Meniscus Tears: Treatment in the Stable and Unstable Knee

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Abstract

Basic science research and follow-up studies after meniscectomy have provided convincing evidence of the importance of preservation of the meniscus in decreasing the risk of late degenerative changes. Whether in a stable or an unstable knee, if a meniscus tear cannot be repaired, a conservative partial meniscectomy should be undertaken to preserve as much meniscal tissue as possible. When feasible, repair should be carried out in young patients with an isolated meniscus tear, despite healing rates that are significantly lower than those obtained when meniscus repair is done with anterior cruciate ligament (ACL) reconstruction. The incidence of successful healing is inversely related to the rim width and tear length. In general, meniscus repair should be limited to patients under 50 years of age. Vertical longitudinal tears, including bucket-handle tears, are most amenable to repair. Some radial split tears can be repaired. In an ACL-deficient knee, meniscus repair is more prone to failure if not performed in conjunction with an ACL reconstruction, and is not recommended. Meniscal allograft surgery is investigational but may hold promise for selected patients.

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As our understanding of meniscus function has developed, the need for more constructive treatment modalities to preserve this function has become apparent. Whereas total meniscectomy was the standard of care in the past, this procedure is now reserved for those cases in which meniscus degeneration is extensive.[1-3] Currently it is felt that many torn menisci can and should be repaired. When a meniscus tear is not amenable to repair, partial meniscectomy is the preferred treatment[1-4] if it is not possible to simply leave the tear alone. This change in treatment strategy has been the result of improved arthroscopic techniques,[4] better understanding of the healing potential of the meniscus,[4-6] and the improved outcomes found in long-term studies in patients who have undergone meniscus-sparing procedures.[2,3,7-9]

Many factors contribute to the ultimate healing ability of repaired meniscus tears.[10] A thorough understanding of the effect of these factors on postoperative outcomes is essential in selecting the optimal surgical technique. In this article we will assess these factors and will provide guidelines for the treatment of meniscus tears in both the stable and the unstable knee.

Anatomy

The menisci are semilunar cartilages that increase the congruency between the convex femoral condyles and the relatively flat tibial plateau. The medial meniscus constitutes more than half of the contact surface of the medial tibial plateau; the lateral meniscus, more than three fourths of the contact surface of the lateral plateau.[11] The lateral meniscus is more mobile than the medial meniscus,[12,13] but both have firm posterior and anterior attachments to accommodate the protective tensile hoop stresses within the body of the meniscus.[11]

In 1936 King[5] published the first study to demonstrate the peripheral vascular supply to the meniscus. He considered this vascular network essential to the healing potential of meniscus tears. Arnoczky and Warren[6] found that the meniscal microvasculature penetrates 10% to 30% of the width of the medial meniscus and 10% to 25% of the width of the lateral meniscus. They noted that a vascular synovial fringe extends a distance of 1 to 3 mm over the peripheral rim of the meniscus but does not contribute a blood supply to the meniscal tissue itself. They also pointed out the decreased vascularity in the region of the popliteus hiatus in the posterolateral corner of the lateral meniscus.

Historical Review

The first meniscus repair was reported in 1883 by Annandale but attracted little interest because the meniscus was considered to represent vestigial tissue. Total meniscectomy remained the primary treatment for the torn meniscus for nearly a century.[11,14]

In 1936 King[15] reported an association of degenerative changes and meniscectomy in a canine model. A

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direct correlation was observed between the size of the meniscus segment removed and the subsequent extent of degeneration of the articular cartilage.

In 1948, Fairbank[16] first described the radiographic changes that follow total meniscectomy in humans, including narrowing of the tibiofemoral joint space, ridging (osteophyte formation) along the margin of the femoral condyle, and flattening of the femoral condyle. Although he found no correlation between these radiographic findings and clinical symptoms, he suggested that the meniscus plays an important role in load transmission across the knee. Many investigators have subsequently confirmed his results. Johnson et al[17] found at least one of these radiographic changes in 74% of their patients. Unlike Fairbank, however, they also found a high incidence of symptoms and disability after total meniscectomy.

