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Arthroscopic Decompression of a Posterior Knee Cyst Causing Vascular Compression



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Abstract: Intra-articular ganglion cysts in the knee large enough to cause neurovascular claudication are rare entities only identified in singular case reports. The severity of claudication can cause debilitating symptoms and pain to previously highly functional and asymptomatic patients. Total knee arthroplasty has been described to treat these cysts in elderly patients with osteoarthritis, although this treatment pathway may not appeal to patients without antecedent pain and high activity levels. This surgical report will detail a reproducible method of arthroscopic decompression of posterior, intra-articular cysts to relieve vascular claudication by highlighting technical pearls in navigating posterior knee arthroscopy.

Cystic degeneration of the anterior and posterior cruciate ligaments is a rare occurrence that most frequently presents with pain, fullness, and a flexion contracture.^{1,2} Radiographic identification of cruciate cysts via magnetic resonance imaging (MRI) in asymptomatic patients occurs frequently and often is observed.^{3,4} While the etiology can be traumatic or idiopathic, arthroscopic resection of symptomatic patients has been demonstrated to be efficacious with low recurrence.⁵ Intra-articular cysts large enough to cause vascular claudication are exceedingly uncommon and have only been described in singular case reports.⁶ Due to the high viscosity of the cystic material, serial aspiration may be unsuccessful, leading to definitive treatment with total knee arthroplasty.⁷ While arthroscopic techniques have been described for the treatment of posterior cruciate ligament cysts,^{8,9} we describe the technique used to successfully treat a cyst causing

vascular claudication in a patient with joint-space narrowing and severe claudication.

Patient Evaluation, Imaging, and Indications

The beginning of patient evaluation should begin with a thorough history, assessing the timeline and progression of clinical claudication and neurovascular symptoms. A physical examination specifically focusing on neurovascular function should be completed before the obtainment of bilateral ankle–brachial indices. If an abnormal ankle–brachial index is measured, further vascular studies including arterial Doppler examination should be procured. MRI of the knee must be completed to evaluate the location of the lesion to aid in preoperative planning in addition to characterizing the lesion to rule out malignant morphologies (Fig 1). Patients with suspicious-appearing oncologic masses must be then biopsied. Homogenous masses consistent with ganglion cysts in patients with severe claudication who have not responded to ultrasound-guided aspiration should then be indicated for operative resection and decompression.

Surgical Technique (With Video Illustration)

The patient is placed supine for standard knee arthroscopy with a hip post and a foot roller to maintain approximately 90° of knee flexion, without the application of a tourniquet (Table 1). A standard 30° arthroscope (Stryker, Kalamazoo, MI) is placed into the anterolateral portal just lateral to the patellar tendon and at the level of the inferior patella and diagnostic arthroscopy is performed. The anteromedial

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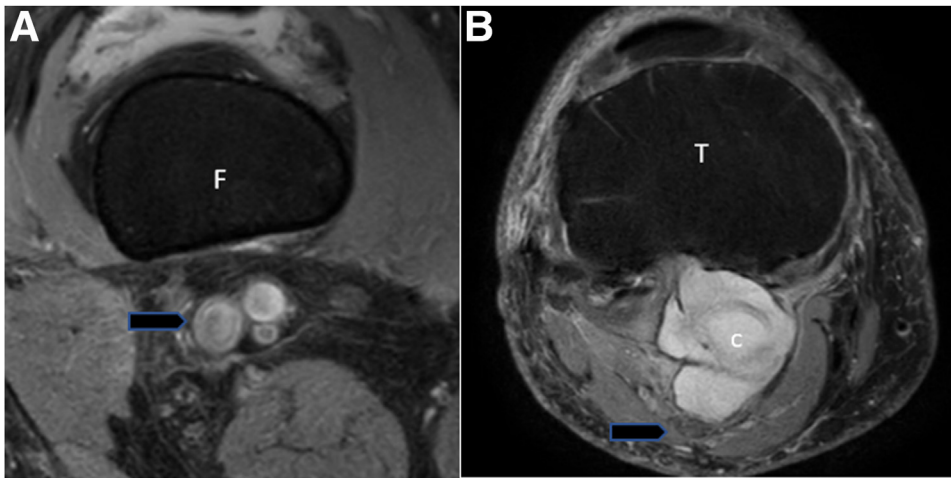


