ARTHROSCOPIC FIXATION OF AVULSION FRACTURES OF THE TIBIAL EMINENCE: COMPARISON OF PULL OUT SUTURE WITH SCREW FIXATION

Sheetal Kumar Gupta¹, Birendra Kumar Jain²*

¹Assistant Professor, ²Associate Professor, Dept. Of Orthopaedics, L.N. Medical college & RC, Bhopal.

ABSTRACT
BACKGROUND: Identification and treatment of type II and type III injuries, combined with the need for accurate reduction of these fractures to assure stability of the knee postoperatively, make arthroscopic examination critical in the successful treatment of these fractures. Several recent reports describe techniques and experiences with arthroscopic fixation of type III fractures using sutures or hardware. The purpose of this prospective study was to review an arthroscopic technique using screw or suture fixation for repair of type III fractures of the tibial eminence and evaluate patient outcomes.

MATERIALS AND METHODS: We conducted a study of 19 patients with Meyers and McKeever type III fractures of the tibial eminence treated with arthroscopic pull out suture or screw fixation. We recorded range of motion, lachmann test, anterior drawer test and Lysholm knee score. Five women and 14 men comprised the study group. 10 patients underwent pullout suture technique while 9 patient underwent screw fixation. Average age was 26 years (range, 15 to 45 Years). Mean follow-up time was 15 months (range, 4 to 26 months).

RESULTS: At last follow-up evaluation, mean Lysholm score was 94.2 for suture fixation group and 86.1 for screw fixation group. In general, the best outcomes were seen in younger patients. Significant differences were seen in outcomes with regard to fixation type with pull out suture fixation giving better results. Complication in form of knee flexion deformity, hardware problem and chronic pain was more with screw fixation.

CONCLUSION: We found that displaced tibial eminence fractures using arthroscopic suture fixation provides better results with most patients returning to their previous activity levels.

Keyword: Meyers and McKeever type III fractures, Screw Fixation, Lachmann test

INTRODUCTION
Tibial eminence fractures represent avulsion injuries to the insertion of the anterior cruciate ligament (ACL) at the tibia. The mechanism of injury is similar to that of ACL tears and includes vehicular accidents, falls, and sports injuries. Meyers and McKeever first described a classification dividing fractures of the tibial eminence into 3 types and recommended treatment accordingly. Type I represented a nondisplaced or minimally displaced eminence fracture. In type II, the anterior third to half of the avulsed bone was displaced proximally, creating a beak-like deformity on lateral radiograph.

In type III fractures, the bone was completely displaced from its bed. Later, displaced and comminuted fractures were identified as type IV. McLenonshowed decreased laxity in type III injuries treated with arthroscopic fixation compared with more conservative treatment. Originally, eminence avulsions were thought to be isolated fractures. However, many reports of associated soft tissue involvement in and around the knee, including chondral, meniscal, and ligament damage. Identification and treatment of these injuries, combined with the need for accurate reduction of these fractures to assure stability of the knee postoperatively, make arthroscopic examination critical in the successful treatment of types II and III fractures. Several recent reports describe techniques and experiences with arthroscopic fixation of type III fractures using sutures or hardware. The purpose of this study was to...
compare the results of technique for surgical treatment of types III fractures of the tibial eminence and to present patient outcomes.

MATERIALS AND METHODS
For this prospective study we selected 19 patients both male and females who sustained fractures of the tibial eminence and were treated with arthroscopic fixation from Jan.2009 to Dec.2012 at the department of orthopaedics, L. N. Medical College and research centre-Bhopal. We routinely approach the fixation of these types of fractures arthroscopically, using either suture or screws. Inclusion criteria were presence of an acute injury, radiographic findings of a displaced eminence Fracture. Physical examination findings included presence or absence of effusion or pain, range of motion, and Lachman tests, and collateral ligament stability. Standard x-rays were done MRI done only in 6 cases. Radiographs and magnetic resonance images (MRIs) were studied for the presence of meniscal or ligament damage or bone contusion, and for fracture classification. Fractures were classified according to the Meyers and McKeever fracture classification system.