In the past 20 years an abundant literature has documented the biomechanical function of the meniscus and the degenerative changes that occur following total meniscectomy. The onset of degenerative changes after total meniscectomy is the result of increased joint reactive forces. When there is associated ligamentous instability, degeneration can be further accelerated by fracture or damage to the articular cartilage[18] and secondarily by further meniscus damage.[4,17,19]

Biomechanics

Krause et al[20] determined in human cadaveric knees that the menisci transmit 30% to 55% of the load across the joint in the standing position. Walker and Erkman[21] found that when the knee is loaded up to 150 kg, the lateral meniscus carries the majority of the load and the medial compartment distributes the load equally between the meniscus and the articular cartilage. Other investigators have noted that the menisci can carry a load even if torn, provided the peripheral circumferential fibers remain intact, which enables the hoop stresses to be maintained, dampening forces across the joint.

These investigations also revealed there is at least a two- to threefold increase in contact stress across the joint following meniscectomy.[20] Baratz et al[22] noted a nearly fourfold increase in peak contact forces when patients who had undergone total meniscectomy were compared with those who had undergone partial meniscectomy. Seedhom and Hargreaves found that removal of as little as 16% of the meniscus increased the articular contact forces by 350%.[7]

Levy et al compared the stabilizing effect of the medial[12] and lateral[13] menisci in knees with an intact or a deficient anterior cruciate ligament (ACL). A significant increase in the anteroposterior translation of the ACL-deficient knee was noted after total medial meniscectomy. They concluded that the medial meniscus, in addition to its role in force transmission across the joint, is also a secondary stabilizer of the knee against anterior displacement of the tibia, and is subjected to anteroposterior shear forces in the ACL-deficient knee. Because the lateral meniscus is more mobile, it is less likely to undergo these shear stresses in ACL deficiency. This is in contrast to the posterior cruciate ligament (PCL)-deficient knee, where there does not appear to be any significant increase in shear or compressive forces on the posterior horn.

As the biomechanical importance of the meniscus has been revealed, it has become clear that procedures that preserve the meniscus have significant long-term advantages for the patient.

Diagnosis

The evaluation of meniscal pathology is beyond the scope of this article. Suffice it to say that a thorough history should elicit the mechanism of injury and both mechanical and instability symptoms. A careful physical examination and radiographs are essential. Additional imaging studies, such as magnetic resonance imaging or arthrography, may be selected prior to operative intervention, if necessary.

Surgical Techniques

Partial Meniscectomy

The technique of partial meniscectomy involves removing only the offending fragment or flap of the meniscus, preserving as much of the remainder of that structure as possible. The cut into the meniscus should blend in with, and be contoured to, the remaining anterior and posterior portions.[11]

Meniscus Repair

Most surgeons perform meniscus repairs through the arthroscope. Open repair may be done, but is usually limited to tears with a rim width of less than 2 to 3 mm. There are basically three techniques for arthroscopic meniscus repair: inside-out, outside-in, and all-inside.

The inside-out technique is the most commonly performed. There are numerous surgical systems on the market to facilitate the procedure. These systems consist of either single- or double-barrel cannulas that allow long threaded needles to be passed through the meniscus and retrieved through a posteromedial or posterolateral incision. Alternatively, shorter needles attached to small needle holders can be passed in a similar manner. Vertical sutures are preferred over horizontal

sutures because of their biomechanical advantage.

In the outside-in technique, sutures are passed through straight and curved spinal needles that have penetrated through the tear site. A knot is created on the end of the retrieved suture and is pulled tight against the surface of the meniscus. Adjacent sutures are then tied together subcutaneously.

The all-inside technique is more difficult, and is reserved for very peripheral posterior horn tears.[11]

Considerations in Treatment of Isolated Meniscus Tears

Options for treatment of meniscus tears include leaving the tear alone, partial meniscectomy, and meniscus repair. As a rule, a tear that is amenable to repair should undergo the procedure. In a prospective study with a 6- to 10-year follow-up, Sommerlath[9] found a statistically significant improvement in clinical outcome scores, as well as decreased radiographic evidence of osteoarthritis, in ACL-stable knees that underwent meniscus repair as compared with ACL-stable knees that underwent partial meniscectomy.

Unfortunately, tears frequently are not repairable due to various factors. Isolated meniscus tears frequently occur in association with an increase in degenerative changes in the meniscal tissue or are due to abnormal endogenous biomechanical forces that predispose the meniscus to injury, or both.[14] Because these factors are not corrected in the repair of isolated meniscus tears, the failure rate for isolated meniscus repairs is higher than that for meniscus repairs performed in conjunction with ACL reconstruction. Various tear characteristics also result in poor healing rates. Thus, partial meniscectomy remains the more commonly chosen procedure. Total meniscectomy is rarely performed, except in the most advanced cases of meniscus degeneration.[1,4] To limit reoperation for failed primary treatment, the surgeon must understand the indications for each option.

