Meniscal Tears

The proper function of the menisci is integral to the health of the knee joint. The menisci function to decrease joint contact forces by increasing surface contact with the femur and dispersing compressive joint forces to the periphery. It has been reported that 50% - 85% of the compressive load through the knee is absorbed by the menisci, with the greatest forces occurring toward 90° of knee flexion.¹

The medial meniscus is most often torn, owing perhaps to its decreased mobility as compared to the lateral meniscus, with the posterior horn of each meniscus being the least mobile portion. Meniscal healing is dependent upon the type of tear and the amount of vascular perfusion present at the area of the tear. Blood
supply, which is present throughout the entire menisci in children, gradually withdraws laterally leaving the adult with significant blood supply to only the outer 1/3 of the structure. Acute, longitudinal tears that are simple in nature have a greater healing potential than complex, degenerative, or radial tears.

Meniscal Repair

**Surgical Considerations:**

Historically, surgical treatment of meniscal tears often took the form of a complete meniscectomy. As understanding of the significant functional role of the menisci evolved, this approach has fallen significantly out of favor. Several factors are considered in a patient with a meniscal tear, including age, type of tear, location of tear, and the functional requirements of the patient. Improved outcomes have been noted when repairs occur less than 8 weeks from time of injury. The stability of the ACL is also considered in determining the options for meniscal repair. Only those tears that are simple and occur in the outer 1/3 or “red” zone, where vascular perfusion is abundant have predictably good success with repair. Repairs in other regions are less common, but some evidence now supports good outcomes for tears previously thought to be inoperable. All other tears are treated with various degrees of partial meniscectomy, with the surgeon’s goal to preserve as much of the functional meniscus as possible. Longitudinal tears less than 10cm, or radial tears that do not extend to the periphery are not usually repaired.

Indications for meniscal repair include a full-thickness, longitudinal tear of at least 10cm in the vascular peripheral 1/3 of the meniscus with no secondary disruptions in the knee. Ideally the patient is under age 50.
Rehabilitation Considerations for Meniscal Repairs:

- Motion restrictions and weight bearing are variable dependent upon surgeon preference, although some research has indicated no advantage to conservative vs. accelerated weight bearing protocols. One caveat is that longitudinal tears may be more tolerant of early weight bearing than radial tears.
- Suture fixation
- Location of tear (anterior or posterior)
- Compounding Factors such as Ligamentous instability or repair.
- Flexion angles greater than 60 degrees add more stress to the menisci.
- Early activities must include a focus on neuromuscular control in straight plane motions
- Delay of return to sports that require pivoting motions are often delayed up to 6 months

Meniscectomy

Surgical Considerations:

Primary indications for partial meniscectomy are those meniscal tears which are complicated, radial, degenerative, or occur away from the vascular periphery of the meniscus. Preservation of the meniscus is attempted whenever possible. Limited evidence indicates that functional outcomes are inversely related to the quantity of tissue removed and that preservation of the posterior rim of the menisci is important to knee stability.3

Rehabilitation Considerations for Meniscectomy:

- Type, Size, Location of Tear
- Type, Size of Repair (partial vs. full meniscectomy)
- Size of Repair In weight-bearing, the menisci are largely unengaged until those motions past 60 degrees of knee flexion where the medial meniscus begins to move posteriorly
- Hamstring attachment to medial meniscus can dictate commencement of hamstring activities
- No requirement for decreased weight bearing
- More rapid return to function anticipated following meniscectomy

Meniscal Replacement

Allograft
Meniscus-deficient knees experience increased articular contact joint degeneration.4-8 Meniscal allograft transplantation has emerged as a treatment option for selected meniscus-deficient patients to decrease the articular contact stress knee kinematics.

Indications:
• Arthroprotection
• Improve biomechanics
• “youthful” patient
• Post-meniscectomy – painful knee

Favorable environment
• Alignment
• Stability
• Arthrosis minimal

The clinical success of meniscus transplantation has been well documented. Numerous studies have demonstrated statistically significant improvements in pain and function using various clinical outcome measures.4-11

Rehabilitation:
The principles used for rehabilitation after meniscus repair can provide some guidance for determining the ideal postoperative management of meniscal allograft transplantation. The loads placed on the healing meniscal allograft during rehabilitation activities are unknown. However, since meniscal transplants are thought to be under higher stresses in a joint with early degenerative changes, a more conservative protocol is typically recommended.

• standard double-upright, hinged knee brace first 6 weeks
• toe-touch weight bearing with the knee in full extension - 4 weeks, with gradual progression to full weight bearing by 6 weeks postoperatively
• Early range-of-motion exercise is begun immediately, including full extension
• Flexion is limited to 90 degrees during the first 4 weeks
• Range of motion is progressed after 4 to 6 weeks
• Closed kinetic chain strengthening exercises within the flexion limits - 3 weeks
• Gentle sport-specific activities - 4 months
• Running is not recommended before 4 months
• Squatting and hyperflexion are discouraged for 6 months
Collagen Meniscal Implant

Implications:
Similar to that of the allograft.

Meniscus Evidence Summary
The knee menisci serve as an integral component of knee stability and function, and the loss or removal of all or part of the meniscus has been correlated with negative outcomes. Complete meniscectomy has fallen out of favor and now every effort is made to retain original joint tissue through partial meniscectomy, meniscal repair, or more recently, meniscal transplantation. Heckmann’s review of meniscal repair included as part of a special JOSPT issue on articular cartilage serves as a launching point for a discussion of meniscal injury, repair, and rehabilitation. In that 2006 review, Heckmann details indications, operative techniques, rehabilitation guidelines and outcomes following meniscal repair. Good results have been reported with meniscal repair, when careful patient selection is utilized with respect to the type and location of the tear.

While repair of meniscal structures seems promising, a debate still exists with respect to the benefit of any form of meniscectomy. A 2000 Cochrane Systematic review by Howell reported that no conclusions can be made when comparing surgical vs. non-surgical treatment of meniscal tears. A more recent trial comparing arthroscopic partial meniscectomy and exercise versus exercise alone for degenerative medial meniscal tears found that both groups improved and that meniscectomy offered no additional benefits over exercise alone. It has been reported that patients receiving surgical intervention for acute meniscal tears fare better than those with degenerative changes.

Rehabilitation after meniscectomy and meniscal repair is significantly different, based on the need to protect a healing meniscus in the instance of a repair. There is conflicting evidence regarding the effectiveness of supervised physical therapy after meniscectomy. In a somewhat controversial RCT, Goodwin et al. found no benefit to a supervised physical therapy program after meniscectomy. Others have criticized this study for its small sample size as well as the protocol used and have reported improved outcomes when other protocols of supervised physical therapy were used. From a functional standpoint, the general consensus is that patients undergoing meniscectomy have no particular restrictions and can resume strengthening and functional activities as tolerated.

Rehabilitation after meniscal repair is alternatively characterized by a period of controlled motion and limited weight bearing to allow protection of the healing repair site. Few studies have compared different parameters of rehabilitation after meniscal repair. Heckmann describes a protocol where patients are limited to 90° of knee flexion for up to 3 weeks post-repair. The multimodal approach described also included proprioceptive training and aerobic conditioning as part of an overall goal to maximize knee stability and function.

Oxford Level of Evidence: B/C

References: