

Functional Outcome of Arthroscopic Meniscal Root Repair

Nicholas Antao¹, Clevio Desouza^{1*}

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Abstract

Objectives: The aim of the study was to assess the functional outcome of the knee in patients before and after meniscal root repair.

Material and Methods: This study was a prospective study done on 52 patients with Meniscal Root tear treated by arthroscopic repair. The follow-up period was 6 weeks, 3 months, and 6 months. Functional outcome was assessed using the VAS and Lysholm Knee Score.

Results: The VAS pre-operative was 7.46, the VAS post-operative at 6 weeks was 4.23, the VAS post-operative at 3 months was 3.12 the VAS post-operative at 6 months was 1.19. As compared to preoperative scores at the end of 6 months the difference was statistically significant with a p-value < 0.001. Following surgery there was an excellent outcome in most of the cases with respect to the range of motion, overall, the improvement in the range of motion was statistically significant with a p-value < 0.001. On the evaluation of the Lysholm Knee Score, there was a significant difference between the pre-operative and post-operative scores at each follow-up. The pre-op was 68.52, the Lysholm Knee Score post-op - 6 weeks was 81.72, the Lysholm Knee Score post-op - 3 months was 85.72, the Lysholm Knee Score post-op - 6 months was 92.23. As compared to preop scores at the end of 6 months the difference was statistically significant with a p-value < 0.001.

Conclusion: In the present study we found that sports-related injuries were commoner, seen more in males and in young. Following meniscus repair, it is possible to get a good range of motion back post-operatively. A fair number of cases get back their knee function if appropriate post-operative physiotherapy rehabilitation protocol is followed.

Keywords: Meniscus Tear, Root Repair, Arthroscopy, VAS, LYSHOLM Knee Score

Introduction

One of the major weights bearing joints in the lower extremities is the knee joint. The knee menisci were thought to be little more than functionless remains of developing leg muscle until the second half of the twentieth century [1]. When presented with symptomatic tearing, this presumption led to the entire excision of the menisci. However, it was quickly found out that these structures were essential

for preventing the onset of osteoarthritis and joint health preservation. [1]. Studies to evaluate the menisci's precise structure and the role it plays in the functioning of the knee began in the 1970 and 1980 which lead to a shift in treatment protocols which focused more on meniscus preservation. [2]. However, the primary goal of "preservation" has been the status quo of patient care since that time. The hope is that modalities and treatment protocols in the future such tissue engineered replacements and targeted drug delivery, will improve quality of life and clinical outcomes in an ageing population, based on ongoing research into meniscus biomechanics and molecular pathways, including response to injury.

The goal of surgical therapy for knee injuries is to restore function by maintaining the mechanical axis and restoring ligamentous stability, allowing the knee joint to function painlessly and with a decent range of motion [3,4]. The menisci are two fibro cartilaginous structures in the

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* Corresponding author:

Dr. Clevio Desouza

✉ ceviold@gmail.com

1 Holy Spirit Hospital, Andheri, Mumbai, INDIA

knee that are necessary for proper knee function and joint preservation. The menisci bear between 40 and 70 percent of the stress transferred via the knee. The menisci are also essential for maintaining knee stability. The axial strain of tibia-femoral contact can be converted by intact menisci into hoop stress, which preserves the knee joint [5].

The meniscal root insertion integrity is critical for maintaining proper knee kinematics and avoiding degenerative alterations. Increased cartilage stress, meniscal extrusion, decreased contact surface, and eventually articular degeneration can result from injuries to the meniscal attachments [6]. Rapid degeneration of the knee could occur as a result of total meniscectomy. Meniscal root tears and avulsions are the functional equivalent of total meniscectomy, according to clinical and biomechanical evidence. Knee ligament sprains and tears frequently result in lateral root tears. Preexisting knee arthritis can induce medial root tears, which are more chronic in nature.

When a meniscal root tear is discovered in a knee with minimal to no arthritis, meniscal root repair is recommended. In the case of chronic root tears caused by osteoarthritis, conservative treatment is used. The anterior cruciate ligament, the most usually injured of the main knee ligaments, is the most injured of the major knee ligaments. Meniscus damage is linked to 50 percent of acute ACL tears, and it rises to 90 percent in chronic ACL deficient knees. If meniscal root tears are not treated concurrently with cruciate ligament tears, they can aggravate symptoms of instability and have a negative impact on the outcomes of anterior cruciate ligament restoration. As a result, we conducted research to assess the Functional Outcome of Arthroscopic Meniscal Root Repair

Materials and Methods

This was a prospective study done on 52 patients with Meniscal Root tear treated by arthroscopic repair during the period from June 2017 to June 2021. The follow up period was 6 weeks, 3 months and 6 months.

