Current Concepts Review

"Doctor, What Happens After My Meniscectomy?"

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- It is imperative that surgeons educate their patients on what to expect following a meniscectomy.
- A high preinjury activity level, younger age, medial meniscectomy, and smaller meniscal resection play a role in reducing the time until patients are able to return to sport.
- Improved clinical outcomes can be expected for male patients without obesity who are undergoing medial meniscectomy with minimal meniscal resection. Varus or valgus deformities, preexisting degenerative changes in the knee, and anterior cruciate ligament deficiency negatively impact outcomes following meniscectomy.
- Failure rates following meniscectomy are relatively low compared with meniscal repair and discoid saucerizations, although revision rates are increased in patients undergoing lateral meniscectomy.
- Meniscectomy increases the risk of developing knee osteoarthritis (OA), particularly in female patients with obesity who undergo large meniscal resection. Because of the risk of developing OA, there is a corresponding increase in the likelihood of total knee arthroplasty following meniscectomy.

The meniscus provides several structural, biomechanical, and biological functions to the knee. The primary function of the meniscus is to redistribute forces across the tibiofemoral articulation, thereby decreasing the contact pressure experienced by the joint and the resultant stress on the articular cartilage[1-3]. The menisci play a secondary role in stabilizing the knee and a possible role in joint lubrication and proprioception[3,4].

Partial meniscectomy (Fig. 1) remains the most commonly performed procedure among orthopaedic surgeons in the United States[5] and worldwide[6]. Despite this, many patients have minimal knowledge with regard to meniscal injuries or possible treatment options. Notably, Brophy et al. performed a survey of 253 patients with meniscal pathology and found that 62% of the respondents rated their knowledge of the meniscus as little or none[5]. Additionally, only 28% of the respondents knew that meniscectomy, rather than meniscal repair, is the most common surgical treatment for meniscal tears[5]. Because of the high prevalence of meniscal tears potentially requiring surgical intervention, it is imperative that orthopaedic surgeons educate their patients on the following postoperative considerations: overall clinical outcomes, the risk of subsequent surgery, the ability to return to sport (RTS), the risk of postoperative development of knee osteoarthritis (OA), the risk of progression to total knee arthroplasty (TKA), and the functional repercussions on overall knee stability, particularly with combined anterior cruciate ligament (ACL) reconstruction. The purpose of this review was to highlight the current literature on important postoperative considerations following meniscectomy, which will help orthopaedic surgeons to best educate their patients on expectations following this procedure.

Clinical Outcomes

Treatment of meniscal injuries can range from benign neglect to nonsurgical measures, such as physical therapy and

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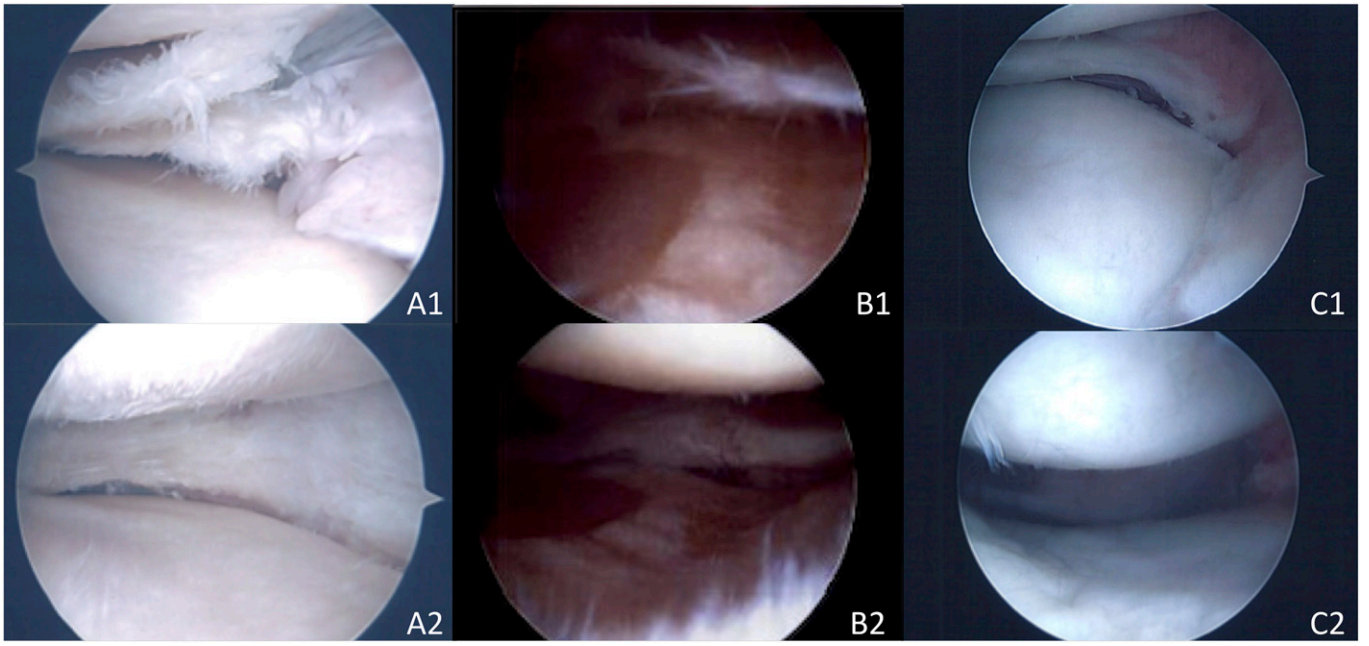

Fig. 1

Intraoperative images showing multiple patterns of meniscectomy: prior to partial meniscectomy (**Fig. 1-A1**), following partial meniscectomy (**Fig. 1-A2**), prior to partial meniscectomy (**Fig. 1-B1**), following partial meniscectomy with a large extent of meniscal resection (**Fig. 1-B2**), prior to total meniscectomy (**Fig. 1-C1**), and following total meniscectomy (**Fig. 1-C2**).

injections, to surgical interventions, such as meniscectomy and meniscal repair. Treatment decisions are influenced by the clinical presentation, patient expectations, patient age, tear pattern and location, associated injuries, and the presence or absence of associated degenerative change. Although meniscectomy is the most common surgical intervention for symptomatic meniscal pathology[5,7], the role of nonsurgical management should not be overlooked.

A recent randomized clinical trial[8] concluded that physical therapy was not inferior to partial meniscectomy for improving patient-reported knee function in patients with meniscal tears without frank mechanical symptoms. Furthermore, a meta-analysis of randomized controlled trials indicated an insignificant difference in pain improvement at short-term and long-term follow-up in patients with degenerative meniscal tears undergoing meniscectomy or conservative treatment[9].

In patients who have failure of nonoperative management or patients with overt mechanical symptoms from a mechanically unstable meniscal tear, meniscectomy can be a successful intervention for the relief of painful mechanical symptoms and improvement in function[10-12]. One study[10] demonstrated short-term improvements in the mean visual analog scale (VAS) score for pain and mean Lysholm score following partial meniscectomy in patients with unstable meniscal tears. Additionally, the study indicated that pain subsided completely within 2 to 4 weeks, 80% of the patients had returned to their previous activity levels 6 months after surgery, and overall patient satisfaction was 87%. These results highlight the short-term improvements in pain and function following partial meniscectomy.

Clinical outcomes following partial meniscectomy are influenced by the laterality of the meniscal pathology. Furthermore, patient-specific factors (including sex, body mass index [BMI], and age), alignment of the limb, the presence of concomitant degenerative changes, ligamentous instability, and ultimately the extent of the meniscectomy performed can have a substantial impact on outcomes[12-23].

