

Arthroscopic Excision of a Deep Infrapatellar Cyst



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Abstract: The knee joint is surrounded by multiple bursae, which are fluid-filled sacs whose main function is to reduce friction during movement. Extrusion of fluid from the bursa sac due to trauma or overuse can lead to the formation of cysts in the adjacent region. Operative treatment for cysts involves excision, traditionally performed as open surgery, which is associated with complications such as poor wound healing or recurrence. This Technical Note describes the arthroscopic excision of a deep infrapatellar cyst as an alternative to open surgery.

A bursa is a fluid-filled sac, mostly located around joints, with the primary function of reducing friction during movement.¹ The knee is one such joint surrounded by multiple bursae, which are further categorized based on their location in the knee.² Bursae surrounding the patella are named according to their position with respect to the patella and include the prepatellar, suprapatellar, and infrapatellar bursae. The infrapatellar bursa is further divided into superficial and deep, with the superficial bursa lying between the tibial tubercle and overlying skin and the deep being located between the anterior aspect of the tibia and the patellar tendon.

Inflammation of these bursae can result in the formation of cyst-like lesions, which present as tender lumps,³ many of which have various eponymous names. Herniation of fluid from the bursal sac due to trauma or repetitive knee flexion can also lead to the formation of cysts in the adjacent region.⁴ Treatment of symptomatic cysts begins with a trial of nonsurgical management that includes the use of analgesia and rest. Surgical treatment, typically via open surgery, is indicated for those whose symptoms still persist despite the above.

In this Technical Note, we describe the use of arthroscopy for surgical excision of a deep infrapatellar

cyst. Some of the pearls and pitfalls of this technique are displayed in [Table 1](#).

Preoperative Assessment

Patient Evaluation

Initial assessment of patients presenting with a lump in a knee should include taking a thorough clinical history and performing an adequate physical examination. The patient's medical history must be evaluated for any existing conditions such as malignancy or those that predispose the patient to infections. Further clinical history should also exclude trauma, as well as screen for symptoms of infection or malignancy.

A thorough physical examination should subsequently be performed to characterize the lump as per standard examination practices, likewise paying specific attention to signs of infection or malignancy. The knee should also be ranged to assess any limitation in range of motion, as well as to determine the site of the knee from which the lump is potentially decompressing.

Investigations

Biochemical investigations to rule out infection should be performed. Baseline imaging with plain-film radiographs of the affected knee should be performed to assess for any abnormalities.

Further imaging should include either an ultrasonography scan of the lump or a magnetic resonance imaging (MRI) scan of the knee for characterization and delineation of the lump. An MRI scan of the knee is the preferred imaging modality of choice as it allows adequate anatomic localization of the cyst, identifies structures it decompresses into, and screens for concomitant pathologies in the affected knee.

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Table 1. Pearls and Pitfalls

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Pearls	
Standard operative setup	
No contraindications for arthroscopic approach	
Side support for stability	
Arthroscopic approach provides direct visualization of cyst	
Pitfalls	
Piecemeal removal of cyst	
Incomplete removal of cyst wall	
Directing the shaver anteromedially may increase risk of iatrogenic injury to the patella tendon	

Indications

Indications for the surgical removal of the cyst include large or persistent cysts, concerns of malignancy, and symptomatic treatment.

Surgical Technique

Patient Preparation and Positioning

The patient is administered general or regional anesthesia and positioned supine.

A sandbag is placed under the foot of the operated limb to provide support and hold the knee in flexion at



Fig 1. Clinical photograph showing patient positioning for arthroscopic excision of an infrapatellar cyst of the right knee. The patient is positioned supine after administration of general or regional anesthesia. A sandbag is placed under the operated foot to flex the knee at 90°. A side support is also placed laterally to provide stability.

90°. Additionally, a side support can be positioned lateral to the proximal third of the thigh to prevent the hip from externally rotating (Fig 1). A triangular cushion can also be positioned beneath the knee as a substitute for the above to flex the knee.

A tourniquet is also applied to the limb and inflated after cleaning and draping as per standard procedure.