Surgical Technique
Spinal anaesthesia was used in all cases. The hematoma was washed out until visibility improved. After the pathology was visualized, an anteromedial portal was established after localization with a spinal needle. An arthroscopic probe was used to manipulate the fragments and to begin debridement of clotted blood. A 4.5-mm synovial resector was used to further debride the region and to remove clot and loose pieces of cancellous bone from the bed. The probe was reinserted through the anteromedial portal, and a reduction was attempted. If interposition of the intermeniscal ligament prevented complete reduction, the probe was used to pull the ligament anteriorly and ACL guide was used through an accessory medial portal to maintain reduction. In cases in which the ligament blocked reduction and could not be mobilized effectively, it was resected allowing reduction without obstruction. A 2mm K-wire was placed percutaneously from a medial midpatellar position and was used to fix the fragments in a reduced position. If the fragment was not comminuted and was large enough to hold a screw without breaking, fixation was achieved with one or two 4.0-mm cannulated screws. These were placed from a superomedial position through a midpatella portal with a percutaneous technique. If the K wire was in good position, it served as the guide pin for the cannulated screw. If not, a second wire was placed using intensifier.¹

In pull out Suture method fixation was obtained by passing a K-wire percutaneously through a midpatella portal, the anterior cruciate ligament (ACL) tibial tunnel guide was used to pass a wire up through the anteromedial tibial metaphysis through the lateral side of the fragment. A suture passer was passed up the hole and a No. 5 Ethibond suture was delivered into its loop through the anteromedial portal and pulled out the anteromedial tibia. A second wire was passed starting 1 to 2 cm medially to the first hole on the tibial cortex, entering the knee at the medial side of the fragments. Suture passer was advanced through the hole into the joint. The other end of the No. 5 Ethibond suture was delivered into its loop through the anteromedial portal and pulled out the tibia. A crochet hook was passed into the subcutaneous tissue through one of the suture holes, hooking the opposite suture, and pulling it out the same hole. A knot was tied and passed through the skin hole and subcutaneous tissue and secured onto the tibial cortex over a endobutton or suture disk providing firm fixation of the fracture fragment in its bed.⁵

RESULTS
The study group comprised 19 patients. The average patient ages were 26 years (range, 15 to 45 years). Treated knees included 9 right knees and 10 left knees. 14 were men and 5 women patients. 10 patients were operated by pull out suture group and 9 patients by screw fixation method. Average time of surgery from date of trauma was 2.5days (range 1-14days). Average follow-up time was 15 months (range, 4 to 26 months). Effusion was mild in 8 cases, moderate in 4 cases. On palpation, 4 patients had medial joint line tenderness and 15 had none. 3 patients underwent subsequent surgery. Two patients had hardware removed; one patient had an arthroscopic debridement. Flexion deformity of 5to 10 degree were seen in 3 patient all of them from screw fixation.
group. Lysholm score of 86.1 was there for screw fixation group while 94.2 for suture fixation group. Lachmann test was positive in 2 screw group patient but no symptomatic instability was there. Anterior drawer test was negative in all 19 patients. Range of motion was full at end of 3 months except in 3 patients who had flexion deformity. 2 patients complained of chronic knee pain post-surgery.

**DISCUSSION**

Arthroscopic internal fixation of type III tibial spine fractures appears justified given the potential for meniscal entrapment under the fractured tibial eminence preventing anatomic closed reduction, the ability to evaluate and treat associated intra-articular meniscal or osteochondral injuries, and the opportunity for early mobilization. The potential for instability and loss of extension is associated with closed reduction and immobilization particularly for type 3 disfavouring this modality in active young individual. In our case series we have used two different surgical methods for type 3 fractures. For all type 4 fractures pullout suture is standard describe surgery but for type 3 fracture when fragment is large screw fixation and for smaller fragment pull out suture is described in literature. In our series we have used pull out technique even for large fragments and compared it with screw fixation. We have observed better results with pull out suture technique in terms of Lysholm score, range of motion and resurgery rate. Drawback of our study is that we have not considerd associated chondral injury that may be reason of chronic pain in screw group patients, sample size is small and follow up is midterm only. By analysis of data we rate pullout suture technique better then screw fixation for tibial eminence fracture.

**CONCLUSION**

We found that displaced tibial eminence fractures using arthroscopic suture fixation provides better results with most patients returning to their previous activity levels.

**REFERENCES**


