
**FUNCTIONAL OUTCOME OF TRANSVERSE PATELLA FRACTURES TREATED WITH
CANNULATED CANCELLOUS SCREW AND TENSION BAND WIRING**

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ABSTRACT

Background: Most patellar fractures are transverse involving the central third. Open reduction and stabilization of transverse patellar fractures is indicated if there is more than 2-3 mm of fragment separation and/or articular incongruity. **Materials and methods:** Twenty four patients with Transverse patella fractures treated by cannulated cancellous screw with TBW from June 2013 to June 2015 at Rajah Muthiah Medical College and Hospital with two year follow up were studied and the clinical outcomes of these patients were evaluated with simple radiographs, and Iowa scoring. **Results:** The cannulated screw tension band showed improved fracture reduction, reduced healing time, and better Iowa score. There were no complications in the cannulated cancellous screw and tension band group. **Conclusion:** The cannulated screw with tension band technique shows excellent results, This technique provides stable fixation and should be considered as an alternative method for treatment of transverse patellar fractures.

Keywords: Transverse Patella Fractures, Screw band wiring, Tension band wiring

1.INTRODUCTION

Fractures of the patella constitute 1% of all skeletal fractures. About 50–80% of patellar fractures are transverse (Arbeitsgemeinschaft für Osteosynthesefragen classification: 34-C1)^{1,2} and are likely to disrupt the extensor mechanism of the knee, making operative management necessary.³ Since the patella is subjected to strong tensile forces, patella fractures require rigid fixation with anatomical reduction.⁴ Fixation can be achieved in different ways. The classical Kirschner (K) wires and tension band wiring (TBW) technique, described by the AO foundation,⁵ have been the most widely used: two parallel Kirschner wires (K-wires) are combined with figure of eight metallic TBW.^{3,5} Fixation can be also achieved using TBW through cannulated screws.⁶

The TBW technique is associated with failure from prominent hardware and postoperative discomfort.⁷ Metal implants have to be removed as a result of local tissue irritation produced by the K-wires,⁸ which can also migrate.^{9,10}

We have adopted what we perceive to be an improved technique, the cannulated cancellous screws with tension band wiring

Functional outcome depends on the ability to achieve early, pain-free, stable range of motion. In this study, we investigated the functional outcome in 24 patients with transverse patella fracture treated with cannulated cancellous screw fixation and tension band wiring.

Aim of study:

To assess the functional outcome of Tension band wiring with cannulated cancellous screw fixation in closed patella transverse fracture.

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2.MATERIALS AND METHODS:

Twenty four patients with Transverse patella fractures treated by cannulated cancellous screw with TBW from **June 2013 to June 2015** at **Rajah Muthiah Medical College and Hospital** with two year follow up were studied.

Principle:

- The principle of TBW with cancellous screw fixation relies upon compression by dynamic component of the functional load allows some load induced movements.
- The cancellous screw on TBW in combination adds strength to the fixation by converting tensile force to compressive force on the fracture site with the additional fracture site compression using cc screws.

Inclusion criteria:

- **Displaced transvers patella fracture >3mm**
- **Compound grade 1 & 2**
- **Age above 20yr**

Exclusion criteria:

- **Communited fractures**
- **Compond fracture grade 3**
- **Age below 20 yrs**

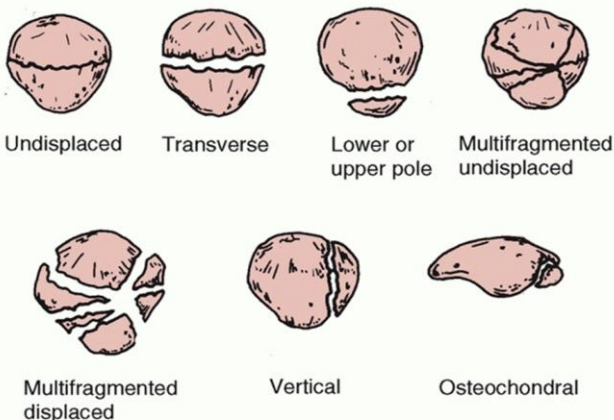
Classification:

Undisplaced

- **Transverse fracture (80%)**
- **Vertical fracture**
- **Communited fracture**

Displaced

- **Transverse (85 %)**
- **Oblique fracture**
- **Vertical fracture**
- **Comminuted fracture**
- **osteochondral fracture**



In my study complete transverse patella taken Initially patients were stabilized in the trauma ward associated trauma were excluded with thorough clinical examination, after taking appropriate knee x-rays cylindrical slab was given temporarily and admitted