Portal Placement

For portal placement, anatomic surface landmarks are first identified. The border of the patella, the edges of the patella tendon, and the tibial tuberosity are palpated and marked out with the use of a skin marker. The site of anteromedial (AM) portal placement is identified by palpating the soft spot just medial to the medial edge of the patella tendon at a level of 1 cm above the joint line (Fig 2). The AM portal is created contralateral to the

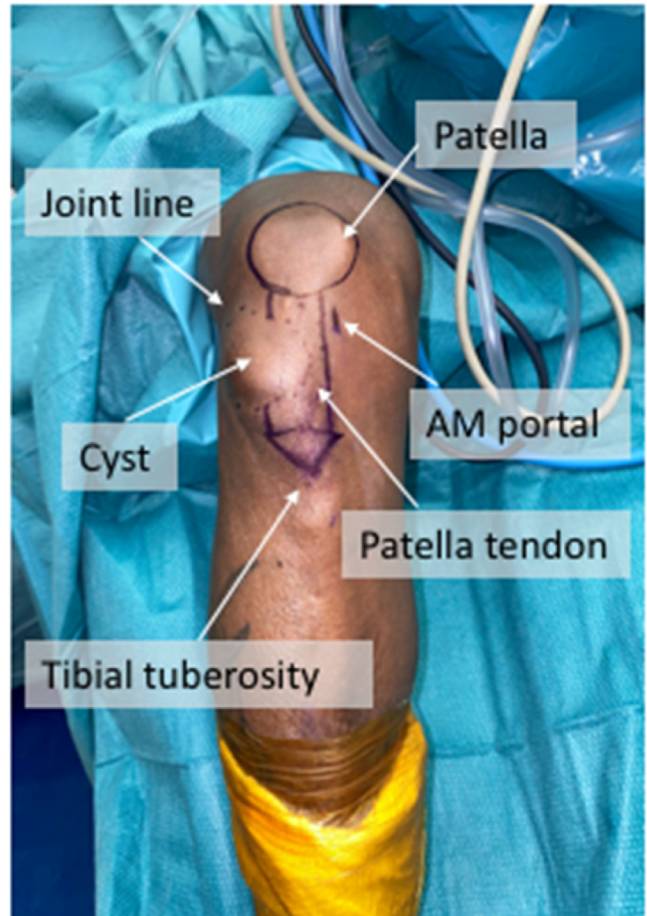


Fig 2. Clinical photograph showing anteromedial (AM) portal placement for arthroscopic excision of an infrapatellar cyst of the right knee. Surface landmarks of the right knee are first identified and marked out. Important landmarks include the border of the patella, the edges of the patella tendon, and the tibial tuberosity. The site for AM portal placement is identified by locating the intersection 1 cm above the joint line and just medial to the patella tendon at a palpable soft spot.

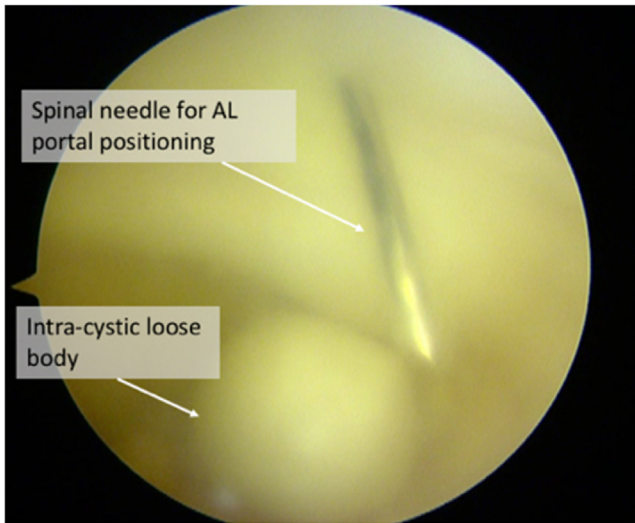


Fig 3. Accessory anterolateral (AL) working portal placement for arthroscopic excision of an infrapatellar cyst of the right knee. The anteromedial (AM) portal is the viewing portal. The accessory AL working portal placement is performed with direct visualization of the cyst. A spinal needle is first inserted to ensure optimal position of the AL portal with adequate working angles to facilitate excision.

side affected by the cyst in order not to perforate the sac before visual confirmation.

A vertical skin incision is made and the skin and joint capsule are stretched with an artery forceps. The blunt trocar is first introduced and then replaced with the arthroscope (30° 4-mm arthroscope LENS Integrated System; Smith & Nephew).

The AM portal is the viewing portal, and a diagnostic scope of the knee is first performed to diagnose any concomitant intra-articular pathologies. The scope is then withdrawn just outside the capsule and redirected inferolaterally toward the anterolateral aspect of the deep infrapatellar region where the cyst is located.