Patients should be counseled regarding short- and long-term risks and the benefits of meniscus repair compared with partial meniscectomy. The patient also should understand the benefit of definitive treatment of ligamentous pathology in conjunction with meniscus repair, which will be discussed later.[3] The patient must weigh the disadvantages of a longer rehabilitation period with the potential long-term beneficial effects of meniscus repair. Although Sommerlath found better results after meniscus repair, one third of his patients stated that they would not undergo the same treatment again, citing the prolonged rehabilitation period and the delayed return to normal activity.[9]

Prior to embarking on a surgical treatment plan, the surgeon must consider the age, health, lifestyle, and physical demands of the patient[1,3,4,23] and his or her ability to undergo a major reconstructive procedure.[3,24] There are no definitive guidelines for meniscus repair with respect to these variables.

The surgeon must also evaluate the reparative ability of the tear to ensure a successful outcome. Several elements play a role in this regard: rim width, tear length, age of the tear, and tear pattern. Of particular importance is the presence or absence of ligamentous stability.

Patient Age

Patient age is relevant only because older patients may be more willing to adopt a more sedentary lifestyle and avoid sports that subject the knee to pivoting, cutting, jumping, or deceleration maneuvers. We and others[23] believe that the patient under the age of 50 should be considered a candidate for meniscus repair if the tear is repairable. Our opinion is based on the senior author's finding that patients older than 30 years of age who underwent meniscus repair had a higher healing rate than younger patients.[10] However, young patients are more likely to have a vertical longitudinal type of meniscus tear, which is more amenable to repair. Patients in their mid-30s and older have a much higher incidence of degenerative-flap and horizontal-cleavage tears, which are not amenable to repair; thus, they are more likely to be considered candidates for partial meniscectomy.[11]

Rim Width

Rim width is one of the most important factors in determining the likelihood of successful repair because the vascular supply of the meniscus is limited to the peripheral third. King concluded that a tear within the meniscus tissue will not heal unless it communicates directly with the peripheral synovial attachment. If the tear extends to this vascular region, it will fill in with connective tissue arising from the synovial membrane,[5] in a manner similar to the reparative response observed in other vascularized connective tissues.[4]

Tears often are characterized by their gross arthroscopic appearance and are labeled as being located in the red-red zone (at the peripheral capsular attachment), in the red-white zone (near the junction of the peripheral third of the meniscus with the avascular portion), or in the white-white zone (located entirely within the avascular zone of the meniscus).[4] The first two types have an excellent healing potential, whereas the third type is less likely to heal after repair.[10,24]

It is often difficult to determine the vascularity of the meniscus tear,

however. When clinical bleeding is not evident, DeHaven[1] suggested that a tear located within 3 mm of the periphery can be presumed to lie within the vascular region of the meniscus and thus to have the best healing potential. Tears 5 mm or more from the periphery fall outside the vascular network, and therefore heal poorly. The 3- to 5-mm range is variable in its vascularity.

To improve the healing rate, Cannon suggested the use of a rasp to produce parameniscal abrasion.[24] Vascular access channels may also be used.[4] More important, Henning et al[7] improved the rate of successful healing of isolated meniscus repairs from 59% to 92% with the use of fibrin clot.

Cannon and Vittori[10] found that isolated meniscus tears in ACL-stable knees with a rim width of less than 2 mm had a 100% rate of healing after repair (there were only four patients in this group). This rate was reduced to 50% when the rim width was 2 to 4 mm, and all repaired tears with a rim width of 4 mm or more failed to heal (there were four patients in this group). Overall, the incidence of successful healing after repair of isolated meniscus tears was only 50%, in contrast to 93% after repairs done in conjunction with ACL reconstruction.[10]

Tear Length

The stability and length of the meniscus tear should be determined at surgery before proceeding with definitive treatment. Meniscus tears that are stable and less than 1 cm in length usually can be left alone, whereas those that are unstable should be resected or repaired. Guidelines for measuring stability have been outlined by various authors.[1,3,7] Tears that are considered stable include partial-thickness tears measuring less than half the height of the meniscus and full-thickness oblique or vertical tears that measure less than 7 to 10 mm in length if the inner portion cannot be displaced more than 3 mm with probing.[1,3,25] The same guidelines apply for radial tears measuring 5 mm or less.[1,3,25] Weiss et al[25] noted only a 4% reoperation rate and Lynch et al[8] reported a 0% reoperation rate in patients with tears left alone according to these guidelines. Weiss et al[25] found that stable radial tears had not healed in asymptomatic patients who underwent relook arthroscopy.

