressures can increase to 3.3 times body weight when performing stair climbing exercises and up to 7.6 times body weight when squatting [6].

About 1% of all fractures are patellar fractures, which mostly strike active people between the ages of 20 and 50 years [7]. Transverse breaks are the usual presentation of these fractures. They frequently result from trauma, either direct or indirect [8, 9]. A violent collision, like falling on one's knee or slamming onto a hard surface, causes direct trauma [10]. Abrupt jumps or quick knee flexion against fully tensed quadriceps might cause indirect fractures [11, 12]. Significant side effects, such as restricted range of motion in the knee joint and post-traumatic arthritis in the patellofemoral joint, may occur if treatment is not fully successful.

There are differing opinions on how to treat patellar fractures [13]. Traditionally, non-surgical treatment has only been available for fractures in which there is no considerable displacement of the joint surface, the gap is less than two millimeters, and the quadriceps is still intact [14]. Tension Band Wiring is a frequently used therapeutic technique for displaced transverse patellar fractures [15]. The transformation of distractive forces at the fracture site into compressive forces is its basic idea. This technique uses an implant that facilitates bone compression while absorbing strain. Patellar fractures must be well fixed in order to allow for early knee mobilization without damaging displacement at the fracture site. The functional results of tension band wiring in transverse patellar fracture cases are evaluated in this study.

METHODOLOGY

A total of 40 patients were included in this study. All of the participants were having Transverse Patellar fractures and were aged between 20 to 45 years. All of the participants were briefed about this research and their written consent was obtained.

Exclusion criteria: Those people who were having comminuted fracture were not a part of this research. Moreover, people who were medically unfit as well as those who were reluctant for surgery were also not a part of this research.

Every patient's detailed history was obtained. According to the proforma, every patient's clinical examination was conducted. In order to confirm the fracture, the radiographs of the knee were obtained. A brace that was quite rigid was used to immobilize the fracture. Following the required assessments, all patients had their scheduled operation as soon as possible. The patient was placed supine on the operation table while under spinal anesthesia. The middle of the patella was the site of a midline longitudinal incision. The retinaculum's rips and the shattered patella surface were made visible by carefully removing the skin and surrounding tissue. A lot of saline was used to clean the fracture and joint, getting rid of tiny pieces of bone and blood clots. With the use of towel clips and patellar clamps, the fracture pieces were positioned anatomically.

Drilled into the patella from top to bottom, two 2 mm Kirschner wires were inserted, staying approximately 5 mm deep from the front surface. Parallel cables were used for them. Subsequently, beneath the Kirschner wires and across the quadriceps tendon near the bone, an 18-gauge stainless

steel wire was inserted. It was wound in a figure-of-eight pattern around the front of the patella. A second wire was coiled over the front of the patella and put across the patellar tendon at the lower fragment. The upper ends of the Kirschner wires were bent and inserted into the patella's top after the upper wire was tightened. The bottom Kirschner wires' projecting ends were chopped off short. After cleaning the wound and repairing any tears in the surrounding tissue on both sides, the incision was layer-closed. To keep the leg motionless, a lengthy knee brace was fitted. Following the procedure, patients were checked at the two-, four-, three-, and six-month marks. Every visit included a score for knee pain. We also recorded the quality of motion, extension latency, and range of motion. To see if the fracture had healed, X-rays of the operated knee were obtained.

RESULTS

A total of 40 people were involved in this study, out of which 30 (75%) were male and 10 (25%) were females. Overall 16 (40%) of the cases showed extension lag in the first follow-up. The average operation time was 90 minutes. Table number 1 shows the demographics of the patients as well as how they attained the fractures.

Table no. 1: demographics of the patients

Variables	N	%
Gender		
• Male	30	75
• Female	10	25
Knee involvement		
• Right knee	26	65
• Left knee	14	35
Cause of fracture		
• Indirect trauma	24	60
• Direct trauma	16	40

Table number 2 shows the good fellows grading of range of motion.

Table no. 2: good fellows grading of range of motion

Grading	Range of motion
Poor	Limitation of >40 degrees flexion
Satisfactory	Painless movement with a limitation of 20-40 degrees of flexion
Fair	Limited flexion, painless movement with 10 to 20 degrees
Good	Painful squat but full flexion
Excellent	Able to squat, full painless movement

Table number 3 shows functional results according to good fellow grading.

Table no. 3: functional results according to good fellow grading

Grading	2nd week	4th week	3rd month	6th month
Poor	32	12	0	0
Satisfactory	7	15	0	0
Fair	1	9	9	3
Good	0	4	16	5
Excellent	0	0	15	32

DISCUSSION

The main objectives of surgery for patellar fractures are to mend the extensor mechanism, preserve the patellar bone, restore the correct joint surface, and achieve exact alignment. The most often used technique for treating transverse patellar fractures is tension band wiring [16].

According to Mehdi and colleagues' investigation, Tension Band Wiring proved to be effective in treating 203 patellar fractures [17]. Gardner et al. came to the conclusion that anterior tension band fixation techniques are an important part of the treatment strategy for patellar fractures, with consistent results, particularly in cases of simple transverse fracture patterns [18]. A comparison of the modified AO tension band approach and cerclage wiring plus tension band was done in 1990 by Curtis MJ et al [19]. They discovered that the combination of tension band wiring and cerclage was significantly more effective, indicating that this strategy should be used.

Berg EE et al. reported that radiographic healing of a transverse patellar fracture took an average of 13 weeks [20]. By the twelfth week, every patient in our study showed signs of radiological healing. Our analysis also showed that among transverse patellar fractures treated with tension band wire, 80% of patients had outstanding results, 12.5% had good outcomes, and 7.5% had fair results.

CONCLUSION

Because the implant offers consistent support and makes the postoperative rehabilitation process easier, tension band wiring is a safe and effective way to treat transverse patellar fractures.

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Conflict in the interest

The authors had no conflict related to the interest in the execution of this study.

Permission

Prior to initiating this study, approval from the ethical committee was obtained to ensure adherence to ethical standards and guidelines.

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