



## OUTCOME OF PERCUTANEOUS CANNULATED SCREW FIXATION IN PATELLAR FRACTURES

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### ABSTRACT

**Purpose:** To assess the outcome of percutaneous cannulated screw fixation in transverse patellar fractures

**Materials and Methods:** This was a retrospective study conducted in the Department of Orthopaedics at our institute from August 2017 & July 2018 that analysed 12 patients (7 males & 5 females) with transverse patella fracture operated between by the minimally invasive technique of 2 percutaneous cannulated screws. The average follow-up period was 9 months (12-14 months). The average age was 49 years (38-69 years). The cause of the fracture was noted in all cases. We analysed the radiologic union, knee ROM and postoperative Lysholm score.

**Results:** There were no reports of broken screw or non-union in any patient. Normal range of motion upto 120° of flexion was achieved in 11 knees (91.66%). One patient recovered upto 90° of knee flexion due to non-compliance to physiotherapy. There were no cases of stiffness. The Average Lysholm score was 93.7 (85-100 points) at final follow-up. This implied minimal loss of function for the patients post-operatively. There were no reports of wound complication and cosmetically healing was perfectly acceptable to the patient. There were no incidence of infection in our patients. All fractures healed uneventfully. Normal range of motion was achieved in 11 knees (92.9%). Average Lysholm score was 95.9 at final follow-up.

**Conclusion:** Screw fixation seemed to be useful for treatment of transverse patellar fracture except in comminuted fractures. The advantage of this technique was the preservation of extensor mechanism, simplicity, short operation time and good cosmesis.

### KEYWORDS :

#### INTRODUCTION:

Patella fractures account for almost about 1% of all musculoskeletal system fractures.<sup>1</sup>The treatment of patella fractures may sometimes damage the underlying articular surface and lead to traumatic arthritis and cause long-term problems like Joint stiffness, muscle weakness and reduction of function. The most common surgery performed is open reduction & internal fixation with K wire and tension band wiring. However, the incision utilised for the surgery is extensive and the extent of damage to the surrounding soft tissue including retinaculum is massive and can lead to tissue adhesions. There is always a concern about the occurrence of infection and cosmesis. In today's era of Minimally invasive surgery, the technique of using percutaneous cannulated screws promises to be fast, offering early Functional recovery and reduced occurrence of traumatic arthritis. We orchestrated the study with the aim of studying the effectiveness of percutaneous cannulated screw method of fixation of transverse patella fractures.

#### MATERIAL & METHODS

This was a retrospective study conducted in the Department of Orthopaedics at our institute from August 2017 & July 2018 that analysed 12 patients (7 males & 5 females) with transverse patella fracture operated between by the minimally invasive technique of 2 percutaneous cannulated screws. The average follow-up period was 9 months (12-14 months). The average age was 49 years (38-69 years). The cause of the fracture was noted in all cases. We analysed the radiologic union, knee ROM and postoperative Lysholm score.

In all cases the surgical technique involved application of pneumatic tourniquet to the patient in supine position under spinal or general anaesthesia, reduction of the fracture using towel clip under fluoroscopic guidance and insertion of guidewires of 4mm cannulated cancellous screw through a small incision of about 0.5-1 cm in the proximal patella. After accepting the position of guidewire drilling and subsequent insertion of final screw was done. Final reduction was confirmed on image intensifier (FIGURE 1).



**FIGURE 1:** Final reduction was confirmed on image intensifier

After routine closure, knee extension cylinder splint was applied with knee held in complete extension. The next day after surgery bedside knee mobilisation upto 90° was started. Isometric exercises for the quadriceps were taught and weight bearing mobilisation as per pain tolerance was advised. About 6 weeks post-surgery, knee bending beyond 90° was allowed. Lateral radiographs of the knee were analysed for articular surface damage & evidence of arthritis. Lysholm score for each patient was calculated.

#### RESULTS

The most common cause of trauma was road traffic accident. Radiological evaluation revealed that all fractures healed uneventfully. There were no reports of broken screw or non union in any patient. Normal range of motion upto 120° of flexion was achieved in 11 knees (91.66%). One patient recovered upto 90° of knee flexion due to non-compliance to physiotherapy. There were no cases of stiffness. The Average Lysholm score was 93.7 (85-100 points) at final follow-up. This implied minimal loss of function for the patients post-operatively. There were no reports of wound complication and cosmetically healing was perfectly acceptable to the patient. There were no incidence of infection in our patients.