When tears are longer than 1 cm or are unstable to probing, repair or partial meniscectomy should be performed. The length of the tear is the direct determinant of the healing potential of the tear. Cannon and Vittori[10] found that healing was achieved in 60% of repaired meniscus tears that had measured 2.0 to 3.9 cm. Patients with tear lengths greater than 4 cm tended to do poorly, with a healing rate of only 33%. Tear length had a significantly lower impact on the healing of meniscus repairs in ACL-reconstructed knees. Only tears measuring greater than 4 cm had a healing rate of less than 90%; such tears had a healing rate of 67%.

Age of Tear

Henning et al[7] found a significantly better healing rate in tears repaired less than 8 weeks after injury compared with those treated more than 8 weeks after injury. They thought these differences were the result of the increased incidence of complex tears in the group treated 8 weeks or more after the initial injury. Cannon and Vittori[10] confirmed these findings, but the differences observed did not achieve statistical significance. Other studies have not confirmed a significant effect of the age of the tear.[1,24] Though one might assume that the longer a tear has been present the more likely it is to be degenerative, the time period from injury to surgery should not discourage the surgeon from proceeding with meniscus repair if the tear is amenable to such treatment.

Tear Pattern

Some tear patterns heal and perform well following meniscus repair, while others do not. In peripheral tears that do not disrupt the circumferential fibers, healing proceeds rapidly, and the healed tissue performs under load similar to a normal meniscus.[26] The vertical longitudinal tear represents the ideal situation for repair.[11,26] More complex is the bucket-handle tear that can be displaced into the front of the joint. Although this tear still maintains good healing potential following repair, chronic bucket-handle tears have a greater chance of having additional radial components, which make them less amenable to repair. In addition, the presence of amorphous hypocellular tissue on the handle fragment in chronic tears has been noted; unless abraded, such tissue impedes the healing process.[11] More complex double and triple bucket-handle tears are more difficult to repair and may require excision.[11]

Flap tears are often complex, oblique, anteriorly based tears of the posterior horn of the medial meniscus. Flap tears may also represent the anterior leaf of a split bucket-handle tear. Due to their complex nature, as well as the loss of integrity of the circumferential fibers, these tears should be excised.[11]

Radial tears have a lower incidence of successful healing following repair, but tears at the posterior horn origin heal better than those in the middle third owing to improved vascularity in that region. The poor function is due to the disruption of the circumferential fibers of the meniscus. Newman et al[26] reported the formation of an immature, mechanically incompetent fibrovascular scar in repaired radial tears in canine

menisci; the scar elongated when subjected to a load. These menisci performed poorly in load transmission; their biomechanical characteristics were similar to those of a knee following complete meniscectomy.

Horizontal cleavage tears in general are not repairable. On arthroscopic examination of these lesions, it is important to determine which is the larger of the two leafs, as well as whether either leaf is unstable. The unstable leaf should be excised. It should be noted that treatment of these tears does not require complete excision of the torn meniscus. Leaving up to 3 mm of the leaf is acceptable.[11]

Degenerative tears usually occur in older patients and are frequently associated with significant degenerative changes in the articular cartilage. These patients fare better with conservative meniscus debridement.[11]

Rehabilitation in ACL-Stable Knees

Rehabilitation of the knee following partial meniscectomy is relatively straightforward, with usual return of motion and minimal or no quadriceps or hamstring atrophy. The patient is allowed to bear weight as tolerated immediately and usually can return to full activity by 3 to 4 weeks postoperatively.

