IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861. Volume 11, Issue 1 (Nov.- Dec. 2013), PP 40-43
www.iosrjournals.org

Morphometric Analysis of Adult Menisci- A Cadaveric Study.

Mamata Panigrahi[1,] S.Senthil Kumar [2]
1(Department of Anatomy, Kalinga Institute of Medical Sciences, KIIT University, India)
2(Department Of Anatomy, Sri Ramachandra Medical College, Sri Ramachandra University, India)

Abstract: *The Menisci are semi-lunar crescent shaped fibro-cartilages which serve to widen and deepen the tibial articular surfaces. Every knee has a medial and lateral Meniscus that absorbs stress and act as cushions between the bones at the knee. There are many differences in the anatomical features and insertion between the lateral and the medial Menisci also that the contour of the Menisci changes from C – shaped (semicircular) to circular (Discoid) which are important in relation to the injury mechanisms. Discoid lateral meniscus has an incidence of* ***5%*** *of the population with a bilateral as common presentation. The distinguishing features of a Discoid lateral meniscus are its shape and posterior ligamentous attachments. Here the main aim was to describe the anatomical and pathological features of meniscus and carry out the Morphometric study, and finally conclusions being drawn and discussed.*

Keywords: *Discoid, Incidence, Menisci, Morphometric Study, Meniscal lesions.*

I. Introduction

The Menisci of the knee joint are to be considered main elements for perfect articulation among the articular osseous surfaces [1]. It has outer attached thick convex border opposite to free possibility and the kind of injury. However, the data related to the Morphometric parameters of these structures are scarce [2]**.** Because of it, the aim of the present study was to determine Morphometric data regarding:

- The thickness of the outer circumference and the width of Menisci,
- The distance between the anterior and posterior cornu and co-relate between the area of Menisci and the area of corresponding tibial plates.

An expanded knowledge of Meniscal Anatomy with its Morphometric and biomechanical function is crucial to understand the Meniscal pathology and treatment. These reasons motivated me to make an effort to study the Menisci in detail.

II. Materials And Methods

The study was conducted over a period of two years in the Department of Anatomy, Sri Ramachandra Medical College and Research, Institute, Porur, Chennai. For this study 38 Menisci (08 bilateral and 22 unilateral) of corpse (45-55 age range) was treated with a watery solution of formaldehyde were used, the corpses belong to the Department of Anatomy, Sri Ramachandra Medical College and Research Institute, Porur, Chennai.

Following the removal of skin overlying the knee joint, The Ligamentum Patellae and embedded patella turned inferiorly. Knee was then flexed and menisci indentified .Menisci that showed any structural change due to injuries or advanced degenerative changes were excluded as that may prevent its Morphometric analysis.

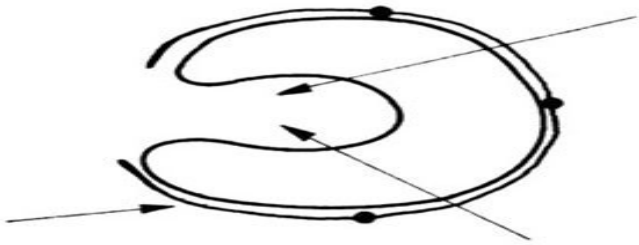
2.1: To measure the length of outer circumference of Menisci

A line was positioned from the apex of anterior cornu to the apex of posterior cornu of Meniscus. Using a cotton thread and then was measured circumferentially by placing the points in the Vernier Calipers.

2.2: The width of Menisci

To measure the width first the Menisci were divided into three zones: Anterior horn (AH), mid body (MB) and posterior horn. From each point, one line was drawn from the peripheral margin to the central margin as shown in the figure1.

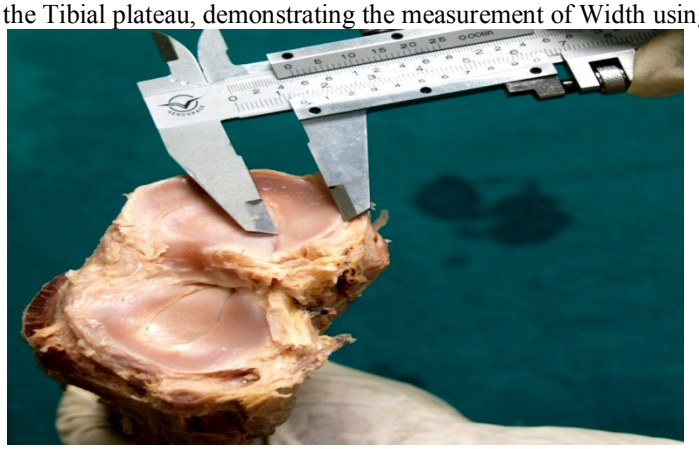
Figure 1: Showing the measurement of width of the menisci by establishing three points: one anterior, One medium and one posterior.