Complete blood analysis were done, after anaesthetic fitness posted for surgery

Operative procedure: The operations were performed via an anterior longitudinal incision. After sectioning the skin and subcutaneous tissue followed by fully exposing the patella and its sides, we confirmed the quadriceps femoris aponeurosis and the ligament patellae were adherent to the patellar surface. We examined the fracture and condition of the bilateral aponeuroses and joint capsule, removed fracture chips or any intraarticular hematoma, and rinsed the articular cavity. the longitudinal fracture was fixed by one lag screw inserted perpendicularly to the fracture line. With the knee in extension, we clamped the fragments to reduce the fracture with a large towel clamp. After we observed the reduction of articular surface under intraoperative fluoroscopy, we drilled two guide wire in parallel from the lower pole to the superior pole of the patella, with a 2-cm space and a 5- to 10-mm distance from the patellar articular surface. The guide wire penetrated the cortex of the superior patellar pole. The position of the guide wire was determined using intraoperative fluoroscopy.

In the cannulated cancellous screw with tension band group. We drilled along the guide wire with a cannulated bit and, after measuring its depth, screwed a 4.0-mm cannulated cancellous compression screw along the guide wire. The screw head remained proud of the patella cortex, and the proximal end of the screw should be close to, or embedded within, the patella. We then screwed in the second cannulated screw and alternately tightened the screws. We removed the guide wire and threaded 18G stainless steel wire ; through each of the cannulated screws. We then tightened the ss wire anterior to the patella to form the tension band, and cut off the excessive ss wire.

STEP-1-midline skin incision



STEP-2-REDUCTION OF THE FRACTURE



STEP-3-PASSING IN TWO PARALLEL WIRES



STEPS-4-PASSING TWO PARALLEL CC SCREWS



STEP-5-TBW



Post operatively true mobilization was started on first post operative day. Partial weight bearing was started after 2 weeks .Sitting and squatting were permitted after 6 weeks.

One year after surgery, the function was evaluated according to the IOWA knee score criteria through inquiring joint pain during weight bearing , assessing walking gait, the existence of deformity or instability, and joint ROM.

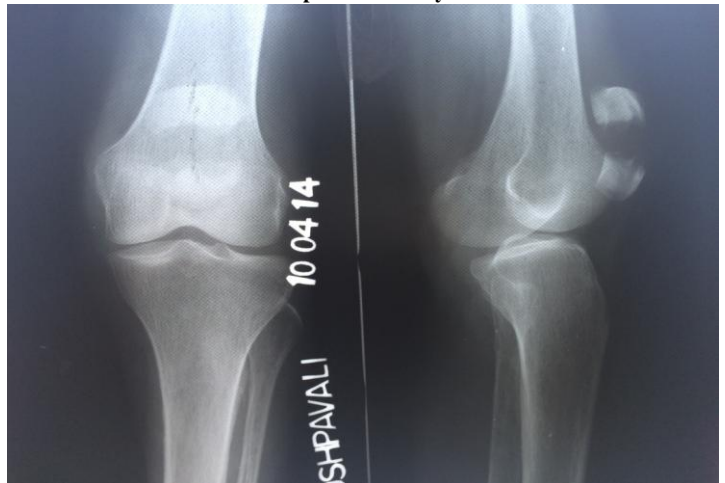
According to the criteria:

NO PAIN AND ROM >= 135 DEGREES	EXCELLENT
NO PAIN AND ROM >= 90 DEGREES - <135 DEGREES	GOOD
NO PAIN WITH ROM < 90 DEGREES	
PAIN WITH ROM >90 DEGREES	FAIR
PAIN WITH ROM <90 DEGREES	POOR

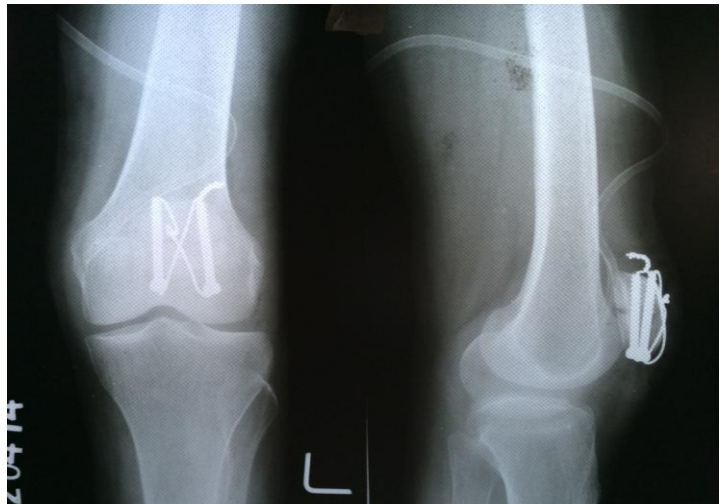
3.RESULTS &DISCUSSION:

