Original Research Article Outcome Assessment Of Arthroscopic Suture Pulls Out Fixation Of Displaced Tibial Spine Avulsion Fracture

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Abstract

Background - In this study, we describe the clinical and radiologically outcomes of arthroscopic fixation of ACL bony avulsion with suture pullout technique using two high strength, nonabsorbable sutures. **Method** - This prospective study conducted on 50 patients having avulsion tibial spine fracture classified Meyers & McKeever Type II, TYPE III and IV were involved in our study **Result** - The mean age of subjects was 26.32 \pm 9.12 years. The majority of subjects were in the age group 21 to 30 years. 82.00% were males and 18.00% were females. 4.00% had Fall from the cycle, 82.00% had fallen from Motorbike and 14.00% had Fall While Playing. 74.00% had Type III and 26.00% had Type IV Meyers and McKeever's classification. At 3 months, the mean Post op Lysholm score was 85.12 \pm 1.51, at 6 months was 96.12 \pm 1.02 and at 12 months was 97.01 \pm 0.98. There was a significant increase in Post op Lysholm score at 6 months and 12 months. At 12 months When compared to 6 months Post op Lysholm score, there was no significant increase in Post op Lysholm score. 4.00% had Post Op Knee Stiffness **Conclusion** - Arthroscopic suture pull-out fixation for type III and IV tibial spine avulsion results in excellent clinical and radiological outcomes in patients with open and closed physis without any significant complications.

Keywords: Tibial spine avulsion, Suture, mayers and mckeever, Outcome.

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Introduction

Tibial spine or anterior cruciate ligament (ACL) bony avulsion is, usually, a result of low-velocity injuries, such as fall from a bicycle or motorcycle and sports. It occurs when an axially loaded knee undergoes hyperextension, and the femur rotates externally.¹⁻⁴ Meyers and McKeever classified avulsion fractures into three types.Type I as undisplaced, type II as partially displaced with intact posterior hinge, and type III as completely displaced. Zaricznyj proposed a fourth category (type IV) for comminuted avulsed fragment.⁵⁻⁷

Complications of such untreated and displaced type III and IV avulsion fracture include nonunion or malunion, which can lead to significant disability in the form of flexion deformity, loss of extension, or instability⁸⁻¹⁰ Hence, it is important to reduce accurately and fix type III and IV fractures and prevent such complications.¹¹

In this study, we describe the clinical and radiologically outcomes of arthroscopic fixation of ACL bony avulsion with suture pull-out technique using two high strength, nonabsorbable sutures. **Methods**

Study design: Prospective study. Sample size: 50 patients.

Inclusion criteria

- 1. Pain and disability resulting from tibial spine avulsion inactive patient type II, type III and type IV
- 2. Age: < 60 years
- 3. The patient must able to use crutches / walker
- 4. The patient should have sufficient muscle strength and motivation to carry out a rehabilitation program

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5. Closed injuries.

Singh *et al* www.ijhcr.com

6. Ability to understand the content of the subject information / informed consent form and to be willing to participate in the clinical investigation.

Exclusion criteria

- 1. Type I tibial spine avulsion according to Meyers and McKeever classification
- 2. Associated with Proximal tibia fracture
- 3. Associated with Multiple ligaments injuries
- 4. Present or past history of inflammatory arthritis
- 5. Open injuries
- 6. Previous operated or infected knee for any reason

All statistical analyzes were performed using the SPSS statistical program (Version 25.0; SPSS Inc., Chicago, IL). While evaluating the study data, the data were summarized by using descriptive statistical methods (mean, standard deviation, frequency, minimum, maximum). The statistical significance level was accepted as p < 0.05.

