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ORTHOPAEDIC SPORTS MEDICINE BOARD REVIEW MANUAL

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The *Hospital Physician Orthopaedic Sports Medicine Board Review Manual* is a peer-reviewed study guide for orthopaedic sports medicine fellows and practicing orthopaedic surgeons. Each quarterly manual reviews a topic essential to the current practice of orthopaedic sports medicine.

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Meniscal Injuries

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Meniscal Injuries

Christie Heikes, MD, and Robert F. LaPrade, MD, PhD

INTRODUCTION

Meniscal injuries are the most common surgically treated knee injury in the United States. Reported rates of meniscal injury are approximately 70 per 100,000.¹⁻³ Men are affected more than women. Meniscal injuries can occur in all age-groups; however, the principal causative factors differ with age. In older patients, tears are predominantly degenerative and are commonly caused by activities of daily living, squatting, or activities involving deep flexion. In younger patients, up to one third of meniscal tears are sports-related and are primarily caused by twisting or cutting movements, hyperflexion, or trauma. In all sports with the exception of wrestling, tears of the medial meniscus occur more often than tears of the lateral meniscus.⁴ Lateral meniscus tears are also more common in patients with concomitant acute anterior cruciate ligament (ACL) injury.⁴

This manual reviews the clinical approach to the patient with a suspected meniscal injury, including diagnostic evaluation and treatment options. As a result of extensive research focused on the vascular supply, ultrastructure, and biomechanics of the meniscus, treatment of meniscal injury has progressed from routine partial and total meniscectomies to meniscal preservation. As knowledge and techniques continue to improve, the orthopaedic surgeon's goal should be to repair amenable meniscal tears while preserving as much meniscal tissue as possible in tears that cannot be repaired. For patients without meniscal tissue, a thorough evaluation is required to determine whether meniscal transplantation may be a potential treatment option.

MENISCAL STRUCTURE AND FUNCTION

GROSS STRUCTURE

The meniscus was once believed to be a functionless remnant of intra-articular leg muscles, but its necessity for long-term knee function is now well recognized. The meniscus is situated between the femoral condyles and the tibia; its superior surface is concave, and the tibial sur-

face is relatively flat. The medial meniscus has a semilunar shape, while the lateral meniscus is more circular (**Figure 1**). The menisci are thick at the periphery and thin centrally, making them triangular in cross-section. The anterior attachment of the medial meniscus is at the medial edge of the anterior intercondylar fossa, approximately 6 to 7 mm in front of the ACL; the posterior horn attachment is located in the posterior intercondylar fossa, just anterior to the posterior cruciate ligament (PCL). The medial meniscus is adherent to the joint capsule along its periphery and is firmly fixed to the tibia and femur through an area of capsular thickening (ie, the deep medial collateral ligament) at its midportion. As a result, the medial meniscus has limited mobility. In fact, studies have demonstrated less excursion of the medial meniscus as compared with the lateral meniscus.⁵

The lateral meniscus covers more of the tibial surface than does the medial meniscus. The anterior horn of the lateral meniscus is attached anterior and lateral to the ACL, with an anterior intermeniscal ligament connecting the most anterior fibers of the anterior horn of the medial meniscus with the most posterior fibers of the anterior horn of the lateral meniscus.^{6,7} The posterior horn of the lateral meniscus attaches to the lateral intercondylar tibial eminence just anterior to the posterior horn of the medial meniscus. The lateral meniscus is only loosely attached to the joint capsule at its periphery, and there is no attachment at the posterolateral aspect of the knee where the popliteus muscle enters the knee joint. The lateral meniscus can have 2 meniscofemoral ligaments: the ligament of Humphrey and the ligament of Wrisberg. The ligament of Humphrey courses from the anterior fibers of the posterior horn and extends to the lateral femoral condyle. The ligament of Wrisberg originates off the posterior fibers of the posterior horn, passes posterior to the PCL, and attaches to the intercondylar fossa for the medial femoral condyle.⁸ A cadaveric study found that 91% of specimens had at least 1 meniscofemoral ligament, with 48% having a ligament of Humphrey, 70% having a ligament of Wrisberg, and 32% having both ligaments.⁹ The exact incidence of these ligaments is still unknown, as arthroscopy and improved dissection techniques have demonstrated them to be present in most patients.