The medial and lateral compartments vary in the way that their respective menisci transmit load[12]. The lateral meniscus transmits 70% of the load in the lateral compartment compared with only 50% for the medial meniscus. Therefore, the biomechanical impact of lateral meniscectomy is greater than medial meniscectomy in their respective compartments. This is largely due to the concave nature of the medial tibial plateau that affords some element of congruity even in the absence of the medial meniscus. In contrast, the convexity of the lateral femoral condyle is mirrored by the convexity of the lateral tibial plateau. Therefore, lateral meniscal deficiency has a greater effect on compartment contact pressures. This likely explains the inferior outcomes of partial lateral meniscectomy (PLM) observed in many studies[14-17,24-28]. Patients undergoing PLM often experience higher revision rates[29], greater prevalence of adverse events following surgery[26], slower RTS[26], and accelerated development of OA[28] compared with patients undergoing partial medial meniscectomy (PMM).

The extent of the meniscal tissue resection is a driver of clinical outcomes following meniscectomy[18-20,27,30-32]. In a systematic review of 32 studies, Eijgenraam et al.[18] found a negative association between the amount of resected meniscal tissue and patient-reported outcomes. Specifically, resecting

TABLE I Effects of Patient-Specific Factors on Clinical Outcomes*

Patient-Specific Factor	Outcome Assessed	Comments
Sex	Lysholm score, recovery rate, self-reported outcomes questionnaire	Females exhibit worse functional outcome scores and prolonged recovery time compared with males[15,17,21-23,28,34,35]
Age	Recovery rate	Controversial results for most outcomes but indicated as an insignificant factor in recovery[21-23,35-37]
BMI	VAS scores for pain	Controversial results for most outcomes[36], but VAS scores were significantly worse in patients with a BMI of >26 kg/m^2

*BMI = body mass index, and VAS = visual analog scale.

>50% of the meniscus and leaving a nonintact meniscal rim were predictive factors for worse clinical outcomes[18]. In a biomechanical study, Ode et al.[33] found that complete radial tears significantly increased mean contact pressure and decreased contact area compared with the intact lateral meniscus; however, differences in smaller radial tears were insignificant compared with the intact lateral meniscus. This suggests the beneficial role that an intact meniscal rim and minimal resection of the meniscus have on clinical outcomes.

Several patient-specific factors have also been associated with clinical outcomes after meniscectomy, with several studies[15,17,21-23,28,34,35] noting worse functional outcome scores and prolonged recovery time in females. Notably, the impact of patient age and BMI is controversial; therefore, more research is needed to determine if these factors significantly influence outcomes following partial meniscectomy (Table I)[21-23,35-37].

The biomechanical environment in which a meniscal tear exists can substantially impact outcomes. Specifically, preexisting degenerative change, limb alignment, and ligament stability influence decision-making and success rates.

Concomitant degenerative changes in the involved compartment impact outcomes following meniscectomy[12,18,21,36-40]. Han et al.[39] evaluated radiographic outcomes following PMM for complete tears of the posterior root of the medial meniscus and found a significant negative correlation between chondral wear of the medial tibial plateau (using Outerbridge grading) at the time of surgery and Lysholm scores at long-term follow-up. They also found a negative correlation between the preoperative Kellgren-Lawrence grade in the medial compartment and Lysholm scores at the time of final follow-up. Similarly, Liebensteiner et al.[37] found that patients with mild cartilage degeneration (International Cartilage Repair Society [ICRS] grade 0 to 3) benefited significantly more from meniscectomy with respect to Short Form-36 Physical Component summary scores than patients with advanced cartilage degeneration (ICRS grade of >3). Surgeons should be cautious in performing a meniscectomy in patients with degenerative change that affects the involved compartment as inferior outcomes can be expected in these groups; therefore, nonsurgical management should be exhausted. It should be noted that meniscectomy for pain relief alone in the setting of advanced arthritis is not indicated or successful.

The impact of malalignment on the outcomes of meniscectomy is clear. In a review of the cases of 154 patients managed with PMM who were >60 years old, 54 of whom had a preoperative varus deformity, Sofu et al.[36] found that postoperative Lysholm and VAS scores were significantly worse for those with a preoperative hip-knee-ankle angle of >5° of varus. Despite evidence correlating malalignment with worse outcomes following meniscectomy, the role of addressing malalignment with an osteotomy remains controversial and indications are poorly defined in this specific context. High tibial osteotomy (HTO) in isolation is a well-established and durable intervention for resolving pain and improving function in unicompartmental arthritis associated with malalignment in younger, high-demand patients. It can improve the mechanical axis and prolong the life of the native knee joint[41-43]. However, HTO is not indicated for a diagnosis of a meniscal tear per se and should be considered in the surgical algorithm along with arthroplasty for patients with degenerative change with coexisting meniscal pathology[44]. In summary, surgeons should be aware that malalignment can negatively influence the outcomes following meniscectomy and should counsel patients appropriately.

Finally, ligamentous insufficiency, particularly ACL deficiency, has been linked to poor results following meniscectomy[15,36,38,45,46]. Burks et al.[45] found that patients undergoing partial meniscectomy in the presence of an ACL deficiency had significantly worse radiographic changes (according to the grading system of Holden et al.[47]) at a mean of 14.7 years after surgery compared with those undergoing partial meniscectomy with an intact ACL. Similarly, Sofu et al.[36] found significantly worse postoperative Lysholm and VAS scores among patients presenting with increased ACL laxity compared with those with an intact ACL.

Risk of Revision and Subsequent Surgery

Failure and revision rates following partial meniscectomy are relatively low in comparison with other meniscal procedures, including meniscal repair and discoid saucerization (Table II)[29,48-50]. Shieh et al.[50] evaluated revision rates for meniscal surgery in 293 patients who were <20 years old and noted that age, sex, BMI, laterality, time to repair, tear location, and associated ligament reconstruction did not have a significant effect on risk of revision. Paxton et al.[29] conducted a systematic review encompassing 95 studies to compare reoperation rates in patients undergoing meniscal repair and partial meniscectomy at short-term (0 to 4-year)

TABLE II Revision and Failure Rate Comparison Among Meniscal Procedures

Procedures According to Study	Revision Rate*	Failure Rate†	
		Short Term (0-4 yr)	Long Term (>10 yr)
Shieh et al.[50]			
Meniscectomy	7%		
Meniscal repair	18%		
Discoid saucerizations	15%		
Paxton et al.[29]			
Meniscectomy		1.4%	3.9%
Meniscal repair		16.5%	20.7%

*Revision was defined as the need for an additional operation because of persistent symptoms after the initial surgery, a period of symptom relief followed by recurrence, or an identifiable traumatic reinjury. †Failure was defined as the need for revision meniscal surgery.

and long-term (>10-year) follow-up. They found that at long-term follow-up, 6.5% of patients undergoing PLM needed revision, whereas 3.0% of patients undergoing PMM needed revision. Similarly, Nawabi et al.[26] found that a higher proportion of patients managed with PLM had adverse events related to pain or swelling compared with patients managed with PMM and underwent repeat arthroscopy at a slightly higher rate.

Symptomatic meniscal deficiency in the absence of high-grade focal chondral loss or malalignment can be addressed with meniscal allograft transplantation (MAT) or meniscal scaffold implantation (Fig. 2). It is important to note that MATs are currently used selectively for symptomatic, post-meniscectomy syndrome. McCormick et al.[51] reviewed the cases of 172 patients who had undergone MAT with a minimum 2-year follow-up (mean, 59 months; range, 24 to 118 months). They indicated an overall 95% survival rate, defined as a lack of revision MAT or knee arthroplasty. Zaffagnini et al.[52], in a retrospective review of the cases of 147 patients who underwent MAT (mean follow-up [and standard deviation], 4 ± 1.9 years), found significant improvements in the overall mean Lysholm score, VAS score for pain, all Knee injury and Osteoarthritis Outcome Score (KOOS) subscales, and Tegner activity level scores; in addition, 82.8% of the patients were satisfied with the procedure. Furthermore, the mean survival time was 9.7 years. The same study indicated a negative relationship between the duration from the primary meniscectomy and subsequent MAT and the postoperative KOOS, VAS, and Lysholm scores. They also noted no significant differences with respect to failure and survival rate between medial and lateral MAT, isolated or combined MAT, patients who were ≥50 years or <50 years old, and patients with a BMI of ≥25 or <25 kg/m^2. There is no definitive conclusion regarding the chondroprotective role of MAT. One study[53] suggested that MAT may prevent progression of cartilage deterioration, whereas a separate study[54] found that MAT does not delay or prevent tibiofemoral OA progression. Further research is needed to determine the chondroprotective role of MAT. Indications for MAT include young patients experiencing joint-line tenderness correlated with previous meniscectomy, patients without Outerbridge grade-III or IV cartilage damage, and patients with a stable and well-aligned knee[21].

As an alternative to MAT, meniscal scaffolds (Fig. 2) have been proposed to substitute or reconstruct a partial meniscal deficit. Scaffolds are designed for patients who have lost >50% of the meniscus but still have an intact rim[55]. Meniscal scaffolds are highly variable in composition, success rates, and incorporation into common practice. Furthermore, these outcomes should be interpreted with caution, as synthetic and biomimetic scaffolds have unproven results at mid-term to long-term follow-up[56]. Furthermore, scaffolds should be avoided in patients with substantial cartilage deterioration, knee malalignment, uncorrected ligamentous instability, and active infection or immunological disorder. Dangelmajer et al.[57] conducted a systematic review of 7 studies involving patients

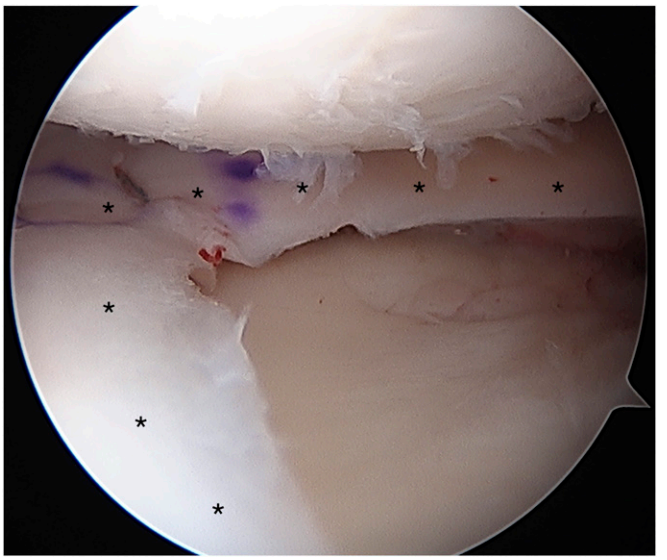

Fig. 2
Intraoperative image of a meniscal allograft transplant. There is no native meniscus present, and the asterisks indicate the location of the meniscal allograft transplant within the tibiofemoral joint.

Fig. 3

Full-length standing anteroposterior radiograph. The mechanical axis lines were created from the center of the femoral head to the middle of the ankle joint and reveal acquired varus malalignment of the right knee following medial meniscectomy.

undergoing meniscal scaffold implantation and found an overall failure rate of 5.6% and an overall reoperation rate of 6.9%. Houck et al.[56] conducted a systematic review of clinical outcomes in 658 patients following meniscal scaffold implantation using 2 available scaffolds, collagen meniscal implant (CMI) and Actifit polyurethane meniscal scaffold (Orteq). The authors found substantial improvement in the VAS pain score, Lysholm knee score, and Tegner activity score in both groups, and improved KOOS and International Knee Documentation Committee scores for patients managed with Actifit scaffold. The authors found an overall failure rate of 6.7% in patients receiving CMI and 9.9% in patients receiving the Actifit scaffold. However, Actifit scaffolds have not been approved by the U.S. Food and Drug Administration. The use of meniscal scaffolds needs further study before being employed in routine clinical practice.

Return to Activity and Sport

The ability to return to physical activities and/or sport following arthroscopic partial meniscectomy remains poorly understood. This is due to a variety of factors, including patient demographics, level of preinjury and/or preoperative activity, chronicity of meniscal injury, meniscal tear pattern, alignment, and degree of concomitant injuries. In general, many patients undergoing arthroscopic meniscectomy are unlikely to return to their preinjury activity levels[58,59]. Stein et al.[58] found that only 50% of patients undergoing partial meniscectomy were able to successfully return to their preinjury activity level. Furthermore, patients who were athletes (defined as those who participated in recreational sports ≥5 times per week) were even less likely to return to their preinjury sports activity level following meniscectomy. Overall, by long-term follow-up, only 43.8% of athletes in the partial meniscectomy group reached their preinjury sports activity level[58].

Aune et al.[59] measured the rate of RTS for 72 National Football League (NFL) athletes after arthroscopic PLM and found that the rate of RTS was only 61%. They found that the athletes who had returned to play competed in significantly fewer games (mean difference, −25.0) and significantly fewer seasons (mean difference, −1.0) following PLM. However, there was no significant difference in the mean percentage of games started. Interestingly, they found that RTS was 3.7 times more likely for players who were drafted in the first 4 rounds of the NFL draft following PLM than for those drafted after the fourth round or those who entered the NFL undrafted. Factors involved in higher draft order, including distinguished talent level, higher salaries, and a greater investment on the part of the organization, may have influenced the rate of RTS[59].

The time frame in which patients return to activity and/or sport following meniscectomy varies as a result of a number of factors, including age, meniscal laterality, extent of meniscectomy, and preinjury activity level of the patient[32]. It has been reported that RTS can occur as early as 5 weeks following partial meniscectomy, but may take up to 15 weeks[26,32,60]. Kim et al.[32] measured the time to RTS for 56 patients (mean age, 26.7 years; range, 13 to 67 years) and found that the mean time to RTS was significantly lower in patients who were <30 years old (54 days to RTS) than for those who were ≥30 years old (89 days). The outcomes of PLM in young, active patients are generally considered to be poor compared with those after medial meniscectomy. Nawabi et al.[26] found that professional soccer players undergoing PMM experienced a faster RTS (5 weeks) than those undergoing PLM (7 weeks), and that the probability of RTS was 5.99 times greater after PMM than that after PLM.

Kim et al.[32] analyzed RTS on the basis of the amount of meniscal resection (small [<1/3], moderate [≥1/3 but <2/3], and large ≥2/3]), and found that the mean time to RTS was significantly less after a small versus a large meniscectomy. In this same study, preinjury sports athletic level was classified into elite (mean Tegner score, 9.3 [n = 12]), competitive (mean Tegner score, 8.3 [n = 23]), and recreational (mean Tegner score, 6.6 [n = 21]). The time to RTS was significantly less in the elite and competitive groups than in the recreational group. It is important to note, however, that patients in the recreational group were significantly older than those in the elite and competitive groups.

Postoperative Knee OA

Because of the functional properties of the meniscus in maintaining the health of the articular cartilage of the knee, it has been well established that meniscal injury requiring consequent meniscectomy increases the risk for developing knee

TABLE III Factors Influencing the Development and Progression of Osteoarthritis (OA) Following Meniscectomy