Inclusion Criteria

1. Diagnosed to have torn meniscal root and those who are undergoing Arthroscopic repair.
2. Patient with intra operative finding of meniscal root tear.
3. Age group :18 years – 50years

Exclusion Criteria

1. Patients not willing for arthroscopic repair.
2. Patient who had developed Osteoarthritis.
3. Patient with comorbid conditions and not fit for surgery.

Methodology

Clinical examination was repeated post operatively at the end of 6 weeks, 3 months and 6 months.

Operative Procedure

Positioning

Following anesthetic induction, the patient was positioned on the operating table with at least 110 degrees of knee flexion, preferably by dropping the affected leg at the table's end. Under the ipsilateral buttock, a rolled flannel blanket was inserted. This helped with rotational alignment. Its use also prevented external rotation of the limb. The limb was prepped and draped according to standard aseptic procedures. The use of a thigh tourniquet was commonplace.

Operative Procedure of Meniscal Root Repair

The Meniscal root tear must be identified before the meniscal root may be repaired (and preparing the meniscal root attachment site). The footprint for the root on the tibia should be decorticated to expose the bone before suturing the meniscal root. This created a better environment for the meniscal root to repair to the tibial plateau. Because of its capacity to restore a large footprint at the meniscal root's native attachment site and normal joint contact pressures, transtibial meniscal root restoration is becoming the gold standard procedure. Furthermore, constructing two transtibial tunnels to bind the meniscal root to its attachment site increases the footprint of the repair.

Two tunnels are reamed toward the torn meniscal root attachment using an offset guide on the anterior proximal tibia. Using FIRSTPASS MINI (Smith & Nephew), two simple sutures are inserted through the torn meniscal root and down each tibial tunnel cannula. While the repair is seen and explored arthroscopically, the two suture ends are knotted together with a surgical button on the anterior proximal tibia. The knee is flexed and extended while arthroscopic visualization is performed to ensure that there is no considerable tension on the root repair.

Post-operative management

The limbs were kept elevated with pillows. Intravenous antibiotics were given first five days and then shifted to oral. Quadriceps exercises and ankle mobilization was started within 48 hours of surgery. Dressing was done on 2nd, 5th and 8th post-operative day. Sutures were removed on 12th post-operative day.

Post-operative protocol:

- There will be significant stress on meniscus especially past 90°, Therefore, sutures have to be tied in 90° flexion of knee, so that flexion can be started immediate post operative.
- Patient advised non weight bearing for 6 weeks, 0 - 90° flexion for first 2 weeks. After 2-week flexion is increased as tolerated.
- Weight bearing started after 6 weeks using crutches which can be later weaned off.

Follow-up:

Duration after surgery: 6 weeks/ 3 months/ 6 months

Results

In this study, we discovered that the majority of the 52 patients in the study were between the ages of 40 and 50. The average age was 40.3+9.37 years. When we looked at the gender distribution of the 52 instances in the study, we discovered that the majority of the patients were males (36, or 69.23 percent) and 16 were females.

In the present study on evaluation of the mode of injury we found that of the 52 cases, fall from height 2 case (3.85%), and 4 cases (7.69%) were due to RTA. Remaining 46 were knee twisting. Twisting included sports in 20 cases (38.46%). Minimal twisting caused knee injury in 26 cases (50%). In the present study on evaluation of the side of surgery we found that most patients had a right sided injury (34, patients, 65.38%). In the present study on evaluation, we found that of the 52 cases in the study 46 patients had Medial meniscus root tear and 6 patients had lateral meniscus root tear. All were posterior root tears.

In the present study on evaluation of the range of motion before surgery, 53.85% had a mild restriction in the range of motion (Tab. 1).

