

## **MENISCAL TEARS**

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(Original scientific paper)

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### **Abstract**

*Meniscus is the most commonly injured structure in the knee joint. Meniscal tear patterns include vertical tears, oblique, complex and horizontal. Aim: The aim of this study is to present the distribution of different types of meniscal tears diagnosed and treated with arthroscopy. Material and methods: Between 2013 and 2015, at the University clinic for orthopaedic surgery, 137 patients with meniscal tears and average age of  $26 \pm 15$  years were diagnosed and treated with arthroscopy. Results: Out of 137 patients with meniscal tear, 109 (79.6%) patients had medial meniscal tear and 28 (20.4%) had lateral meniscal tear. Male female ratio was 3:1. Distribution of vertical, oblique, horizontal and complex medial meniscal tear was 16 (14.7%), 83 (76.1%), 6 (5.5%) and 4 (3.7%) respectively. Distribution of vertical (longitudinal and radial), oblique, horizontal and complex lateral meniscal tear was 5 (17.9%), 18 (64.3%), 2 (7.1%) and 3 (10.7%) respectively. Conclusion: Arthroscopy is essential for diagnosis and treatment of meniscal tears. In our study, medial meniscus is more frequently injured than lateral meniscus and horizontal meniscal tears appear less then oblique and vertical meniscal tears.*

**Key words:** *Meniscal tears, Arthroscopy, Knee*

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### **Introduction**

The knee joint is the biggest joint in the human body. Despite bones (femur and tibia), a number of soft tissue structures are part of this most complex joint such as: menisci, ligaments, articular cartilage, articular capsule, infrapatellar fat pad, burse and tendons of the surrounding muscles.

#### *Anatomy of meniscus*

The menisci are two semilunar-shaped fibrocartilaginous structures, which are interposed between the femoral condyles and tibial plateaux. They are triangular in cross section and are attached to the lining of the knee joint along its periphery. There are two menisci: medial and lateral. Their unique anatomy is comprised of circumferentially oriented collagen fibres which provide resistance to hoop stresses and radially oriented fibres which resist shear forces (Cole BJ, Carter TR, Rodeo SA, 2003). The lateral meniscus is C-shaped with a short distance between its anterior and posterior horns. The medial meniscus is U-shaped with larger separation of the two horns (Maffulli N, Longo UG, Campi S, Denaro V, 2010), (Shiraev T, Anderson SE, Hope N, 2012), (Fan R, Ryu R, 2000).

Menisci are mostly avascular in adults. After the second decade only the peripheral 10% to 30% of the meniscus is vascularized, with a limited blood supply arising from a perimeniscal capillary plexus. The inner 70% to 90% of the meniscus is avascular and is nourished by the synovial fluid through diffusion (Arnoczky SP, Warren RF, 1982).

The meniscus has functions in load bearing, load transmission, shock absorption, joint stability, joint lubrication, and joint congruity (Henning CE, Lynch MA, 1985).

### *Diagnosis of meniscal tears*

Meniscus is the most commonly injured structure in the knee joint. Clinical examination is the first step in establishing clinical diagnosis of meniscal tear. Varieties of clinical test are used for conducting clinical diagnosis of the injured knee. Several tests such as: McMurray, Apley, Steinmann, Thessaly, are most frequently used for diagnosis (Abdon P, Lindstrand A, Thorngren KG, 1990), (Yan R, Wang H, Yang Z, Ji ZH, Guo YM, 2011), (Solomon DH, Simel DL, Bates DW, Katz JN, Schaffer JL, 2001).

Magnetic resonance imaging (MRI) is additional diagnostic method frequently used for diagnosis and better visualization of the soft tissue structures, especially injured menisci. It is the most appropriate screening tool before therapeutic arthroscopy. MRI gives substantial benefit to orthopedics, traumatology and sports medicine.

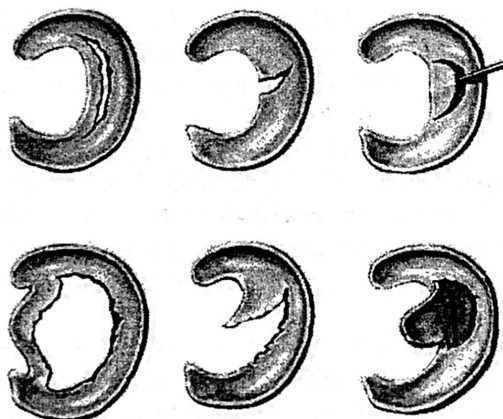
Arthroscopy is final diagnostic method for meniscal tears. It gives direct visualization of the knee and its structures, so the diagnosis is accurate (Crawford R, Walley G, Bridgman S, Maffulli N, 2007), (Munshi M, Davidson M, MacDonald PB, Froese W, Sutherland K, 2000).