NO	SIDE	GENDER	AGE	ROM	IOWA SCORE	KNEE
1	LEFT	FEMALE	60	0-140	EXCELLENT	
2	LEFT	MALE	42	0-140	EXCELLENT	
3	RIGHT	MALE	45	0-140	EXCELLENT	
4	LEFT	FEMALE	35	0-110	GOOD	
5	RIGHT	MALE	48	0-140	EXCELLENT	
6	RIGHT	MALE	36	0-100	GOOD	
7	LEFT	MALE	28	0-140	EXCELLENT	
8	LEFT	MALE	34	0-140	EXCELLENT	
9	RIGHT	MALE	41	0-130	EXCELLENT	
10	LEFT	FEMALE	39	0-120	GOOD	
11	LEFT	MALE	37	0-110	GOOD	
12	RIGHT	MALE	44	0-140	EXCELLENT	
13	RIGHT	FEMALE	29	0-140	EXCELLENT	
14	LEFT	MALE	36	0-140	EXCELLENT	
15	LEFT	MALE	48	0-110	GOOD	
16	LEFT	MALE	52	0-140	EXCELLENT	
17	RIGHT	FEMALE	34	0-140	EXCELLENT	
18	LEFT	MALE	33	0-140	EXCELLENT	
19	RIGHT	MALE	54	0-140	EXCELLENT	
20	RIGHT	MALE	47	0-140	EXCELLENT	
21	LEFT	MALE	30	0-110	GOOD	
22	LEFT	MALE	42	0-140	EXCELLENT	
23	LEFT	FEMALE	45	0-140	EXCELLENT	
24	IGHT	MALE	43	0-140	EXCELLENT	

CASENO - 1
Pre-operative x-ray:



CASENO - 1
Post operative x-ray:

