Case Report

Arthroscopic treatment of tibial spine malunion with ACL reconstruction: A case report

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ABSTRACT

Tibial spine fractures are rare and highly associated with instability of the knee as it is where the anterior cruciate ligament attaches. Malunion or nonunion are common complication of tibial spine fractures with loss of knee extension as the major problem. We report a case of a 30-year-old female with a neglected malunion tibial spine avulsion fracture of the right knee joint. She came to our clinic with knee pain and loss of extension due to malunion with impingement anteriorly of the tibial spine on the notch, which previously managed as osteoarthritis and planned for replacement in another hospital. We performed tibial spine excision, sacrificed the ACL remnants, and reconstructed it with hamstring tendons per arthroscopic. Post-operatively, the patient was able to fully extend the knee without any pain and instability. In this report, we present an alternative method regarding the treatment for malunion of tibial spine fractures.

Keywords: case report, tibial spine fractures, malunion, arthroscopic treatment, ACL reconstruction
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INTRODUCTION

Tibial eminence fractures are relatively rare with an incidence of approximately 3 per 100,000 per year.[1] Though more commonly seen in children, recent literature suggests that the incidence of these injuries in adults is higher than previously thought.[2,3] Hayes *et al*. Reported that 40% of tibial eminence fractures occurred in adults.[4] Tibial spine is the site of attachment of the anterior cruciate ligament (ACL), tibial spine avulsion may be associated with ACL tear, and also 40% of these fractures are associated with concomitant injury like collateral ligaments and menisci, and there are evidences to suggest that associated injuries are more common in adults.[4,5]

Patients with tibial eminence fracture cases, usually came in as chronic cases with malunited fractures of the tibial eminence. Different surgical treatments have been proposed in acute cases, including open reduction and fixation or arthroscopic reduction and fixation. Method of fixation of these fractures include Kirschner wires, staples, screw, non-absorbable or absorbable sutures. Malunited avulsion fractures of tibial eminence is uncommon. Several methods for this condition have been reported. However, an ideal technique has not been instituted for this is rarely found.[6]

We report a case of a 30-year-old female with neglected tibial spine fracture of the right knee joint for 1 year. She developed a subsequent malunion with impingement anteriorly of the tibial spine on the notch.

Case Report

A 30-year-old Female came to our Sport Injury clinic for evaluation of her right knee injury. She got the injury due to a motorcycle accident 1 year ago, after which she complained about pain and swelling at the right knee. She was brought to a bonesetter and got an inappropriate treatment. Now she complained of loss of knee extension and instability of the right knee. Physical examination showed that there was lack of extension with range of knee motion of 10° to 135°, grade 2 Lachman test and anterior drawer test, also negative result in McMurray test.

Preoperative anterior-posterior and lateral radiograph showed malunion of tibial eminence. Magnetic resonance imaging showed a large tibial spine fracture that had already healed in malunited position with fragments extended on posterior hinge creating a large anterior bony prominence, and ACL fibers were likely to remain partially ruptured and lack appropriate tension secondary to dis- placement of tibial insertion.

Figure 1. Loss of extension at right knee joint

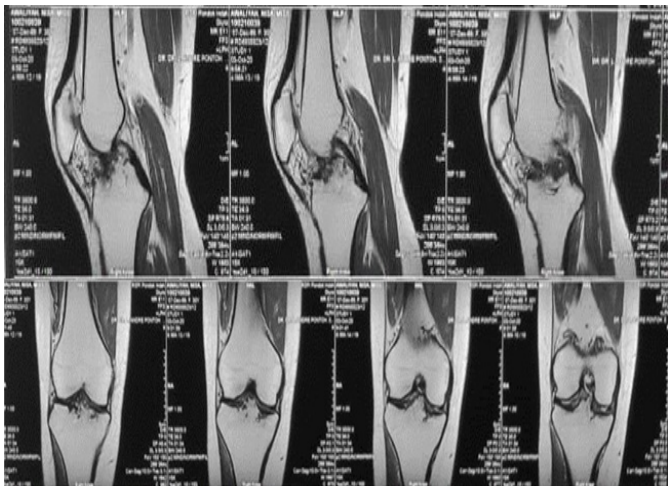

Figure 2. MRI showed a large tibial spine fracture in malunited position with extended fragment on posterior hinge

The patient underwent arthroscopic surgery for diagnostic and definitive treatment. Standard arthroscopy was performed by using anterolateral and anteromedial portal. From arthroscopy diagnostic, we found a large prominence of anterior tibial eminence. ACL fibers were still intact but maintained in a slack position secondary to elevation and more lateral to the tibial insertion point. Impingement of the anterior tibial spine along the femoral notch was shown by taking the knee into full extension. Based on these findings, we decided to treat the malunion fracture at the expense of the ACL fibers, and perform ACL reconstruction using a hamstring tendon autograft.