2.3: The thickness of Menisci

The thicknesses were also determined in same way as described above.

Figure 2. View of the Tibial plateau, demonstrating the measurement of Width using Vernier calipers.



III. Observation

The following are the observations noted:

3.1 MORPHOLOGICAL FEATURES

3% of dissected specimens showed variations in the shape of Lateral Menisci from semicircular to discoid (circular).No Discoid were observed in Medial Menisci. The variation in shape was in accordance with Wantanabe classification [3] **i.e.** complete ,incomplete and Wrisberg type of discoid lateral menisci .Complete and incomplete was in accordance with the tibial plateau coverage .The Wrisburg type discoid meniscus had an absence of the attachment of normal Menisco-tibial ligament to the posterior horn. The complete and incomplete variants are essentially discoid in shape and have normal posterior attachment. The incidence of discoid type variance was 3% in my study.

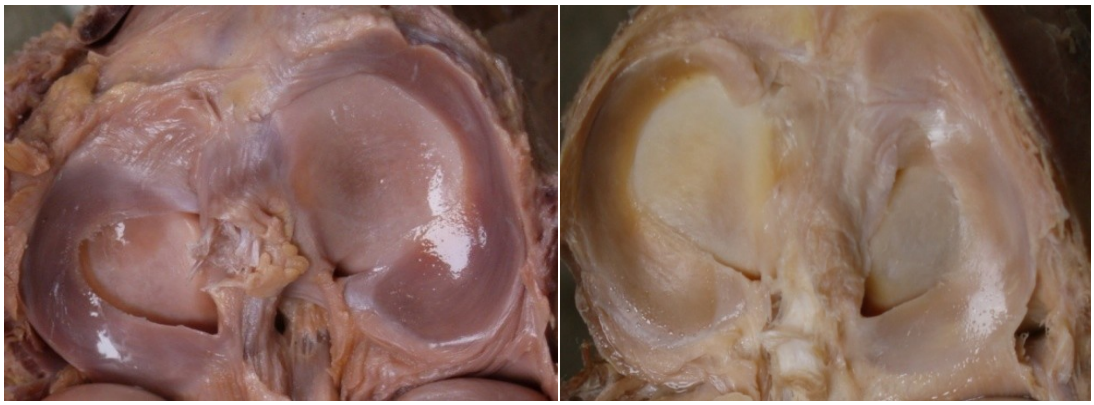


Figure 3: Showing Variations in shape of Lateral menisci from semicircular to circular (Discoid).

Table-1 Width of Medial and Lateral Menisci (mm)

Right side	Anterior horn	Mid body	Posterior horn
Medial Menisci	2.52 ± 0.34	2.9 ± 0.20	4.15 ± 0.59
Lateral Menisci	3.51 ± 0.42	5.02 ± 0.59	3.31 ± 0.17

Table- 2 Width of Medial and Lateral Menisci (mm)

Left side	Anterior horn	Mid body	Posterior horn
Medial Menisci	2.67 ± 0.33	3.16 ± 0.6	4.85 ± 0.74
Lateral Menisci	3.62 ± 0.95	4.61 ± 0.97	4.43 ± 0.67

Table - 3 Thickness of Medial and Lateral Menisci (mm)

Side	Medial	Lateral
Right	2.34 ± 0.17	1.59 ± 0.34
Left	2.16 ± 0.25	2.09 ± 0.21

Table – 4 Length of Medial and Lateral Menisci (cm)

Side	Medial	Lateral
Right	7.38 ± 0.69	6.59 ± 1.29
Left	7.66 ± 0.8	7.02 ± 1.23

IV. Discussion

4.1 MORPHOLOGICAL FEATURES

According to Cohen et al [4], the menisci cover from ½ to 2/3 of articular surface of corresponding tibial plate, with the Lateral Meniscus covering an area higher than the medial meniscus. According to Smillie and Farias Filho et al [5], the lateral meniscus cover a higher area of the tibial plate, due to its semicircular format, been near the insertions of its cornua.We verified that the Medial Meniscus covers an area of tibial plateau significant higher than the lateral meniscus, which justified the higher incidence of injuries of Medial meniscus because it suffers a higher action of femoral condyle.