Results

The mean age of subjects was 26.32 ± 9.12 years. The majority of subjects were in the age group 21 to 30 years. 82.00% were males and 18.00% were females. 4.00% had Fall from the cycle, 82.00% had fallen from Motorbike and 14.00% had Fall While Playing. 74.00% had Type III and 26.00% had Type IV Meyers and McKeever's classification. At 3 months, the mean Post op Lysholm score was 85.12 ± 1.51 , at 6 months was 96.12 ± 1.02 and at 12 months was 97.01 ± 0.98 . There was a significant increase in Post op Lysholm score at 6 months and 12 months. At 12 months When compared to 6 months Post op Lysholm score, there was no significant increase in Post op Lysholm score 4.00% had Post Op Knee Stiffness

Table 1: Outcome		
Mean age in years		26.32 ± 9.12
Male : Female		44:6
Mode of injury	Fall from Cycle	2 (4.00%)
	Fall from motorcycle	41 (82.00%)
	Other	7 (14.00%)
Meyers and McKeever's classification	Type III	37 (74.00%)
	Type IV	13 (26.00%)
Post op Lysholm score distribution	3 month	85.12 ± 1.51
	6 month	96.12 ± 1.02
	12 month	97.01 ± 0.98
Post Op Knee Stiffness		2 (4.00%)

Discussion

The majority of the patients reported in our series were males (44 cases; 88%). However, we believe that this factor may have no clinical relevance. The mean age of subjects was 26.32 ± 9.12 years. The majority of subjects were aged 21 to 30 years. ACL avulsion is more common in children than adults because of the relatively unossified state of the tibial eminence and the highly elastic nature of ACL.¹¹ In our study Status of Physis in 66.00% was closed and open in 34.00%. In the study, there was no significant difference in the mean Post op Lysholm score with respect to the Status of Physis at 3 months, 6 months and 12 months. However, many studies have documented a higher incidence in adults too, and many authors have published their series in an exclusive adult population only.¹²

In our study 4.00% had fall from the cycle, 82.00% had fall from Motorbike and 14.00% had Fall While Playing. With significant number is seen among motorbike injuries. There can be associated injuries to menisci, cartilage, capsule, and MCL in up to 59% of the patients in the children and adolescent age group.13 Meniscal tear is the most frequently associated intraarticular pathology along with tibial spine avulsion. In our study 10% had Partial Damage to ACL and 3.3% had Lateral Meniscus Posterior Third Longitudinal Tear and Oblique Small Tear in Posterior Third of Medial Meniscus. Displaced ACL tibial avulsion fractures result in anterior knee instability and occasionally in loss of knee extension. Therefore, surgical treatment is recommended for all Meyers and McKeever type III and IV fractures and should be considered in all cases of displaced type II fractures.in our study 74.00% had Type III and 26.00% had Type IV Meyers and McKeever's classification. ¹⁴In the study there was no significant difference in the mean Post op Lysholm score with respect to Meyers and McKeever's classification at 3 months, 6 months and 12 months.

The Lysholm knee scoring system was used to analyze subjective symptoms. The mean preoperative Lysholm score in the 50 knees was 38 (range, 28 to 54); the mean postoperative Lysholm score was At 3 months, the mean Post op Lysholm score was 85.12 ± 1.51 , at 6 months was 96.12 \pm 1.02 and at 12 months was 97.01 \pm 0.98. There was a significant increase in Post op Lysholm score at 6 months and 12 months. At 12 months When compared to 6 months Post op Lysholm score, there was no significant increase in Post op Lysholm score. The postoperative laxity is attributed to an initial stretch of ACL before giving away at the tibial attachment site, unrecognized intra-substance tears, and improper anatomical reduction.¹⁵ Even though literature reports suggest increased postoperative laxity up to 6 mm in 10 to 20% of the patients treated with tibial spine fixation, we did not find such increased laxity tendency in our patients. 16-17 Postoperative stiffness of the knee is the most common complication observed in many series, and is because of arthrofibrosis or mechanical impingement of displaced bony fragment.

Conclusion

This technique of arthroscopic fixation with transosseous sutures is very useful in treating these fractures. Approaching these injuries arthroscopically allows for complete inspection of the joint and dealing with associated injuries, early mobilization, fast rehabilitation, and decreased hospital stay. Suture fixation has the advantages of being more versatile and biomechanically superior to screw fixation and has the ability to fix not only isolated large but also small and comminated fractures and to incorporate the ACL into the fixation **Conflict of Interest: Nil Source of support: Nil** structure. Also, there is minimal risk of damage to the epiphyseal plate in children, and there is no need for hardware removal. Furthermore, sutures allow for stable fixation and aggressive early rehabilitation. Arthroscopic suture fixation uniformly leads to excellent outcomes.

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