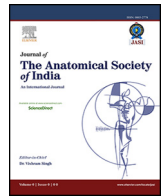




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Original Article

A cadaveric study of tibial meniscal dimensions and its clinical implication

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ABSTRACT

Introduction: The knee-joint consists of three articulations in one joint. There are two condyloid joints between condyles of femur and tibia, and third joint is between patella and femur. It is a complex joint because the articular surfaces of the femoral and tibial condyles are not congruent to each other. The tibial menisci play important role in articulation by providing congruent articulating surfaces to tibia and femur.

There is very few data related to the morphometric parameters of tibial menisci. Aim of this study was to measure and analyse the dimensions of tibial meniscus in cadavers.

Methods: In the present study, different parameters of tibial meniscus were measured after exposure of knee joint. These measurements were done with the help of digital Vernier calliper.

Results and discussion: Mean length, width and circumference of medial meniscus were 42.28 ± 3.71 mm, 31.67 ± 3.40 mm and 101.46 ± 6.89 mm respectively. Mean widths of anterior horn, body and posterior horn of medial meniscus were 6.48 ± 1.21 mm, 8.37 ± 1.54 mm, 14.34 ± 2.59 mm respectively. Mean thicknesses of anterior horn, body and posterior horn of medial meniscus were 4.81 ± 1.34 mm, 5.80 ± 1.25 mm and 5.28 ± 1.22 mm respectively. Mean length, width and circumference of lateral meniscus were 32.73 ± 3.08 mm, 33.22 ± 3.37 mm and 97.61 ± 7.32 mm respectively. Mean widths of anterior, body and posterior parts of lateral meniscus were 8.57 ± 1.6 mm, 9.79 ± 1.71 mm, 9.21 ± 1.28 mm. Mean thicknesses of anterior horn, body and posterior horn of lateral meniscus were 3.03 ± 0.94 mm, 6.53 ± 1.07 mm and 4.76 ± 1.00 mm respectively.

Conclusion: These dimensions of the menisci might be the major factors that determine the location and the kind of injury to menisci.

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1. Introduction

Knee joint consists of three articulations in one joint, firstly two condyloid joints between condyles of femur and corresponding condyles of tibia and secondly a joint between the patella and the femur. The knee-joint is much complicated joint as compared to other condyloid joint in the body. Owing to the incongruency of the articular surfaces of femur and the tibia, this joint does not carry out the simple gliding movement.¹ The semilunar cartilages known as tibial menisci are extensions of tibial articulation of knee.

Menisci help in tibial articulation with the femur by providing the congruent articular surfaces.²

Meniscal injuries are common in young athletically active persons aged <25 years. They are common in players involved in sports that involve frequent pivoting, such as soccer, American football and racket sports like badminton.³ Meniscal injury was the most common lesion in knee injuries, in these types of sports as diagnosed by arthroscopy.⁴

Osteoarthritis of knee is degenerative joint disease, which results from tibio-femoral cartilage loss. The cartilage loss may be due to many factors that are related to menisci, namely damage to the menisci, extrusion of the menisci from its normal anatomical position, malalignment of the menisci, and laxity of the meniscus etc.⁵ Thus integrity and the proper functioning of tibial meniscus are very important for the normal working of the knee joint.⁶

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Meniscal repair is recommended when technically and anatomically feasible to preserve meniscal function.⁷ Allograft or synthetic meniscal implant has been suggested as means to restore contact pressure following meniscectomy.

Many differences have been found in the shapes, dimensions and the insertion points between the medial and the lateral menisci, in previous studies. Study of dimensions of the menisci is very important, as it will help in understanding the various injury mechanisms causing the damage to the menisci. Hence this study was conducted to throw light on the morphometric parameters of the tibial menisci of knee joint. Objectives of present study were to measure the dimensions of both the medial, lateral menisci as well as to analyse the results and make clinical inferences.

2. Materials and methods

The present study entitled "A cadaveric study of tibial meniscal dimensions and its clinical implication" was carried out at Anatomy Department of T.N. Medical College, Mumbai. The permission of the Head of Department of Anatomy was taken prior to beginning of the study. Consent was not required being a cadaveric study.

We studied 50 specimens of adult Indian cadaveric knee joints.

Skeletally mature normal human cadaveric knees of either sex were included in study. Cadaveric knees with evidence of meniscal tear, knees with evidence of any previous surgery were excluded from the study.

