Complications In Brief

Arthroscopic Partial Meniscectomy

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Abstract Arthroscopic partial meniscectomy can be complicated by excessive resection, damage to articular cartilage, neurovascular injury, persistent drainage from portals, and infection; the procedure can be rendered more difficult, and the outcome less certain, if the surgeon fails to recognize concomitant injuries, malpositions the portals, or misidentifies the components of a meniscus tear. We review the problems that can occur as a result of errors made before, during, and after surgery.

Preventing Technical Problems and Major Complications

To increase the likelihood that surgery will resolve the patient's pain, the surgeon must examine the injured knee meticulously, correlate findings to preoperative imaging, and exclude alternative disorders (eg, inflammatory arthropathy, crystalline arthropathy, infection) and sources of referred pain (eg, disorders of the hip, lumbar spine, sacroiliac joints). At the time of surgery, the surgeon must use anatomic landmarks and imaging as necessary to ensure proper portal position, carefully insert and select instrumentation, completely observe the articular surfaces at arthroscopy, resect as much meniscus as needs to be taken (but no more, to decrease the risk of progression of osteoarthritis), and use sterile technique to minimize infection.

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Detection and Treatment of Major Complications

Misplaced portals should be revised and additional portals created if needed. Systematic diagnostic arthroscopy should be used to minimize the chance of missing additional disorders. Concomitant injuries must be recognized and surgically treated if necessary (eg, ACL reconstruction, resection of unstable cartilage fragments). Any iatrogenic meniscal injury should be addressed as one would manage meniscal injuries from other causes, that is, with resection of any unstable meniscal fragment. Unstable articular cartilage fragments also should be treated. Persistent drainage from portals should be managed with reapproximation and closure of incision sites. Superficial infection requires antibiotics and possible immobilization, whereas deep infection requires arthroscopic irrigation and débridement in addition to antibiotic administration.

Table 1. Complications related to problems in diagnosis and judgment

Problem	Comment	Prevention	Detection	Remedy
Recommending arthroscopic meniscectomy based solely on MRI findings [5]	Incidental meniscal tears seen on MRI are common, especially with increasing age	Ensure that imaging findings are concordant with features on history and physical examination	The patient will not improve clinically if the underlying source of pain remains unaddressed	Perform a thorough history and physical examination to determine the true source of pain
Recommending arthroscopic meniscectomy when osteoarthritis is the true source of pain [10, 13]	Arthroscopic surgery for knee osteoarthritis has not been shown to provide additional benefit to optimized physical therapy and medical therapy	Use weightbearing knee radiographs to diagnose osteoarthritis; knee MRI can help if questions remain	The patient will experience partial or no relief of symptoms	At the time of arthroscopy, loose bodies and unstable articular cartilage fragments should be resected; postoperatively, manage arthritis symptoms with nonsurgical interventions or further surgery
Failure to exclude other sources of direct knee pain	Inflammatory arthropathy, crystalline arthropathy, and infection all can cause knee pain	When clinically indicated, a knee aspiration can evaluate such disorders	The patient will experience partial or no relief of symptoms	Perform a thorough history and physical examination to determine the true source of pain
Failure to exclude sources of referred knee pain	Disorders of the hip, lumbar spine, and sacroiliac joints may manifest as knee pain	When clinically indicated, imaging of the hip, pelvis, and lumbar spine	The patient will experience partial or no relief of symptoms	Perform a thorough history and physical examination to determine the true source of pain
Failure to recognize concomitant ACL rupture (or other ligamentous injury, eg, PCL, MCL, LCL, posterolateral corner) [18, 19]	Joint line tenderness is neither sensitive nor specific in the setting of an acute ligamentous knee injury; a flipped bucket handle meniscal fragment may cause a false-negative Lachman test	A knee MRI will show an ACL rupture and the associated characteristic bone bruising	Arthroscopic evaluation will show the ACL rupture	Address the meniscal disorder. Review operative findings with the patient; consider ACL reconstruction later if indicated
Neglecting to establish appropriate expectations [6]	Pain may paradoxically worsen in the immediate postoperative period (anterior knee pain is one of the more common complications of arthroscopic knee surgery from quadriceps weakness, especially with chondromalacia patella)	Careful preoperative counseling	Patient will present with clinical disappointment from ongoing functional limitations	Reassure the patient that some ongoing knee pain is common, if other causes of pain have been excluded. Prescribe rehabilitation to improve hip and quadriceps strength if indicated

ACL = anterior cruciate ligament; PCL = posterior cruciate ligament; MCL = medial collateral ligament; LCL = lateral collateral ligament.

Table 2. Complications related to surgical preparation for meniscectomy

Problem	Comment	Prevention	Detection	Remedy
Wrong-site surgery [1]	Arthroscopic knee surgery was likely the most common wrong-site surgery before implementation of the “sign your site” initiative	Initial the surgical site using a permanent marker with the patient awake and alert	A formalized “time out” in the operating room should include confirmation of the correct operative site before any surgical instrumentation is passed to the surgeon	If wrong-site surgery has been identified, the surgeon should withdraw instrumentation, close the portals, and then perform the surgery at the correct site (unless the correct-site surgery would result in additional and unacceptable disability). Advise the patient and the patient’s family as soon as possible of what occurred and the likely consequences
Poor placement of lateral post	If the lateral post is too proximal, the surgeon may have difficulty applying a valgus stress to the knee to improve access to the medial compartment	Before the extremity is prepared, ensure the lateral post is placed in a way that allows for application of valgus stress	The surgeon will not be able to apply adequate valgus stress as the hip abducts or internally rotates	The circulating nurse should adjust the post position since it requires nonsterile adjustment
Portal malpositioning [8]	A malpositioned portal will prevent deep access into the tibiofemoral compartments	Place lateral portal 3 to 5 mm lateral to the lateral margin of the patellar tendon, equidistant from the distal patella and proximal lateral tibial plateau; place medial portal 3 to 5 mm medial to the medial margin of the patellar tendon Consider confirming with a localizing needle before incision	The surgeon will have difficulty seeing into or working in the involved compartment(s)	Extend longitudinal portals proximally or distally with the scalpel; a curved hemostat also may be opened within the portal to increase the portal caliber more deeply. Establish an additional portal under direct observation if needed
Failure to identify articular cartilage defects [9]	Meniscus tears often are associated with cartilage defects	Systematic diagnostic arthroscopy will minimize the chance of missing additional disorders (Fig. 1)	The patient will experience continued knee pain, recurrent effusions, and/or mechanical symptoms	Size- and age-appropriate cartilage treatment