## DISCUSSION

The patella provides a lever arm to the femoral quadriceps and extensor apparatus. It plays an important role in increasing the power of the knee joint extension. The aim of fracture treatment is to ensure continuity of the extensor mechanism and to ensure that the incidence of complications related to the articular surface of the patella are reduced.

Since the patella happens to be subcutaneously placed in the lower limb, traditionally any and every fixation modality that has been utilised for fracture fixation like K wire or tension band/cerclage wires are often responsible for soft tissue irritation of the anterior knee region. Literature reports the incidence of complications related to wire cerclage to be as high as 47%.<sup>2</sup> These complications prolonged recovery and necessitated additional surgery.

Various modalities of treatment used to fix patella fractures include K wire tension band wiring or encirclage or percutaneous cannulated screws. Many attempts have been made to perform minimally invasive surgery using arthroscopy assisted reduction.<sup>3,4</sup> Proposed advantages include short surgical time, smaller incision, less risk of infection and more satisfaction of patients who desired cosmesis, decompression of intra-articular hematomas, removal of loose bodies or fracture pieces and direct visualization of the articular surface for reduction. Even while performing open approach, arthroscopy has the distinct advantage of offering a clearer evaluation of articular congruity with magnified visual field.<sup>4</sup>

Tandogan<sup>3</sup> studied Arthroscopic-assisted percutaneous screw fixation of select patellar fractures and achieved decent results. The soft tissue disturbance was less than that of a routine open fixation. Yet it is difficult to apply on a regular basis because of limitations of setup requirement and expertise of arthroscopic techniques which may have a learning curve.

Edwards et al<sup>5</sup> in their landmark study of 30 years follow-up of patella fractures laid down the guidelines for recommended treatment. Whittle<sup>6</sup> states that a disruption of the extensor mechanism or 2 to 3 mm of displacement is an indication for surgical treatment. Benjamin et al<sup>7</sup> is stated in biomechanical cadaveric experiments recommended that screw fixation should be utilised for transverse patellar fractures in patients who have good bone quality. In patients who sustain patellar fractures with comminution and/or osteopenia, choice of fixation is modified tension band fixation. Simple wiring techniques alone may not provide sufficient fixation to allow immediate range of motion a single bone would be useful for pipe screw fixation.

The patella provides attachment to the quadriceps mechanism. This group of muscles extend along the borders of the patella as retinaculum which is an accessory knee extensor. Sometimes in cases of patella fractures this accessory extensor group can provide some degree of knee extension. But if there is complete detachment of extensor mechanism with patella and retinacular damage no active knee extension will be possible. The advantage of open technique of patellar fixation involves that retinacular tears can be visualised and repaired if required according to Weber et al<sup>8</sup>. Carpenter<sup>9</sup> noted that there is a disadvantage of K wire and tension band wiring method of fixation that it cannot be used in complex or comminuted fractures.

The vascular supply of the patella is through a branch of the upper, middle, and lower patellar arteries. Open reduction may damage the patellar peripheral vascular plexus and can cause a non-union or avascular necrosis of the patella. In our study there was an advantage of being able to preserve the

blood supply well and hence minimise the chances of vascular damage.

Routinely reported postoperative complications of patella fractures include infection, fixation failure, knee stiffness and posttraumatic osteoarthritis. Such complications have not been reported in our study.

In recent years, early joint movement has become critical for optimising results. In some cases we had to use passive or active assisted range up to 90 degrees immediately post-surgery for ensuring early joint movement. Allowing light exercise and enforcing early weight bearing led to enhanced functional recovery and shortened the rehabilitation time. However, our limitation was smaller sample size and short follow-up. Future studies can be targeted at larger sample sizes and longer follow-up to achieve higher level of evidence.

## CONCLUSION

Hence we conclude that Cannulated cancellous screw fixation can be safely used in the treatment of transverse patella fractures except comminuted type. It is relatively simple and minimally invasive, does not affect the overall function, the operation time is relatively short, associated complication rate is lesser and is considered to be cosmetically satisfactory to the patients.

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