Rehabilitation of the knee following meniscus repairs is somewhat controversial. The conservative approach in the immediate postoperative period is to maintain the knee in non-weight-bearing status for approximately 4 weeks, with subsequent increase to full weight bearing by 6 weeks. Some authors allow the patient to move the knee immediately after surgery, while others immobilize the knee for 3 to 4 weeks. At 6 weeks, closed-kinetic-chain exercises are begun. At 5 months the patient is allowed to run, and at 6 months the patient is allowed to return to sports.[14]

Considerations in Treatment of Tears in the Cruciate-Deficient Knee

The ACL-Deficient Knee

The success of meniscus repair is highly dependent on the stability of the supporting ligamentous structures of the knee. Repairable meniscus tears are most commonly encountered in conjunction with ACL disruptions. Henning et al[7] noted that only 8% of their patients who were candidates for meniscus repair presented with an isolated meniscus tear. In contrast, patients with an acute ACL tear have been reported to have meniscus lesions 65% of the time, with 50% of the lesions being medial and 50% lateral.[23] In chronic ACL injuries, meniscus tears are found in as many as 98% of patients[3,23]; the reported 3:1 ratio of medial to lateral tears is most likely due to the increased stress on the posterior horn of the medial meniscus, which contributes to knee stability in the ACL-deficient knee.[12]

Meniscus tears that occur in the ACL-deficient knee show no histologic evidence of degeneration.[14] Thus, meniscus repairs performed in conjunction with an ACL reconstruction result in healing rates that are significantly better than those after isolated meniscus repairs, due to the lack of degeneration of the meniscus tissue, the restoration of more normal knee biomechanics, and the copious postoperative hemarthrosis.[14] Attempted repair of a torn meniscus should be combined with reconstruction of the ACL if a peripheral-third vertical longitudinal tear is found in patients under the age of 50. Warren[23] reported an overall 93% success rate for meniscus repair performed in conjunction with an ACL reconstruction, whereas the failure rate was 30% when the ACL was not reconstructed. Other authors have confirmed these findings. The success of meniscus repair performed in conjunction with ACL reconstruction ranges from 62% to 96%, compared with 17% to 62% when the ACL is not reconstructed.[1,24]

Lynch et al[8] reported significant radiographic changes in patients who underwent ACL reconstruction combined with partial or total meniscectomy. The authors reviewed the long-term outcome in four groups of patients who underwent various treatments for meniscus lesions following a stable-ACL reconstruction (specifically, no treatment, repair, partial excision, and complete excision). Patients undergoing ACL reconstruction without meniscal damage were used as a control group. Three years postoperatively, only 3% of the control patients had developed at least two of three Fairbank changes, compared with 12% of the patients who underwent meniscus repair, 23% of the patients whose tears were left alone, and 88% of the patients who underwent partial or total meniscectomy.

The greater success rate in patients who underwent meniscus repair in conjunction with ACL reconstruction is due to two primary factors: First, the ligamentous stability afforded by the ACL reconstruction serves to protect the repaired meniscus from repetitive anteroposterior shear forces. Second, the postoperative hemarthrosis may bathe the torn meniscus with fibrin clot, which contains growth factors that may contribute to enhanced healing. It is commonly observed that the amount of hemarthrosis is less in patients who have undergone isolated meniscus repair.

Tear patterns vary depending on the type of injury as well as the nature of the associated ligamentous injuries. The senior author found that 57% of meniscus tears in ACL-deficient knees were of the vertical longitudinal type, and thus were not

displaceable to the front of the joint (Cannon, unpublished data). An additional 29% were bucket-handle tears. Double vertical longitudinal and displaced double bucket-handle tears represented 6% of all tears, and radial split and flap tears represented 8%.

Cannon and Vittori[10] found satisfactory results in 84% of meniscus repairs of vertical longitudinal tears and bucket-handle tears when healing was assessed by arthroscopy for lateral meniscus repairs and arthrography for medial meniscus repairs 6 months postoperatively. Radial tears were repaired successfully in seven of eight knees (87.5%). Complex tears, such as displaced bucket-handle and double bucket-handle tears, demonstrated less encouraging healing rates of 67% and 50%, respectively (it should be noted, however, that the number of patients was small).

According to Wickiewicz,[3] lateral meniscus tears are more common in the acutely injured ACL-deficient knee, whereas in chronic injuries the medial aspect is more commonly involved. Cannon and Vittori[10] found that lateral meniscus repairs had better healing rates than medial meniscus repairs when performed in conjunction with ACL reconstruction (100% versus 86%).