Fig 1. Magnetic resonance imaging of the right knee. Axial images above (A) and at the level (B) of the posterior cyst extending from the posterior cruciate ligament. The femur (F), tibia (T), cyst (C), and neurovascular bundle (arrow) are highlighted, with severe compression noted in (B).

portal is established at the same height as the anterolateral portal, just medial to the patellar tendon.

Due to medial tibial spine overgrowth and osteophytes along the medial femoral condyle (Fig 2), a burr is introduced from the anteromedial portal to allow access to the posterior knee (Fig 3). After debridement of the osteophytes and partial resection of the medial tibial spine, a transpatellar Gilquist portal is created to access the posterior knee to optimize visualization.

After the arthroscope is transferred to the Gilquist portal, needle localization is performed to create a posteromedial portal. By transilluminating the posteromedial knee, the saphenous nerve and vein is avoided as the needle enters the knee joint from just proximal and posterior to the tibiofemoral joint. A No. 11 scalpel follows the needle into the joint, after which an 8.25-mm cannula is inserted into the posteromedial portal (Arthrex, Naples, FL).

After a cannula is placed into the posteromedial portal, a 4.0-mm oscillating shaver (Stryker) is introduced to debride fibrous tissue and the walls of the cyst (Fig 4). The highly viscous, straw-colored fluid and cyst walls are resected with digital palpation of the posterior

knee used to further assist with the knee at 90° flexion to maximally distance the neurovascular bundle from the posterior capsule. Samples of this tissue are retrieved and sent to pathology (Fig 5). To better visualize the cyst and ensure that all walls are systematically debrided, the arthroscope is introduced into the posterior portal and the shaver is placed into the Gilquist portal.

Next, a 70° arthroscope is then introduced into the Gilquist portal and the cyst walls are thoroughly debrided, with the shaver returning to the posteromedial portal. Finally, the 70° arthroscope is driven directly into the cyst from the posteromedial portal to ensure circumferential decompression of the cyst (Fig 6). The wounds are closed with 3.0 nylon sutures and a sterile dressing is applied. An overview of this technique is displayed in Video 1.

Rehabilitation

Immediately following decompression, a neurovascular examination should be conducted in the recovery unit. Postoperatively, patients should be placed in partial weight-bearing status to allow a mostly

Table 1. Pearls and Pitfalls

Pearls	Pitfalls
Using a burr to debride osteophytes along the medial femoral condyle and tibial spine allows access to the posterior knee with arthritic changes	Establishing the posteromedial portal without transillumination may cause injury to the saphenous vein
The transpatellar Gilquist portal allows optimal visualization of the cyst walls to aid efficient and safe debridement from the posteromedial portal	Directing the shaver posteriorly without the knee in flexion increases risk of injury to the neurovascular bundle
Introduction of a 70° arthroscope dramatically improves visualization and can be driven into the cyst from the posteromedial cannula	Sole use of a 30° arthroscope may inhibit cyst wall resection and increase risk of recurrence
Manual palpation of the posterior cyst to aid intraarticular extrusion must be performed in 90° of knee flexion to minimize risk of injury to the neurovascular bundle	

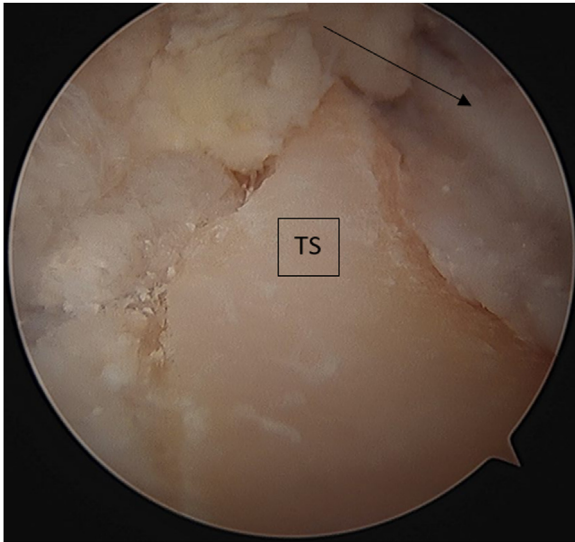


Fig 2. Viewing a right knee arthroscopy from the anterolateral portal, the hypertrophied medial tibial spine (TS) and medial femoral condyle (black arrow) are present, obstructing access to the posterior knee.