<i>Rom pre-operative</i>	<i>No. of patients</i>	<i>% of patients</i>
Less than 80 Degrees	2	3.85
80-90 Degrees	26	50
91-120 Degrees	18	34.62
>120 Degrees	6	11.54

Table 1: Pre-Operative Range of Motion

In the present study on evaluation of the, range of motion following surgery, most patients had a good range of motion of 130 degrees (12 patients, 23.08%) (Tab. 2). Overall, the improvement in the range of motion was statistically significant with p value < 0.001.

<i>Rom post-operative</i>	<i>No. of patients</i>	<i>% of patients</i>
Less than 80 Degrees	2	3.85
80-90 Degrees	0	0
90-120 Degrees	38	73.08
>120 Degrees	12	23.08

Table 2: Post-Operative Range of Motion

In the present study on evaluation of complications following surgery, most patients had no complications. However, 2 patients (3.85 %) had knee stiffness post-surgery.

In the present study on evaluation of LYSHOLM Knee Score there was significant difference between the pre-operative and post-operative scores at each follow up. The pre-operative score was 68.52, while the LYSHOLM Knee Score post-operative at 6 weeks was 81.72, 3 months was 85.72, and 6 months was 92.23. As compared to pre-op

scores at the end of 6 months the difference was statistically significant with a p value < 0.001 (Tab. 3).

LYSHOLM Knee SCORE	Pre-operative SCORE	Post- operative SCORE		
		6 Weeks	3 Months	6 Months
Mean	68.52	81.72	85.72	92.23
SD	4.37	3.91	3.91	2.27
P-Value	<0.001			
		0.046		
			0.031	

Table 3: LYSHOLM Knee Score

In the present study on evaluation of VAS Score there was significant difference between the pre-operative and post-operative scores at each follow up. The vas pre-operative was 7.46, the VAS post operative at 6 weeks was 4.23, 3 months was 3.12. The VAS post operative at 6 months was 1.19 as compared to pre-operative scores. At the end of 6months the difference was statistically significant with p value < 0.001 (Tab. 4).

VAS SCORE	Pre-operative SCORE	Post- operative SCORE		
		6 Weeks	3 Months	6 Months
Mean	7.46	4.23	3.12	1.19
SD	0.86	0.91	0.521	0.40
P-Value	<0.001			
		0.02		
			0.015	

Table 4: VAS Score

Following surgery, there was an excellent outcome in 38 cases based on LYSHOLM Knee Score (Tab. 5).

<i>Results</i>	<i>No. of patients</i>	<i>% of patients</i>
Excellent	38	73.07
Good	12	23.07
Fair	0	0
Poor	2	3.85

Table 5: Outcomes Post-Operative based on LYSHOLM Knee score

Discussion

In this study we evaluated the functional meniscal root repair joint repair and here we compare our studies with other studies.

In the present study on evaluation of the age distribution we found that of the 52 cases in the study most patients belonged to the category 40-50 years. The mean age was 40.03 years+9.37years. we compared our findings with the other studies (Tab. 6).

	Study Year	Age Distribution (Mean Age)
Venkata Ritesh Akarapu [7]	2018	18-40 (27.5)
Dandy et al [8]	2004	10-78 (38.4)
Simpson et al [9]	1986	7-67 (30.7)
Tregonning et al [10]	1983	15-54 (27)
G. Ramesh et al [11]	2015	10-40 (27.05)
Present Study	2021	18-50 (40.03)

Table 6: Comparison of the Age distribution with other studies

In the present study on evaluation of the gender distribution we found that of the 52 cases in the study most patients were males (18, patients, 69.23%). Meniscal injuries are more common in males which may be reflection of male being more involved in aggressive sporting and manual activities that predispose to rotational injuries of the knee. In females, twisting of the leg at home was the common cause of meniscus injury

	Study Year	Males	Females
Venkata Ritesh Akarapu [7]	2018	16 (80%)	4 (20%)
Simpson et al[9]	1986	90%	10%
Tregonning et al[10]	1983	40	4
G. Ramesh et al [11]	2015	17 (85%)	3(15%)
Present Study	2021	36 (69.23%)	16 (30.77%)

Table 7: Comparison of the Gender distribution with other studies

In the present study on evaluation of the side of surgery we found that of the 52 cases in the study most patients had a right sided injury (34 patients, 65.38%) (Tab. 8).