In older or more sedentary patients with ACL-deficient knees, Wickiewicz[3] feels that meniscus repair should be performed if possible even if an ACL reconstruction is not chosen as the treatment option. The patient should be informed that the repaired meniscus will be subjected to increased stresses and a higher rate of failure. The group of patients selected for an isolated meniscal repair should be small, however, as the postoperative rehabilitation periods after meniscus repair with ACL reconstruction and without ACL reconstruction are similar. In both groups, return to sports is usually delayed for at least 6 months. A meniscus repair should rarely be performed in an ACL-deficient knee without repair of the ligament.[14]

The PCL-Deficient Knee

The treatment of meniscus pathology in association with PCL deficiency remains controversial. The incidence of meniscal pathology in PCL-deficient knees is much lower than in ACL-deficient knees.[4] However, clinical studies have documented an increased incidence of degenerative changes in PCL-deficient knees with or without meniscus pathology.[27] Wickiewicz[3] suggested that treatment of meniscal pathology be directed at preservation of as much meniscal tissue as possible. In isolated PCL-deficient knees, meniscal repair should be performed if the tear is amenable to that treatment. Isolated PCL reconstruction in conjunction with meniscus repair remains controversial due to the less predictable outcome. In addition, it is unlikely that a PCL reconstruction plays the protective role following meniscus repair that is afforded by an ACL reconstruction.

In patients with PCL and posterolateral ligament complex instability, meniscus treatment and concurrent ligament reconstruction should be undertaken. Torg et al[27] have reported that the indication for PCL reconstruction is multidirectional instability in the presence of a meniscus tear or other factors. Failure to repair this combination of injuries is associated with a poor outcome.

Rehabilitation

Rehabilitation of the knee following meniscus repair in conjunction with an ACL reconstruction is similar to the regimen for isolated meniscus repair, with one exception. To prevent the problem of arthrofibrosis and loss of motion, it is imperative that knee motion be begun immediately in order to achieve full range of motion.

Meniscus Transplantation

Meniscus transplantation may hold future promise in patients with unsalvageable meniscus pathology. This procedure has been utilized on a limited basis by some surgeons with variable results. The problems of allograft sizing, allograft preservation, host-donor immunologic responses, and disease transmission must be investigated further before this procedure is accepted into our repertoire of treatment options for complex meniscus pathology.

A major dilemma in meniscus transplantation is that patients who inquire about this procedure are usually those who are symptomatic as the result of already evident degenerative changes. Results of meniscus transplantation in degenerative knees are poor. The patients who have the best chance for a successful outcome following transplantation are those who have had a recent total meniscectomy with no apparent degenerative changes. Without clear proof of prophylactic efficacy, it would be difficult to convince this group of asymptomatic patients to undergo a meniscus transplantation.

Summary

An increased incidence of degenerative changes is an expected outcome following partial or total meniscectomy as a result of the increased contact forces on the articular cartilage in the absence of some or all of the meniscus. For this reason, either the torn meniscus should be left in place or the tear should be repaired, if it is amenable to surgical treatment. Various tear characteristics contribute to the ultimate success of these procedures, including rim width, length of the tear, age of the tear, and the type of tear.

Significantly higher healing rates are noted in meniscus repairs per-

formed in conjunction with ACL reconstruction. This is due to the lack of degenerative changes in the meniscus, the improved biomechanical function of the ACL-reconstructed knee, and the postoperative hemarthrosis that bathes the repaired meniscus with endogenous factors implicated in the healing of the torn meniscus.

In both cruciate-stable and cruciate-unstable knees, stable meniscus tears should be left untreated. Vertical longitudinal tears measuring less than 1 cm that cannot be displaced more than 3 mm are considered stable, as are radial tears measuring 5 mm or less and simple horizontal cleavage tears that do not appear to be causing symptoms.

Meniscus tears that should be repaired include isolated vertical longitudinal meniscus tears (especially lateral tears), tears measuring less than 4 cm in length, and tears with rim widths measuring less than 4 mm. It is strongly recommended that fibrin clot be used to enhance the healing potential of isolated meniscus repairs. In addition, all vertical longitudinal and displaced bucket-handle tears in an ACL-deficient knee should be repaired, as long as repair is performed in conjunction with an ACL reconstruction; the combined operation will lead to improved healing of the repaired meniscus, as well as increased longevity of the articular surface of the knee.

When a meniscus tear is unlikely to heal following repair or when the patient's lifestyle and demands preclude meniscus repair, a partial meniscectomy should be performed. All isolated degenerative or complex tears may be considered for partial meniscectomy, as well as flap and radial tears measuring more than 5 mm in length. In the ACL-deficient knee not undergoing ACL reconstruction, meniscus tears may be excised. Total meniscectomy is rarely indicated.

In patients undergoing ACL reconstruction who present with complex meniscus pathology, the decision to perform meniscus repair or partial meniscectomy should be at the discretion of the surgeon.

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