elderly population the ability to ambulate while still modulating pain. Following 2 weeks, patients can be advanced to weight-bearing as tolerated. Range of motion should not be limited at any time point to optimize the recovery and maximize functionality.

Discussion

Ganglion cysts of the posterior cruciate ligament are extremely rare entities that can be successfully treated with arthroscopic resection.¹⁰ Clinical suspicion of patients with pain, fullness, and flexion contractures leads

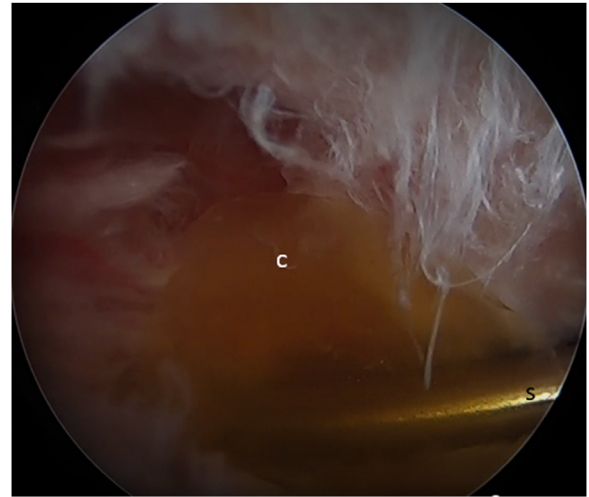


Fig 4. Viewing the right knee posterior compartment using a 30° arthroscope from the Gilquist portal, the cyst (C) is decompressed with a 4.0-mm shaver (S) introduced from the posteromedial cannula.

to confirmation with MRI and subsequent surgical resection. Surgical treatment of large cysts causing vascular claudication, however, is even more uncommon and unstudied in the orthopaedic literature.⁷

While nonoperative treatment is always offered to less-symptomatic patients, claudication necessitates a more urgent treatment paradigm. The standard initial treatments of knee cysts with observation, corticosteroid injections, and physical therapy will not address the claudication and the cysts are so viscous that serial aspiration is rendered ineffective.⁶

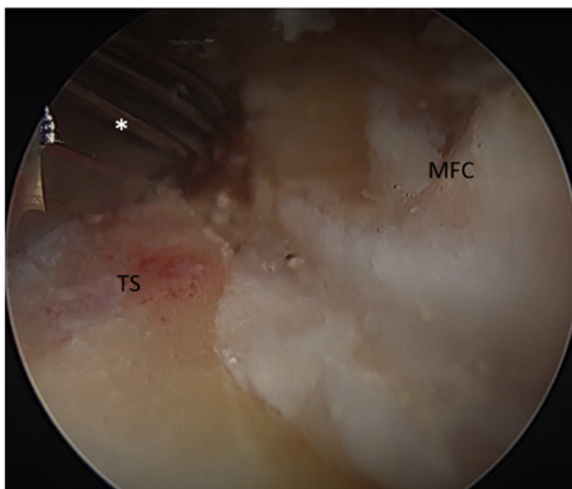


Fig 3. Viewing a right knee arthroscopy from the anterolateral portal using a 5.0-mm burr (*) to debride the medial tibial spine (TS) overgrowth and medial femoral condyle (MFC) osteophytes to provide posterior compartment access via the Gilquist portal.