Study	Factor	Comments
Englund and Lohmander[28] and Hulet et al.[63]	Body mass index	Patients with obesity (≥30 kg/m^2) are at an increased risk of symptomatic knee OA
Johnson et al.[15], Haviv et al.[17], Englund and Lohmander[28], Rosenberger et al.[23], Fabricant et al.[35], Roos et al.[61], Meredith et al.[34], and Morrissey et al.[22]	Patient sex	Greater radiographic evidence of OA following meniscectomy is seen in females than in males
Englund and Lohmander[28], Rockborn and Gillquist[19], and Bonneux and Vandekerckhove[31]	Extent of meniscectomy	Resecting >50% of the meniscus is a predictive factor for worse clinical outcomes and increases the risk of subsequent development of OA
Bulgheroni et al.[67] and Andriacchi and Favre[68]	Altered gait mechanics	Following meniscectomy, the development of a new walking pattern, most commonly a reduced knee extension moment, may correspond to development of OA because of new joint-loading responses
Pengas et al.[70], Yoon et al.[66], Tanamas et al.[65], and Brouwer et al.[64]	Malalignment of the knee joint	Meniscectomy may lead to an increase in varus or valgus malalignment, which in turn may increase the risk of subsequent development of OA

OA (Fig. 3)[12,27,28,34,61-63]. Papalia et al.[27] conducted a systematic review of 32 studies, involving 4,642 patients at a mean follow-up of 13.3 years after partial meniscectomy, and found that the overall mean OA prevalence was 53.5%. In comparison, they noted that the corresponding rate of OA in the contralateral knee ranged from 0% to 44%.

TABLE IV Key Points Influencing Postoperative Expectations Following Meniscectomy

Clinical Outcomes
- Lateral meniscectomy, meniscal root tears, and resection of >50% of the meniscal tissue are predictive factors for poor clinical outcomes.
- Females often experience worse, and prolonged, recovery time following meniscectomy.
- Knee malalignment, preexisting degenerative knee changes, and ligamentous instability are associated with inferior clinical outcomes following meniscectomy.

Risk of revision and subsequent surgery
- Partial meniscectomy has a relatively low failure rate (7% to 15.1%) in comparison with meniscal repair (18% to 65.8%).
- Patients who undergo a lateral meniscectomy experience more adverse events related to pain or swelling than those who undergo medial meniscectomy.
- Meniscal allograft transplantation can be used in patients experiencing symptomatic, postmeniscectomy syndrome.
- Meniscal scaffold implantation can be used to substitute or reconstruct a partial meniscal defect; however, these synthetic scaffolds have unproven results at mid-term to long-term follow-up.

Return to sport (RTS)
- Approximately 50% to 61% of patients are able to return to their preinjury activity level following meniscectomy.
- The time frame to RTS is minimized in younger patients, patients undergoing medial meniscectomy, and those in whom <1/3 of the meniscal tissue is resected.
- Regained quadriceps strength, symmetry in the single-leg hop test, and a positive psychological response are indications that a patient may return to sport.

Postoperative knee osteoarthritis (OA)
- Meniscectomy increases the risk for developing knee OA.
- Female patients and obesity are predictive factors that further increase the risk of OA.
- The extent of meniscal resection has a positive relationship with the risk of OA.
- New walking patterns and knee malalignment further escalate the progression of OA.

Total knee arthroplasty (TKA)
- Meniscectomy increases the risk for subsequent TKA.
- Rates of TKA following meniscectomy have been reported to range from 13.2% to 51.5%.
- Patients undergoing total meniscectomy have a greater rate of subsequent TKA than those who have meniscal repair and nonoperative treatment.

However, lateral meniscectomy, obesity, female sex, large volume of meniscectomy, altered gait mechanics, and malalignment of the knee are predictive factors that further escalate the development and progression of OA following meniscectomy (Table III). Because of the relatively greater contact pressure between the femoral condyle and the tibial plateau in the presence of a deficient lateral meniscus, compared with that in the presence of a deficient medial meniscus, it can be expected that the development of OA is accelerated in patients undergoing lateral meniscectomy. Also, Englund and Lohmander[28] evaluated the cases of 317 patients who had undergone varying degrees of meniscectomy and found that patients with obesity had a greater likelihood of developing radiographic knee OA. Several studies[15,17,21-23,28,34,35] have found greater radiographic evidence of OA following meniscectomy in females compared with males, and Papalia et al.[27] found that the amount of meniscus removed was the most important predictor for the development of knee OA. In addition, factors including altered gait mechanics and knee malalignment may also play a role in the progression of postoperative knee OA[64-68].