### *Treatment*

Arthroscopy is minimally invasive operative technique. It is used for partial meniscectomies which involve avascular areas of the meniscus, without ability to heal. On the other hand, only peripheral tears which are in the vascular zone are amenable to repair techniques.

Meniscal tear patterns include vertical tears (longitudinal and radial), oblique, complex (or degenerative) and horizontal (Picture 1). Usually these tears are not repairable, and meniscal debridement is unlikely to restore meniscal complete function (Binfield PM, Maffulli N, King JB, 1993), (Maffulli N, Chan KM, Bundoc RC, Cheng JC, 1997), (Harper KW, Helms CA, Lambert HS, 3rd, Higgins LD, 2005).

When meniscal repair is not possible, partial meniscectomy is indicated (Metcalf RW, Burks RT, Metcalf MS, McGinty JB, 1996).



Picture 1. Vertical, oblique and horizontal meniscal tears

### **Aim**

The aim of this study is to present the distribution of different types of meniscal tears diagnosed and treated with arthroscopy.

### **Material and methods**

Between 2013 and 2015, at the University clinic for orthopaedic surgery, 137 patients with meniscal tears and average age of  $26 \pm 15$  years were diagnosed and treated with arthroscopy.

All the patients had knee injury, positive clinical tests for meniscal tear and MRI confirmation.

Method of arthroscopic examination was used for final diagnosis. Arthroscopy was done in endoscopic operating room with arthroscope and arthroscopic instruments, using standard knee portals.

### **Results**

Out of 137 patients with meniscal tear, 109 (79.6%) patients had medial meniscal tear and 28 (20.4%) had lateral meniscal tear. Male female ratio was 3:1.

Distribution of vertical (longitudinal and radial), oblique, horizontal and complex medial meniscal tear was 16 (14.7%), 83 (76.1%), 6 (5.5%) and 4 (3.7%) respectively. (Table 1)

Distribution of vertical (longitudinal and radial), oblique, horizontal and complex lateral meniscal tear was 5 (17.9%), 18 (64.3%), 2 (7.1%) and 3 (10.7%) respectively. (Table 1)

Table 1. Distribution of meniscal tears

Tear	Medial meniscal tear		Lateral meniscal tear	
	Number	%	Number	%
<b>Oblique</b>	83	76.1	18	64,3
<b>Vertical</b>	16	14.7	5	17,9
<b>Horizontal</b>	6	5.5	2	7.1
<b>Complex</b>	4	3.7	3	10.7
<b>Subtotal</b>	109	79.6	28	20.4
<b>Total</b>	137			

## Discussion

Injury of the meniscus is one of the most prevalent injuries in the human body. Meniscal tears occur mostly in sports due to a shear force between the femur and tibia. In younger patients, this is typically a twisting force on a weight loaded flexed knee. These are often "bucket-handle tears", in which there is a vertical or oblique tear in the posterior horn running toward the anterior horn, forming a loose section which remains attached anteriorly and posteriorly. In older patients, tears are generally due to degeneration associated with ageing and tend to be horizontal tears. The difference in tear type between these populations is explained by the three dimensional fibrous structure of the meniscus: horizontal delamination occurs in degenerative injuries, while the fibrous structure is ruptured in a vertical fashion in younger patients (Helms CA, Laorr A, Cannon WD, 1998), (Solomon L, Warwick D, Nayagam S, 2005).

Meniscal tear incidence may be as high as six per 1000 population with a 2.5 to 4 time's male predominance. Injury peaks at 20–29 years of age (Metcalf RW, Burks RT, Metcalf MS, McGinty JB, 2004).

Partial meniscectomy is one of the most commonly performed orthopaedic surgical procedures. Once a meniscal tear has been diagnosed it should be operated. This doesn't have to be done urgently, although patients with a painful locked knee may want surgery as soon as scheduling permits. Arthroscopic surgery is the only way to treat the tear since there are currently no medications, braces, or physical therapy treatments that have been shown to promote healing in the avascular tears (Makris EA, Hadidi P, Athanasiou KA, 2011).

Meniscectomy is accomplished by using a variety of small instruments that cut and suck out only the torn portions of the meniscus. The remaining meniscal rim is then balanced and contoured to provide a gradually tapered transition into the area of the resection. The surgeon tries to leave as much normal meniscal cartilage as possible since this is an important shock-absorbing structure.

A repair allows the entire meniscus to be saved. The key to a successful repair is that the meniscus must be able to heal itself; the repair serves only as a means of securely holding the tissue together long enough for biologic process to occur (Metcalf MH, Barrett GR, 2004), (Garrett WE Jr, Swiontkowski MF, Weinstein JN, et al, 2006).

## Conclusion

Arthroscopy is essential for diagnosis and treatment of meniscal tears.

In our study medial meniscus is more frequently injured than lateral meniscus and horizontal meniscal tears appear less then oblique and vertical meniscal tears.

Defining the types of meniscal tears, gives us a clue which type can prevent long term sequelae.

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