In this study, different parameters of tibial menisci were measured after exposure of knee joint. The present study required the adult human knee joints which were made available in the dissection hall of Anatomy Department. We included 50 intact tibial menisci of 50 knee joints in the study, out of which, 25 were from the right side and the rest 25 were from the left side of human cadavers. Skin and muscles around the knee joints were dissected. Ligamentum patellae and collateral ligaments were cut transversely. After giving the vertical incisions on the either sides of joint capsule, the knee joint was opened anteriorly. The intra-articular ligaments and the joint capsule were removed. Condyles were properly dissected by removing the surrounding soft tissues and muscles. All dissections were performed systematically and the data was recorded on a standardised data recording sheet.

The measurements of different parameters were done with the help of digital Vernier calliper and a measuring scale. Different parameters of menisci were measured using the following method:

- (1) The medial meniscal length (MML) and the lateral meniscal length (LML) were measured from the antero-posterior parts of the respective meniscus as shown in Fig. 1.
- (2) The distances between the antero-posterior horns of medial and lateral meniscus (MdAP&LdAP) were measured between the apices of the antero-posterior parts of the respective menisci.
- (3) The medial meniscal width (MMW) and the lateral meniscal width (LMW) were measured from the attachment of the posterior horn on tibia to the outer most edge of the respective meniscus as shown in Fig. 1.
- (4) Medial meniscal and lateral meniscal circumference (MMC&LMC) were measured with the help of a non-elastic cotton thread as shown in Fig. 2. The thread was placed against the outer margin of the meniscus and it was fixed to the ends of the menisci with the help of metallic pins. The length of thread between the pins was measured with the help of a measuring scale. This length is the outer circumference of the meniscus. When the thread is placed against the inner border of the

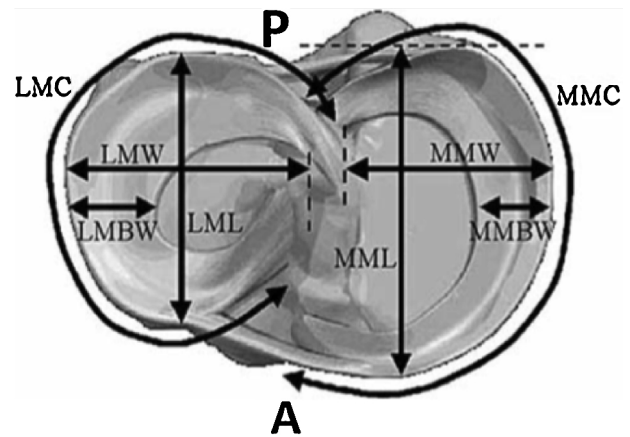


Fig. 1. Showing measurement of meniscal dimensions.⁸

meniscus, the length so found is the inner circumference of respective meniscus.

- (5) When this outer and inner circumference of the meniscus so calculated is divided into three equal parts and the respective division points joined, the meniscus can be divided into three equal parts, i.e. anterior, body (middle) and posterior parts as shown in Fig. 2.
- (6) Width of the three parts of the medial and lateral meniscus (MAW, MBW, MPW & LAW, LBW, LPW) was measured along the mid points of three parts of the respective meniscus as shown in Fig. 2, i.e. from the outer edge to inner edge.
- (7) Similarly the thickness of the three parts of the medial and lateral meniscus (MAT, MBT, MPT&LAT, LBT, LPT) was taken along the mid points of the three parts of respective meniscus. Only the outer margin was considered while measuring the thickness using a digital Vernier calliper.

The data were tabulated and analysed for various parameters described subsequently. Mean, standard deviation and standard error of mean was calculated for each parameter. Unpaired *t*-test and One Way ANOVA test were used to compare the data of various parameters. Statistical analysis was done using spss-15 and Microsoft excel software (Fig. 3).

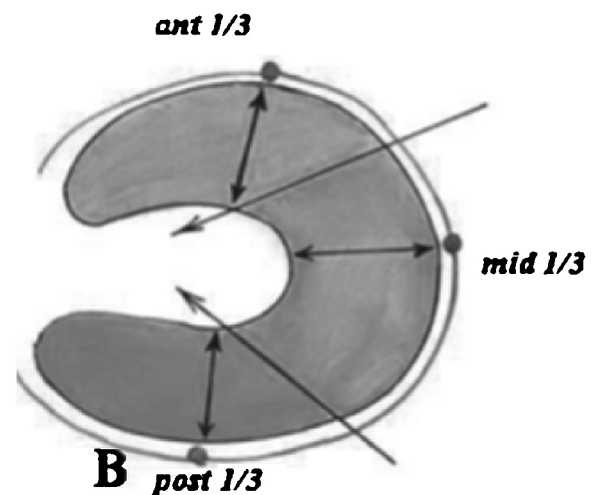


Fig. 2. Showing the measurement of circumference and width of anterior, middle and posterior parts of meniscus.⁹

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