	Study Year	Right	Left
Venkata Ritesh Akarapu [7]	2018	13	11
Simpson et al[9]	1986	50%	50%
Tregonning et al[10]	1983	22	23
G. Ramesh et al [11]	2015	17	3
Present Study	2021	34 (65.28%)	18 (34.62%)

Table 8: Comparison of side of surgery distribution with other studies

In the present study on evaluation of LYSHOLM Knee Score there was significant difference between the pre-operative and post-operative scores at each follow up. The pre-op was 68.52, the LYSHOLM Knee Score post-operative score at 6 weeks was 81.72, 3 months was 85.72, 6 months was 92.23. As compared to pre-operative scores at the end of 6 months the difference was statistically significant with p value < 0.001. Functional results in series of Schimmer et al [12] 94.8% of patients had an excellent to good results and 5.2% Fair to Poor result. Functional outcome results in Ramesh [11] series excellent 70%, good 25%, Fair 5% as compared results in series of Rao [13] was excellent 80%, good 10 % and Poor – 10 %.

In the present study on evaluation of VAS Score, there was significant difference between the pre-operative and post-operative scores at each follow up. The VAS pre-operative was 7.46, the VAS post operative at 6 weeks was 4.23, 3 months was 3.12, 6 months was 1.19. As compared to pre-operative scores at the end of 6 months the difference was statistically significant with p value < 0.001. Following surgery there was an excellent outcome in most of the cases with respect to the range of motion overall the improvement in the range of motion the difference was statistically significant with a p value < 0.001.

Conclusion

In the present study we found that sports related twisting injuries were commoner, seen more in males and in young adults. Following meniscus root repair, it is possible to get a good range of motion back post operatively with significant improvement in LYSHOLM score & VAS score if appropriate post-operative physiotherapy is instituted at the right time.

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References

1. Pache S, Aman ZS, Kennedy M, Nakama GY, Moatshe G, Ziegler C, LaPrade RF. Meniscal root tears: current concepts review. Archives of Bone and Joint Surgery. 2018 Jul;6(4):250.
2. Bonasia DE, Pellegrino P, D'Amelio A, Cottino U, Rossi R. Meniscal root tear repair: why, when and how? Orthopedic reviews. 2015 Jun 3;7(2).
3. Allaire R, Muriuki M, Gilbertson L, Harner CD. Biomechanical consequences of a tear of the posterior root of the medial meniscus: similar to total meniscectomy. JBJS. 2008 Sep 1;90(9):1922-1931.
4. Lee DW, Ha JK, Kim JG. Medial meniscus posterior root tear: a comprehensive review. Knee surgery & related research. 2014 Sep;26(3):125.
5. Hutchinson ID, Moran CJ, Potter HG, Warren RF, Rodeo SA. Restoration of the meniscus: form and function. The American journal of sports medicine. 2014 Apr;42(4):987-998.

6. Rayan, F., Sachin Bhonsle, and Divyang D. Shukla. "Clinical, MRI, and arthroscopic correlation in meniscal and anterior cruciate ligament injuries." *International orthopaedics* 33.1 (2009): 129-132.
7. Akarapu VR, Ramu C, Ramesh B, et al. A study on post-operative evaluation in meniscal injuries treated with arthroscopic partial meniscectomy. *J. Evolution Med. Dent. Sci.* 2018;7(45):4913-4918.
8. Dandy DJ. The arthroscopic anatomy of symptomatic Meniscal lesions. *J Bone and Joint Surgery* 1990;72(4):628-633.
9. Simpson DA, Thomas NP, Aichroth PM. Open and closed meniscectomy – a comparative analysis. *J Bone Joint Surg Br* 1986;68(2):301-4.
10. Tregonning RJ. Closed partial meniscectomy. Early results for simple tears with mechanical symptoms. *J Bone Joint Surg Br* 1983;65(4):378-82.
11. Ramesh G, Reddy JA, Vardhan MV, Ramesh G, Reddy JA, Vardhan MV. A Study Of Arthroscopic Management Of Meniscal Injuries. *Journal of Evidence based Medicine and Healthcare.* 2015; 2(38): 6058-6067.
12. Schimmer R. C, Brulhart K.B, Duff C, Glinz W "Arthroscopic partial meniscectomy a 12 year follow up and two step evaluation of the long-term course" *Arthroscopy* 1998 Mar: 14(2) 136-142.
13. RAO SK, RAO PS. "Lysholm II" Scoring system to evaluate Meniscal injury. *Indian Journal of Orthopedics* 1997;31(2):107-9.