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Case Report

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Assessment of functional outcome of meniscal root repair using pull-out technique

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ABSTRACT

Meniscal root tears (MRTs) are increasingly identified as an important contributor to knee dysfunction and early osteoarthritis when not managed appropriately. Arthroscopic transtibial pull-out repair has gained acceptance as an effective surgical technique aimed at restoring normal joint biomechanics. This case series evaluates the short-term functional outcomes following this procedure in a tertiary care setting in South India. A retrospective analysis was conducted on 20 patients who underwent meniscal root repair over a two-year period. Functional assessment was performed using the international knee documentation committee (IKDC) score and the visual analogue scale (VAS) before surgery and at 6-12 months follow-up. A statistically significant improvement was noted in IKDC scores, which increased from a median of 28.5 pre-operatively to 59.0 post-operatively (p=0.005). VAS scores showed clinical improvement, although statistical significance was not achieved (p=0.075). These findings suggest that transtibial pull-out repair is associated with favorable short-term functional recovery in patients with MRTs.

Keywords: Meniscal root tears, Transtibial pull-out repair, Arthroscopic meniscal repair, Functional outcome (IKDC score), Visual analogue scale

INTRODUCTION

Meniscal root tears (MRTs) are defined as avulsion injuries or radial tears occurring within 1 cm of the meniscal tibial attachment and account for approximately 10-21% of all meniscal injuries.[1] These injuries significantly alter knee biomechanics by increasing tibiofemoral contact pressure, which may accelerate the development of osteoarthritis if left untreated.[2] Conservative management and partial meniscectomy have been associated with poor long-term outcomes, including rapid joint degeneration.[2] Surgical repair techniques aim to restore the anatomical structure and function of the meniscus. Among these, the transtibial pull-out technique is widely utilized due to its reproducibility and ability to restore normal joint kinematics.[3-5] This case series aims to evaluate functional outcomes following transtibial pull-out repair using IKDC and VAS scores at short-term follow-up.

CASE REPORT

This retrospective case series was conducted at a tertiary care teaching hospital after obtaining institutional ethics approval. Case records of patients who underwent arthroscopic transtibial pull-out repair for MRTs over a two-year period were reviewed. Out of 22 identified patients, 20 were included after excluding one patient due to mortality unrelated to the procedure and another due to loss to follow-up. All patients were evaluated at 6-12 months post-operatively. Functional outcomes were assessed using validated scoring systems, including the IKDC score and VAS.[6,7] Statistical analysis was performed using SPSS version 22. Data were expressed as

median (IQR), and comparisons were performed using the Wilcoxon signed-rank test. A $p<0.05$ was considered statistically significant.

A total of 20 patients were included in this study. The majority were males (60%), with most patients belonging to the 30-50 years age group. Medial meniscal root tears were more frequently observed than lateral tears. The duration of symptoms ranged from one to three months in the majority of cases. All patients underwent transtibial pull-out repair and were followed up for a period of 6-12 months.

Table 1: Patient characteristics and functional outcomes (n=20).

Variables	Category	N (%)
Gender	Male	12 (60)
	Female	8 (40)
Age group (in years)	<30	4 (20)
	30-50	10 (50)
	>50	6 (30)
Meniscal tear type	Medial (posterior root)	9 (45)
	Lateral	11 (55)
Duration of symptoms	≤2 months	12 (60)
	>2 months	8 (40)
IKDC score	Pre-operative median (IQR)	28.5 (27.5-31.25)
	Post-operative median (IQR)	59.0 (56.5-65.0)
VAS score	Pre-operative median (IQR)	7 (±1)
	Post-operative median (IQR)	2 (±2)
Statistical significance	IKDC	p=0.005
	VAS	p=0.075

A total of 20 patients who underwent transtibial pull-out repair for meniscal root tears were included in this case series. The study population consisted of 12 males (60%) and 8 females (40%). The majority of patients were aged between 30 and 50 years (50%), followed by those above 50 years (30%) and below 30 years (20%).

Posterior medial meniscus root tears were identified in 9 patients (45%), while lateral meniscus tears were observed in 11 patients (55%). Most patients (60%) presented within two months of symptom onset, whereas 40% had a longer duration of symptoms.

Functional outcomes were assessed using the IKDC score and VAS. The median pre-operative IKDC score was 28.5 (IQR: 27.5-31.25), which improved significantly to 59.0 (IQR: 56.5-65.0) at follow-up. This improvement was statistically significant (p=0.005). The median VAS score decreased from 7 (±1) pre-operatively to 2 (±2) post-operatively, indicating clinical improvement, although this difference was not statistically significant (p=0.075).

DISCUSSION

The present case series demonstrated significant functional improvement following transtibial pull-out repair of meniscal root tears, as evidenced by the increase in IKDC scores. Pain scores measured using VAS also showed improvement, although this did not reach statistical significance, possibly due to the small sample size and short follow-up duration. These findings are consistent with previous studies that have reported improved functional outcomes following anatomical repair of meniscal root tears. LaPrade et al reported significant improvements in functional scores following transtibial pull-out repair at long-term follow-up.[8] Systematic reviews and meta-analyses have also demonstrated that repair techniques provide superior outcomes compared to meniscectomy or conservative management.[4,12] Indian studies have also reported similar findings. Darshan et al observed significant improvement in functional outcomes following arthroscopic meniscal repair using standardized scoring systems.[11] These results support the effectiveness of minimally invasive repair techniques in improving knee function in the Indian population. However, some studies have highlighted that outcomes may vary depending on patient characteristics such as age, body mass index, and chronicity of injury. Degenerative tears, especially in older individuals, may be associated with poorer outcomes due to pre-existing cartilage damage.[15] In contrast, our study demonstrated favorable outcomes even among middle-aged individuals, likely due to early surgical intervention. The predominance of medial meniscus involvement observed in this study is consistent with existing literature.[14] The transtibial pull-out technique offers advantages such as technical simplicity, reproducibility, and cost-effectiveness, making it particularly suitable in resource-limited settings.

CONCLUSION

Transtibial pull-out repair of meniscal root tears results in significant improvement in functional outcomes, particularly in IKDC scores, with clinically meaningful reduction in pain. It is an effective and reliable surgical option for short-term recovery.

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