We reduced and removed the bony prominence at the anterior tibial eminence by using small osteotome and shaver until the knee achieved a fully extended position and no impingement shown between the anterior tibial spine and the femoral notch. We sacrificed and debrided

the ACL remnants, and performed ACL reconstruction using Hamstring tendon. Grafts were harvested from ipsilateral leg. The gracillis and semitendinosus tendon were secured as a single bundle.

Post operatively, the patient was immobilized using knee brace and had ACL rehabilitation program. Gradual ROM exercise with gastrocnemius hamstring muscle strengthening program was prescribed and carried out. At final follow-up after six months, the patient presented with improved knee extension with ROM of 0^0-135^0, pain free and no instability at the knee joint.

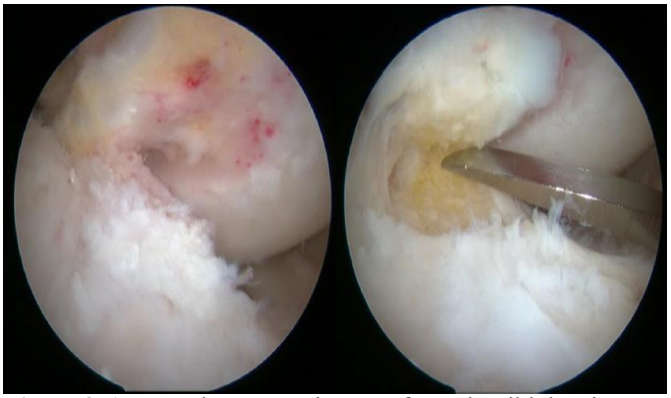

Figure 3. A. Large bony prominence of anterior tibial eminence. (Black Arrow) B. Osteotomy of the bony prominence using small osteotome

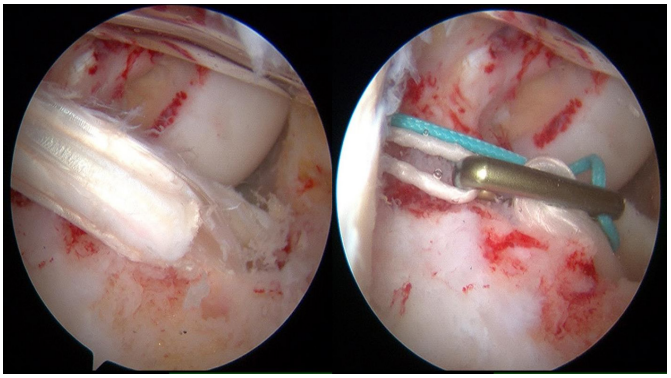

Figure 4. ACL reconstruction was performed to stabilize the knee.

DISCUSSION

Tibial eminence fractures with malunion are infrequent. Several treatment strategies for this ailment have been described, but because it is such an uncommon ailment, no perfect or proper methodology has been established. Both open and arthroscopic methods are explained in the literature. When ACL is still intact, Arthrotomy or per-arthroscopic of the knee joint approach is performed and osteochondral fragment is reduced and fixed with implant. The fragment can be fixed by metal screw, absorbable screw, absorbable suture or Kirschner wires. If metal is used for fixation, damage to physeal plate can occur in children. Arthroscopic procedure is limited by technical difficulties and the operator experience but can avoid morbidity related to the open techniques.[7]

Panni *et al*. performed arthroscopic debridement with partial resection of tibial spine with notchplasty for malunion of tibial eminence fracture and gave satisfactory results in all cases. No increase in anterior laxity was observed and recovery of full range of motion was complete in almost all cases.[8]

Reed *et al*. reported a case of an 11-year-old boy with malunion of tibial eminence fracture with impingement anteriorly of tibial spine on femoral notch. They used arthroscopic reconstruction approach to the malunited tibial eminence fracture by using a resorbable screw. After 11 weeks, recovery of full range of motion between 0^0-140^0 was achieved and the patient was released to return to play as tolerated.[9]

In this study, we performed abrasion to the tibial spine because impingement of the anterior tibial spine along the femoral notch was shown when taking the knee into full extension. We sacrificed the ACL fibers and performed ACL reconstruction because malposition of the ACL, this condition made the ACL fibers loose even though they were still intact. 3 months after the surgery and rehabilitation, there was no complain about pain and instability of the knee joint, and there was improvement in full knee range of motion of 0^0-135^0.

CONCLUSION

In our study, we used arthroscopic approach to the knee lack of extension caused by malunion of the tibial eminence fracture and knee instability due to ACL fiber loosening. The bony prominence of the tibial eminence was removed and the ACL was sacrificed and reconstructed per arthroscopic. These treatments gave satisfactory results in all cases. Follow-up evaluation after six months showed neither anterior instability nor pain of the knee joint, and achieved recovery of full range of motion.

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