After the cyst is identified, a spinal needle is inserted under direct vision for creation of an accessory anterolateral (AL) working portal to provide access for the arthroscopic instruments for excision of the cyst. The needle serves as a guide to screen if the working angles for the instruments are sufficient to reach the deepest portion of the cyst (Fig 3). After an optimal position is found, a vertical skin incision is again made and the skin tract widened with an artery forceps to allow the introduction of an arthroscopic shaver (DYONICS platinum 3.5 Blade; Smith & Nephew) (Fig 4).

Debridement

Decompression and excision of the cyst are performed under direct vision with the arthroscopic shaver. Debridement is performed in a medial to lateral manner with care made to face the shaver away from the patella tendon to prevent iatrogenic injury (Fig 5).

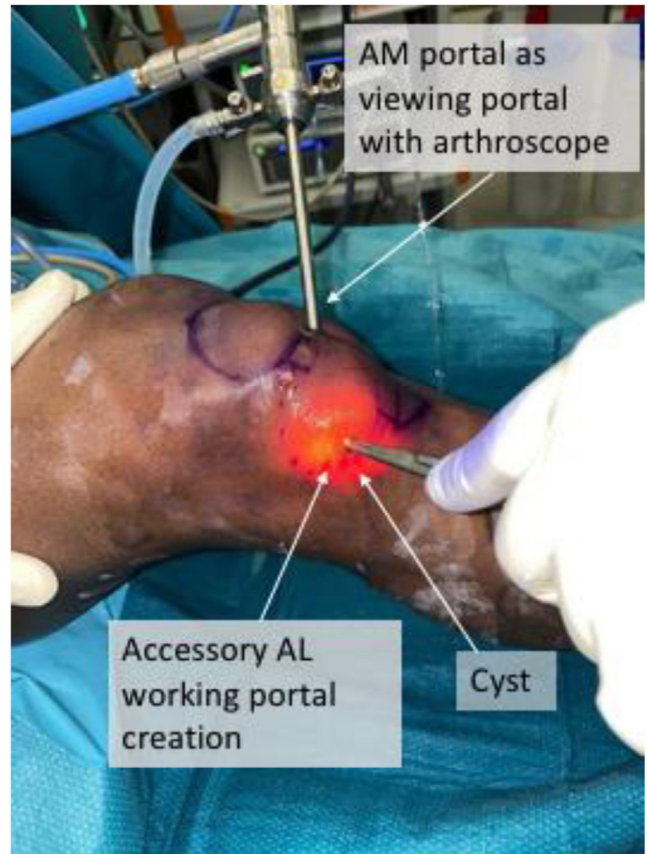


Fig 4. Clinical photograph showing accessory anterolateral (AL) working portal placement for arthroscopic excision of an infrapatellar cyst of the right knee. The spinal needle, which was previously placed under direct visualization, is then withdrawn and replaced with an arthroscopic shaver (DYONICS platinum 3.4 Blade; Smith & Nephew) after a skin incision is made and a tract created with an artery forceps.

A valgus force is applied to the lateral aspect of the cyst wall to displace the cyst toward the arthroscopic shaver to facilitate complete excision and reduce the risk of recurrence. A coblation wand (Werewolf Flow 50; Smith & Nephew) can also be used interchangeably to aid with excision.

The working and viewing portals can be exchanged for better working angles (Fig 6). Debridement is performed until the cyst wall can no longer be directly visualized. The knee can also be manually palpated to ensure adequate decompression. The surgical technique described is shown in Video 1.

Postoperative Protocol

The procedure is routinely less than a 24-hour inpatient stay, and the patient is reviewed by the physiotherapist and surgical team before discharge. The patient is allowed full weightbearing and active range of motion immediately postoperatively.

