MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.36478/makrjms.2024.7.128.131

OPEN ACCESS

Key Words
Anterior cruciate ligament (ACL), meniscal tear, magnetic resonance imaging (MRI)

Corresponding Author
Ashish Devgan,
Department of Orthopaedics, Pt BD Sharma PGIMS, Rohtak, Haryana, India

Author Designation
[1]Junior Resident
[2]Professor and Head

Received: 22 April 2024
Accepted: 8 June 2024
Published: 10 June 2024

Citation: Aditya and Ashish Devgan, 2024. A Retrospective Assessment of the Meniscal Tears in Relation to Complete vs Partial Anterior Cruciate Ligament (ACL) Injury. Res. J. Med. Sci., 18: 128-131, doi: 10.36478/makrjms.2024.7.128.131

A Retrospective Assessment of the Meniscal Tears in Relation to Complete vs Partial Anterior Cruciate Ligament (ACL) Injury

[1]Aditya and [2]Ashish Devgan
[1,2]Department of Orthopaedics, Pt BD Sharma PGIMS, Rohtak, Haryana, India

Abstract
The aim of the present study was to investigate the incidence and location of meniscal tears in relation to complete vs partial anterior cruciate ligament (ACL) injury. Over the past two years, we obtained magnetic resonance imaging (MRI) scans from 100 individuals (100 knees) who were diagnosed with both anterior cruciate ligament (ACL) and meniscal injuries. These patients were followed up for a period of three months to two years after their knee injuries at our centre. In the study, 60 men and 40 women aged 20-55 averaged 29.1 years. In partial ACL injury (50 knees), 46% (23 knees) had medial meniscal tears, 44% (22 knees) had lateral and 10% (5 knees) had bilateral. In full ACL injury (50 knees), 60% (30 knees) had medial meniscal tears, 32% (16 knees) had lateral tears and 8% (4 knees) had bilateral tears. According to Cooper, partial ACL injuries were often present in zones E and F, the middle to posterior lateral meniscus. However, tears in zones A and B-the middle to posterior medial meniscus-increased in the total ACL group. Medial meniscus tears were over 50% in total ACL tears. Lateral meniscus injury was linked to partial ACL tear more than total. In total ACL tears, medial meniscus tears were more common in posterior horn than middle horn, while lateral tears were almost equal in anterior and posterior horn.

INTRODUCTION

Reconstruction can correct functional instability following ACL injury. However, the meniscus lesions generally cannot be healed and may impair knee function over time[1]. Meniscal damage rates range from 16-82% in acute ACL injuries to 96% in chronic ACL deficiencies[2]. Acute ACL injuries involve the lateral meniscus, while chronic ACL deficit involves the medial[2,3]. The anterior cruciate ligament (ACL) controls knee anterior translation and stabilises frontal and sagittal rotation[4]. Most ACL injuries in young athletes occur through pivoting and cutting sports[5]. ACL repair has poor healing and functional results, therefore Anterior Cruciate Ligament Reconstruction (ACLR) is the gold standard treatment for fast return to pre-injury sports performance.

ACL injuries account for 25-50% of knee ligamentous injuries, while partial ACL injuries account for 10-27%[6]. Clinical examinations like Lachman and Pivot Shift tests and imaging techniques like MRI offer a tentative diagnosis, but diagnostic arthroscopy is needed for a conclusive diagnosis. The presence of torn ACL fibres aids in biomechanical stability, better vascularity and proprioception, which aids in healing. When sportspeople are unable to reach an optimal fitness level to resume pre-injury sports, management depends on knee instability, functional limitations and laxity[7].

This study examined meniscal tear incidence and location in total vs. partial anterior cruciate ligament (ACL) damage.

MATERIALS AND METHODS

After a two-year follow-up at our centre, we obtained magnetic resonance imaging (MRI) scans of 100 knees from patients who had suffered a combined anterior cruciate ligament (ACL) and meniscal damage. Half of the patients had full ACL tears (50 knees, mean age 28.2 years) while the other half had partial tears (54 knees, mean age 23.7 years).

Regarding the site of the tear, we contrasted the two sets of data. We utilized the categorization scheme outlined by Cooper *et al*. to record the spot where the rip occurred. in[13] Using this method, the meniscuses are radially divided into thirds. For the medial meniscus, the radial zones are represented as A, B and C, with A representing the posterior third., for the lateral meniscus, the radial zones are D, E and F, with F representing the posterior third. To demonstrate a significant difference, a p-value less than 0.05 was used.