Fig. 1A–B (A) An arthroscopic view shows an unstable articular cartilage fragment on the medial femoral condyle during a partial meniscectomy. (B) Instrumentation of the articular cartilage fragment

delineates extent of lesion. Complete observation of the articular surface can reveal occult defects amenable to resection.

Table 3. Complications related to the intrinsic meniscectomy

Problem	Comment	Prevention	Detection	Remedy
Not identifying or resecting all unstable components of a meniscus tear (or retear) [7]	Posterior meniscal root avulsions occasionally may be missed after treating the more obvious tears	Systematic diagnostic arthroscopy minimizes the chance of missing additional disorders (Fig. 2)	Continued knee pain, recurrent effusions, and/or mechanical symptoms	Consider repeat arthroscopic meniscectomy if needed
Resecting more meniscal tissue than necessary [15]	Poor observation or technical error may result in resecting stable meniscal tissue beyond the tear	An assistant may increase compartment distraction, control fluid inflow/outflow, and optimize observation while the surgeon operates the camera and instruments (Fig. 3)	The inappropriately extensive resection will be seen when observation improves	Treat iatrogenic meniscal injuries as any meniscus tear; specifically, resect unstable meniscal fragments
Damage to the articular cartilage while inserting instruments [3, 9, 16]	Forcefully penetrating instruments through the capsule may injure the articular surfaces	A curved hemostat may be opened within the portal to permit controlled passage of instrumentation into the joint	Arthroscopic observation of the articular surface will reveal a discrete defect	Resect unstable articular cartilage fragments
Damage to the articular cartilage while resecting the meniscus [3, 9, 16]	Assume that most linear markings on articular surfaces are iatrogenic	Smaller arthroscopic instruments may provide safer access in tight knees; curved instruments occasionally are helpful (Fig. 4)	Arthroscopic observation of the articular surface will reveal a linear impression or fissure	Resect all unstable articular cartilage fragments
Breaking an instrument [14, 17]	Instruments typically break owing to fatigue failure, excessive torque by the surgeon, or incarceration during active motion by an awake patient	Careful handling and use of instruments; review with the anesthesiologist the dangers of a partially awake patient	The instrument will cease functioning; and the broken fragment may be seen	The broken instrument piece should be removed from the joint

Summary

Meniscal tears are a frequent source of knee pain in active patients and arthroscopic meniscectomy is one of the most

common procedures that orthopaedic surgeons perform. The goals of partial meniscectomy are improved function and decreased pain, and, in general, the procedure is very effective. However, like any surgical procedure, it can be

Fig. 2 An arthroscopic view shows a complex meniscal tear not amenable to repair. Systematic diagnostic arthroscopy minimizes the chance of missing additional disorders. Posterior meniscal root avulsions occasionally may be missed after treating the more obvious multidirectional tears of the body and posterior horn.

Fig. 3 An arthroscopic view shows a partial meniscectomy. Proper observation allows for resection of only unstable meniscal fragments.

Fig. 4 An arthroscopic view shows safe instrumentation. Damage to the articular cartilage while inserting instruments and while resecting the meniscus can be avoided by careful instrument use. For example, a smaller 2.7-mm biter (rather than the standard 3.4-mm biter) can provide safer access to the meniscus without damaging the articular cartilage while resecting the meniscus.

Table 4. Complications related to postoperative complications

Problem	Comment	Prevention	Detection	Remedy
Failing to achieve intraarticular hemostasis	Persistent bleeding at the meniscus periphery may lead to hemarthrosis	Arthroscopic electrocautery; if a tourniquet is used, consider deflating it; it should be deflated before the conclusion of surgery	Careful arthroscopic evaluation will reveal bleeding	Consider aspiration of large, tense effusions postoperatively and application of a compressive wrap
Failing to observe sterile precautions [2]	Infection may result	Preoperative administration of antibiotics minimizes the risk of infection	Clinical signs of infection, including purulent drainage or pain with small-arc ROM	Consider antibiotics and possibly immobilization for superficial infection, and arthroscopic irrigation and débridement, and culture and sensitivity test followed by postoperative antibiotics for deep infection
Failure to recognize risk factors for VTE [4, 11, 12, 20]	VTE may occur after arthroscopy	No routine thromboprophylaxis, other than early mobilization, is recommended; however, for patients with inherent risk factors (such as personal history of prior VTE), low-molecular-weight heparin is recommended	Clinical diagnosis of deep venous thrombosis is unreliable; ultrasonography should be done when clinical suspicion arises	Most commonly, anticoagulation

VTE = venous thromboembolism.

rendered more difficult by misdiagnoses or technical errors, and compromised by complications. In this article, we present common problems associated with diagnosis and judgment (Table 1), surgical preparation for meniscectomy (Table 2), the procedure (Table 3), and postoperative complications (Table 4).

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