TKA

With the increased risk of developing progressive knee OA in the setting of meniscal pathology, a corresponding increase in the prevalence of TKA following arthroscopic meniscectomy has also been reported, with rates of TKA following meniscectomy ranging from 13.2% to 51.5%[69-71]. Pengas et al.[70] found that, at a mean of 40 years postoperatively, 13.2% of patients who had undergone total meniscectomy underwent subsequent TKA, with a significant difference in the risk of knee OA between the surgically treated and the contralateral knees. Faucett et al.[71] found that patients undergoing total meniscectomy (51.5%) underwent subsequent TKA at a higher rate than those who had meniscal repair (33.5%) and nonoperative treatment (45.5%). Additionally, Zikria et al.[69] found that meniscal surgery because of a preceding knee trauma was not associated with radiographic progression of joint space narrowing, although degenerative meniscal tears were associated with radiographic progression of joint space narrowing as well as TKA.

The extent of meniscectomy likely plays an important role in the risk of subsequent TKA, and the aforementioned studies apply only to patients who underwent total meniscectomy. However, because of the role that meniscal resection has on the development of knee OA, patients should be educated about the risk of progressive OA and possible need for TKA.

Conclusions

The meniscus is a critical structure to the health of the knee. Surgeons should be aware of patients' lack of understanding regarding meniscal surgery and postoperative expectations (Table IV). Meniscectomy remains a viable and successful intervention for pain relief and functional improvement for symptomatic meniscal tears in appropriately indicated patients. Nonsurgical care should be used for older patients with degenerative changes and meniscal pathology prior to recommending surgery. Many patients are able to return successfully to activities and sports following partial meniscectomy, although not always at their preinjury level of activity. Clinical outcomes following meniscectomy are dependent on multiple considerations. While controversial and certainly dependent on a variety of factors, outcomes following partial meniscectomy are likely optimized in male patients without obesity who are undergoing PMM with minimal resection of the meniscus, in the setting of proper knee alignment and ligament stability, with minimal concomitant degenerative changes in the affected compartment. It should be stressed that the results of lateral meniscectomy are generally inferior in terms of pain relief, revision surgery, and the development of OA. Therefore, extreme caution should be taken before recommending a PLM in a young and active patient.

Meniscal resection should be limited to torn and degenerative tissue, and efforts should be taken to preserve healthy meniscal tissue. Surgeons should be mindful of inferior outcomes associated with malalignment and instability and should counsel patients appropriately and consider these factors in their treatment plan (Table V). Because of the functional properties of the meniscus in maintaining the health of the articular cartilage, the risk of developing knee OA increases following meniscectomy and with that so does the risk of progressing to TKA. ■

TABLE V Grade of Recommendations

Recommendations*	Grade of Evidence†
Surgeons should resect a minimal amount of meniscal tissue for meniscal tears requiring partial meniscectomy.	B
A shorter timeframe of preoperative symptoms before meniscal allograft transplantation results in better postoperative Lysholm, VAS, and KOOS scores.	C
Concomitant ligament reconstruction and/or a realignment procedure should be considered in patients with ligament tears or varus or valgus malalignment, respectively, in the presence of meniscal deficiency.	B

*VAS = visual analog scale, and KOOS = Knee injury and Osteoarthritis Outcome Score. †According to Wright[72], grade A indicates good evidence (Level-I studies with consistent findings) for or against recommending intervention; grade B, fair evidence (Level-II or III studies with consistent findings) for or against recommending intervention; grade C, poor-quality evidence (Level-IV or V studies with consistent findings) for or against recommending intervention; and grade I, insufficient or conflicting evidence not allowing a recommendation for or against intervention.

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