RESULTS AND DISCUSSIONS

In partial ACL injury (50 knees), medial meniscal tear was found in 46% (23 of 50 knees), lateral meniscal tear in 44% (22 of 50 knees) and bilateral meniscal tears in 10% (5 of 50 knees). Regarding the locations of meniscal tears, in complete ACL injury (50 knees), medial meniscal tear was found in 60% (30 of 50 knees), lateral meniscal tear only in 32% (16 of 50 knees) and bilateral (including medial and lateral) meniscal tears in 8% (4 of 50 knees).

When meniscal tear locations were classified according to Cooper, the tears in the partial ACL group were frequently located in zones E and F., that is, middle to posterior region of the lateral meniscus.

In the complete ACL group, however, there was an increase of tears in zones A and B., that is, middle to posterior region of the medial meniscus.

Treatment for anterior cruciate ligament (ACL) injuries is based on the specific pattern of lateral meniscus tears seen in each patient. Minor effects on knee joint health make some tear patterns, including partial longitudinal tears or complete stable longitudinal tears, suitable for leaving in place[8-10]. Repairing other types of tears promptly is necessary to avoid quick joint deterioration., these include root tears, full radial tears and bucket-handle tears, all of which are linked to significant biomechanical implications[11-14].

Of the fifty knees that had partial ACL injuries, forty-six percent (23 of 50) had medial tears, forty-four percent (22 of 50) had lateral tears and ten percent (five of fifty) had bilateral tears. Among 50 knees that had a full ACL rupture, 60% had a tear in the medial meniscus (30 out of 50), 32% in the lateral meniscus (16 out of 50) and 8% in both the medial and lateral meniscus (4 out of 50). The posterior or centre section of the lateral meniscus becomes impinged upon by the femur and tibia during valgus movement, potentially resulting in longitudinal meniscal tears. Complex knee injuries are typically the result of a number of mechanisms working together. Meniscal tears were observed in 41-22% of acute ACL ruptures and 58%-100% of chronic ACL injuries, according to a 1997 meta-analysis by Bellabarba It is also hypothesized that most peripheral meniscal abnormalities are linked to ACL laxity to some extent. Primary meniscal tears after injury and subsequent meniscal tears induced by increased knee joint laxity generating peripheral tears of the posterior horn of the medial meniscus likely account for the more than 50% frequency of medial meniscus tear in full ACL tears in our research. Since index complex knee injuries and reduced knee translation are more common in partial ACL tears than in full ACL tears, a lateral meniscus tear is more common in the former.

Tears in the partial ACL group were most commonly seen in zones E and F, which correspond to the middle to posterior portion of the lateral meniscus, when meniscal tear sites were categorized according to Cooper. But in the group that underwent a full ACL reconstruction, tears in zones A and B-the mid-to posterior area of the medial meniscus-were more

Table 1: Distribution of meniscal tears in ACL-deficient knees

	Partial ACL injury	Complete ACL injury
Bilateral meniscus	5 (10%)	4 (8%)
Lateral meniscus	22 (44%)	16 (32%)
Medial meniscus	23 (46%)	30 (60%)

Table 2: Zone distribution of meniscal tears in Partial ACL injury

Zone distribution of meniscal tears	N
A	14
A-B	2
A-B-C	1
B	5
B-C	2
C	1
D	5
D-E	2
D-E-F	1
E	5
E-F	2
F	10

Table 3: Zone distribution of meniscal tears in complete ACL injury

Zone distribution of meniscal tears	N
A	16
A-B	2
A-B-C	1
B	4
B-C	2
C	1
D	6
D-E	2
D-E-F	1
E	2
E-F	1
F	12

common. Based on the sites of 575 prospectively assessed ACL injuries, Smith and Barrete[15] characterized the meniscal tear pattern in ACL deficient knees in 2001. Medial vs. lateral tears were not significantly different from one another. On the other hand, the posterior horn and the peripheral meniscocapsular junction are heavily engaged in injuries involving the medial meniscus. More than 50% of meniscal tears in individuals with acute or chronic ACL injuries were identified as peripheral posterior horn tears, according to a review of several articles conducted by Thompson and Fu[16]. The vascularized outer layer of the meniscus provides these lesions hope for healing and makes them repairable instead of surgically removing them, as many articles have also noted.