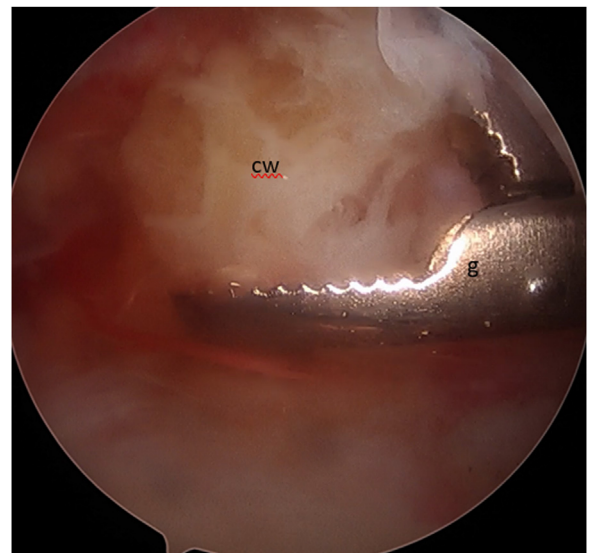


Fig 5. Using the 70° arthroscope into the patient’s right knee from the Gilquist portal, an arthroscopic grasper (G) is introduced from the posteromedial cannula to sample tissue of the cystic walls (CW) to send to pathology.

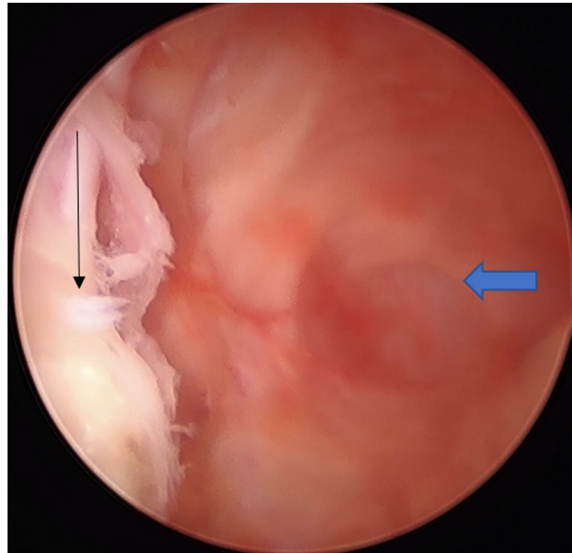


Fig 6. In the patient's right knee, a 70° arthroscope from the posteromedial cannula is driven directly into the cyst viewing the lateral wall (black arrow) and the posterior wall (blue arrow) to ensure that all loose bodies and cystic fluid are thoroughly decompressed, thus completing the surgery.

In this technique, we present a reliable and safe surgical approach to decompression a posterior, intra-articular cyst that is causing severe claudication. While arthroscopic access to the posterior knee has been described,^{10,11} efficacious decompression a cyst causing claudication in an arthritic knee are presented here and summarized in [Table 1](#).

While more invasive surgery, including total knee arthroplasty, may be offered in the treatment paradigm, this treatment is excessively invasive for patients who were asymptomatic before rapid cyst development. The minimally invasive arthroscopic decompression allows for alleviation of claudication and vascular compression while offering a rapidly accelerated recovery and much fewer complications. Arthroscopic decompression of cysts carries the inherent risk of cyst reformation, and patients must be counseled regarding this complication. In addition, given the proximity of the neurovascular bundle to the posterior knee, inherent risk exists in surgical decompression. By carefully establishing a posteromedial portal and thoroughly evaluating

preoperative imaging, risk can be minimized. [Table 2](#) further delineates the advantages and disadvantages of the described approach. In conclusion, decompression of a posterior cyst causing neurovascular claudication can be safely and reliably accomplished by adhering to the principles outlined in this technique.

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Table 2. Advantages and Disadvantages

Advantages	Disadvantages
Excellent visualization and access of the cyst to thoroughly debride and decompress	Establishment of the transpatellar portal may result in iatrogenic damage to the tendon
Immediate relief of vascular claudication with accelerated rehabilitation without TKA complications	Surgeon must be comfortable with posterior knee anatomy and arthroscopy to minimize neurovascular risk

TKA, total knee arthroscopy.

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