4.2 LENGTH OF MENISCI

In the present study, the length of the medial menisci of both right (7.8cms) and left (7.5cms) was found to be more when compared to lateral menisci (right-5.83cms, left-5.0cms).

4.3 WIDTH OF MENISCI

In this study the width was assessed in three different point's i.e. anterior, mid-body, posterior horn. Relating to width of the medial menisci, the width was less on the right side (5.8mm, 5.55mm, 5.91mm and 5.78mm respectively) when compared to the width on the left side (5.9mm, 6.0mm and 6.19mm respectively). The lateral meniscus showed a significant difference in shape when compared to medial meniscus. According to Figueroa et al [6] the lateral meniscus is liable to higher variations in its general configurations than the medial meniscus.

According to Smillie [7] the lateral meniscus shows a width higher than the medial meniscus. According to Almedia et al [2], the width of the mid body of lateral menisci was more when compared to posterior third of lateral meniscus. In the present study however the posterior horn is larger than the mid body. This morphological difference in width can determine not only the possibility of an injury, but also the location and kind of injury. Therefore he suggested that narrow menisci are less prone to rupture than the wide. A higher evidence of this context is suggested by the rarity of the injuries of the anterior third of medial menisci as related by Rico and Ayala et al [8].

THICKNESS OF MENISCI

In relation to thickness the lateral menisci (2.3mm) were thicker when compared to the medial menisci (1.4mm).

V. Conclusion

Understanding of the importance of the Menisci in the biomechanics of the knee has progressed steadily since 1968, when Jackson wrote, "The exact function of that structure (Meniscus) is still a matter of some conjecture" [9]**.**At that time, it was common to remove the entire substance if any doubt existed regarding the integrity of the Meniscus. Today, it is known that the Menisci are not optional or expendable structures; they have an integral role in normal knee joint mechanics. The physician treating an athlete with a known or suspected Meniscal tear needs to understand the structure and function of the Meniscus and the factors involved in treating an athlete with non-coperative versus operative treatment. The present study will form guideline measurements for clinical treatments of pathologic conditions of the Menisci of knee joint, based on the anatomical and functional characteristics. The limitations for the study include that it uses a very simple technique and requires a more sophisticated equipment getting the volume of the menisci.

References

[1]. Testut, L. & Latarjet, A. *Tratado de Anatomía Humana*. *10aed*. Barcelona, Salvat, 1975.
[2]. Almeida, S. K. S.; Demoraes, A. S. R.; Tashiro, T.; Neves,S. E.; Toscano, A. E. & Deabreu, R. RM.Morphometric study of menisci of the knee joint. *Int. J. Morphol., 22:181-4*, 2004.*Am j sports med*; *10:90-95*, 1982.
[3]. WatanabeM,Takeda S and Ikeuchi H.Atlas of Artroscopy ;berlin:*springer-verla,75,*1979.
[4]. Cohen M.J.Abdalla r. , Barreto F.A.Q.M,Bouchabki E.T,Oliveira E.C and Ejnisman B. *J.Estudo Da Vascularizacao Do menisco humano ortop;28950:263-72,199.*
[5]. Farias Filho, O. C.; Lyrio Mello, R. S.; Souza, D. C. & Paz Junior, A. C. Menisco discoide: *estudo retrospectivo*. Rev. Bras. *Ortop,* 20:106-10, 1985.
[6]. Figueroa, M.; Rios, A. L. L.& Narvaez, C. Menisco discoid interno: presentacion de un caso y revision de la literatura. *Rev. Colom. Ortop. Traumat., 3*:155-8, 1999.
[7]. Smillie, I. S. *Injuries of the knee Joint.* 4a ed. London, Living Stone, 1975.
[8]. Rico, E. G. C. & Ayala, C. E. A. Localizacion de las rupturas meniscales en nuestro medio. *Rev. Mex. Ortop.Traumatol., 11*:10-3, 1997.
[9]. Jackson JP. Degenerative changes in the knee after meniscectomy. *Br Med J. Jun 1 1968; 2(5604):525-7.*