CONCLUSIONS

Medial meniscus tears were above 50% in total ACL tears. Lateral meniscus injury was linked to partial ACL tear more than total. In total ACL tears, medial meniscus tears were more prevalent in posterior horn than middle horn, whereas lateral tears were virtually equal in anterior and posterior horn. In partial ACL tears, medial meniscus tears were more prevalent in posterior and middle horn, whereas lateral meniscus tears were practically equal in anterior and middle horn and more common in posterior.

REFERENCES

1. Chhadia, A.M., M.C.S. Inacio, G.B. Maletis, R.P. Csintalan, B.R. Davis and T.T. Funahashi, 2011. Are meniscus and cartilage injuries related to time to anterior cruciate ligament reconstruction. Am. J. Sports Med., 39: 1894-1899.
2. Bellabarba, C., C.A. Bush-Joseph and B.R.B. Jr, 1997. Patterns of meniscal injury in the anterior cruciate-deficient knee: A review of the literature. Am. J .Orthop. (Belle Mead NJ)., 26: 18-23.
3. Kilcoyne, K.G., J.F. Dickens, E. Haniuk, K.L. Cameron and B.D. Owens, 2012. Epidemiology of meniscal injury associated with acl tears in young athletes. Orthopedics, 35: 208-212.
4. Butler, D.L., F.R. Noyes and E.S. Grood, 1980. Ligamentous restraints to anterior-posterior drawer in the human knee. A biomechanical study. J. Bone Joint Surg. Am., 62: 259-270.
5. Kiapour, A.M. and M.M. Murray, 2014. Basic science of anterior cruciate ligament injury and repair. Bone Joint Res., 3: 20-31.
6. Temponi, E.F., L.H.D. Júnior, B. Sonnery-Cottet and P. Chambat, 2015. Partial tearing of the anterior cruciate ligament: Diagnosis and treatment. Rev. Bras. Ortopedia, 50: 9-15.
7. Carulli, C., M. Innocenti, G. Roselli, L. Sirleo, F. Matassi and M. Innocenti, 2020. Partial rupture of anterior cruciate ligament: Preliminary experience of selective reconstruction. J. Orthop. Traumatol., Vol. 21 .10.1186/s10195-020-0544-0.
8. Pujol, N. and P. Beaufils, 2009. Healing results of meniscal tears left in situ during anterior cruciate ligament reconstruction: A review of clinical studies. Knee Surg., Sports Traumatol. Arthrosc., 17: 396-401.
9. Fitzgibbons, R.E. and K.D. Shelbourne, 1995. "Aggressive" nontreatment of lateral meniscal tears seen during anterior cruciate ligament reconstruction. Am. J. Sports Med., 23: 156-159.
10. Shelbourne, K.D. and J. Heinrich, 2004. The long-term evaluation of lateral meniscus tears left in situ at the time of anterior cruciate ligament reconstruction. Arthrosc. J. Arthroscop. Related Surg., 20: 346-351.
11. LaPrade, C.M., K.S. Jansson, G. Dornan, S.D. Smith, C.A. Wijdicks and R.F. LaPrade, 2014. Altered tibiofemoral contact mechanics due to lateral meniscus posterior horn root avulsions and radial tears can be restored with in situ pull-out suture repairs. J. Bone Joint Surg., 96: 471-479.
12. Forkel, P., M. Herbort, F. Sprenker, S. Metzlaff, M. Raschke and W. Petersen, 2014. The biomechanical effect of a lateral meniscus posterior root tear with and without damage to

the meniscofemoral ligament: Efficacy of different repair techniques. Arthrosc. J. Arthroscop. Related Surg., 30: 833-840.
13. Ode, G.E., G.S.V. Thiel, S.A. McArthur, J. Dishkin-Paset and S.E. Leurgans *et al.,* 2012. Effects of serial sectioning and repair of radial tears in the lateral meniscus. Am. J. Sports Med., 40: 1863-1870.
14. Schillhammer, C.K., F.W. Werner, M.G. Scuderi and J.P. Cannizzaro, 2012. Repair of lateral meniscus posterior horn detachment lesions. Am. J. Sports Med., 40: 2604-2609.
15. Smith, J.P. and G.R. Barrett, 2001. Medial and lateral meniscal tear patterns in anterior cruciate ligament-deficient knees. Am. J. Sports Med., 29: 415-419.
16. Thompson, W.O. and F.H. Fu, 1993. The meniscus in the cruciate-deficient knee. Clin. Sports Med., 12: 771-796.