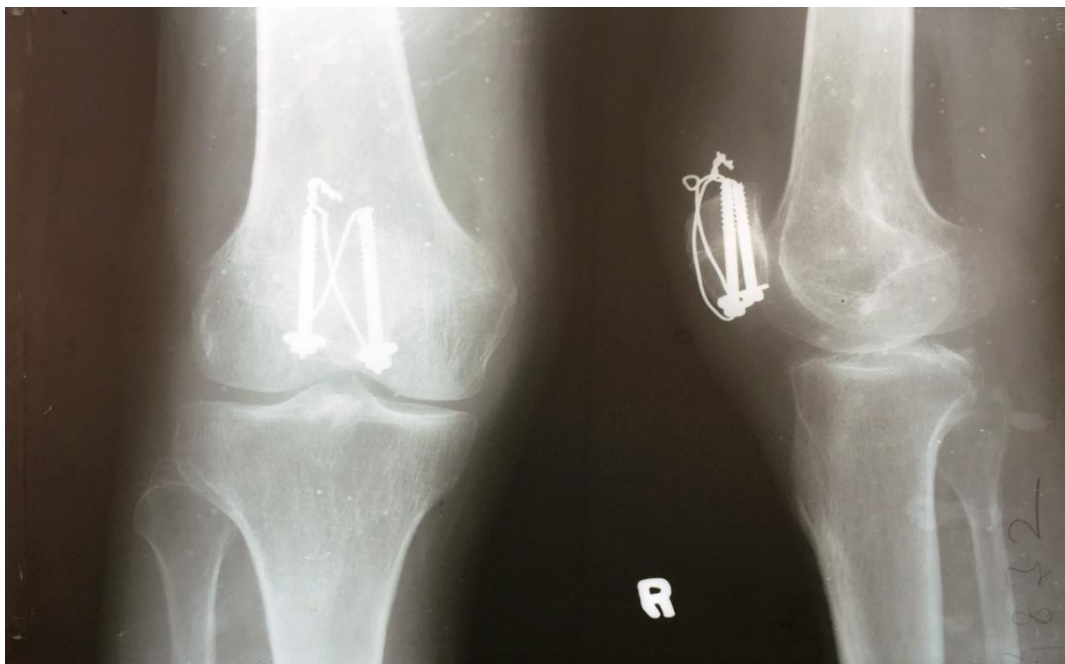


CASE-9

PRE-OP X-RAY

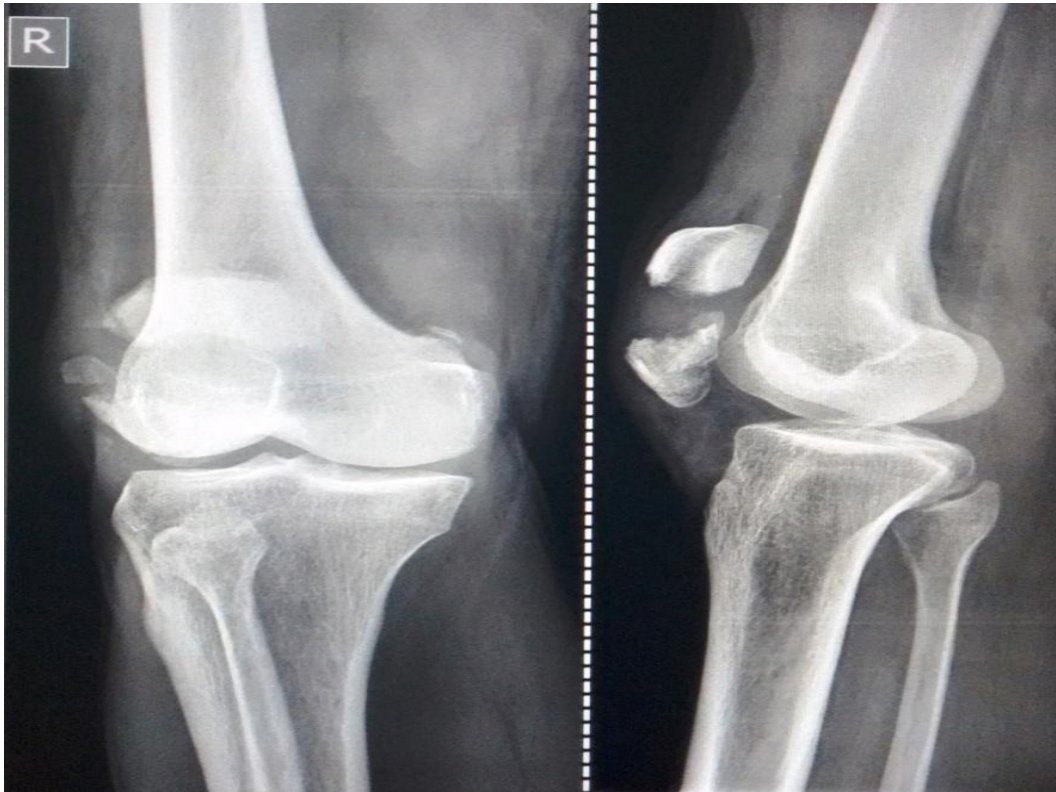


POST-OP X-RAY



CASE-12

PRE-OP X-RAY:



POST-OP X-RAY:



4.DISCUSSION:

Patella fractures are one of the rarest fractures encountered in orthopaedic practice.

Previous epidemiology studies show that patella fractures account only 1% of all adult fractures.

Patellar fractures are prevalent within age group of 20-50 years old and males are twice more affected than females.

The injury mechanism may be either direct (most common) or indirect. For example, the patella may be fractured by a direct blow to the knee during a fall or when it hits the dashboard in a traffic accident.

According to Orthopaedic Traumatic Association of classification, patella fracture are classified into displaced and non displaced.

Transverse fractures are the most common ones, accounting for 50-80% of the patellar fractures, Comminuted fractures account for 30-35% and Vertical fractures account for 12-17%.

Torchia and Lewallen¹¹ found an open fractures rate of 7% among patellar fracture, with 14.5 % being type 1 open fracture, 76.4% type 2, 1.6% type 3A and 7.3% type 3B as per Gustilo and Anderson classification. They noticed that the open fractures present a worse prognosis than closed fractures

The deforming forces of quadriceps muscle and patellar

tendon is the reason for the displacement of the fragments which is the reason for delayed or non-union. Hence the displaced transverse patella fractures necessitate fixation.

Anatomical alignment and prevention of displacement will suffice for such fractures to unite.

In this study we took 24 cases of transverse patella fractures treated with cannulated cancellous screw with tension band wiring. In 24 cases, 18(75%) were male and 6(25%) were female. 11(45.83%) cases were due to self fall, 12(50%) cases were due to RTA and 1(4.16%) cases were due to implant failure. 14(58.33%) cases were left sided fracture and 10(41.6%) cases were right sided fracture. 2(8.3%) of the cases were Grade I compound fracture. 24 cases were fixed with cannulated cancellous screw with TBW. One of the case was attempted for cannulated cancellous screw with TBW, fixation was not achievable due to lower pole comminution, hence fixation was proceeded with modified TBW.

According to the IOWA scoring system 18(75.0%) patients showed excellent results. 6(25.0%) patients showed good results. Of the 6 patients, 2 patients had superficial infection and 4 patients failed to have regular physiotherapy and follow up.

5.CONCLUSION:

In this study cannulated cancellous screw fixation with tension band wiring increases the interfragmentary compression and anatomical reduction, the probability of screw loosening is very low owing to cancellous bone density of patella and the fact that distal end of cannulated cancellous screw is threaded

The IOWA score was excellent in majority of the cases and has a good functional outcome.

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