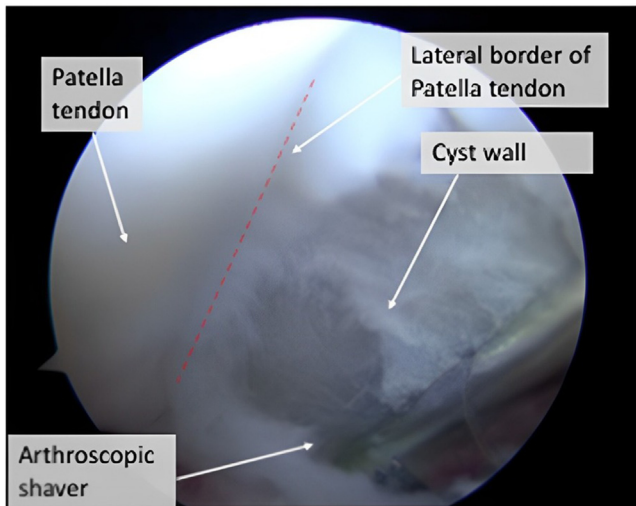


Fig 5. Arthroscopic excision of an infrapatellar cyst of the right knee. The anteromedial portal is the viewing portal, and the accessory anterolateral portal is the working portal. Debridement of the cyst wall is performed under direct visualization with an arthroscopic shaver (DYONICS platinum 3.4 Blade; Smith & Nephew) or a coblation wand (Werewolf Flow 50; Smith & Nephew). Debridement is performed in a medial to lateral manner with the shaver orientated away from the patella tendon to prevent iatrogenic injury. A valgus force is also applied to the lateral aspect of the cyst wall to displace the cyst toward the arthroscopic shaver to facilitate excision.

Discussion

The use of arthroscopy in the extra-articular region of the knee has been previously described for the surgical excision of other cysts in the knee, most notably for popliteal cysts. Open surgery for the removal of such cysts comes with known complications such as abscess formation and injury to neurovascular structures, including the saphenous nerve.⁵ An arthroscopic approach not only conveys a lower risk of complications but also allows a quicker recovery for patients due to its less invasive nature.⁶

Arthroscopy also allows direct visualization of the cyst, which facilitates better excision of the cystic wall. Good clinical outcomes have previously been reported, with reduced risk of recurrence compared with open surgery.^{7,8} Furthermore, a study by Park et al.⁹ has shown a high incidence of intra-articular pathologies in association with extra-articular cysts. An arthroscopic approach for cyst excision therefore also confers the ability to treat any concomitant pathology affecting the knee in the same surgical setting.

Certain challenges and disadvantages are faced with an arthroscopic approach. First is the need for more operative room equipment in terms of the arthroscopic setup compared with simple open surgery. Second is the potentially longer operative time taken with an arthroscopic approach compared with the more direct open surgery. The above is also surgeon dependent as

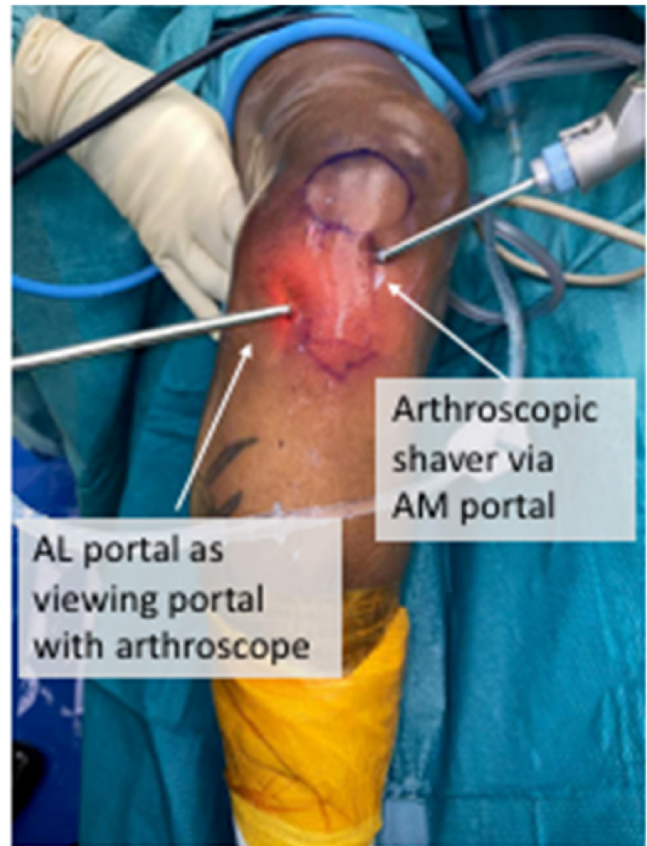


Fig 6. Clinical photograph showing the anteromedial (AM) and accessory anterolateral (AL) portals as working and viewing portals, respectively. The viewing and working portals are interchangeable to provide better working angles to allow complete excision.

arthroscopy is performed in a lesser discussed area of the knee and hence has a steeper learning curve. The advantages and disadvantages of an arthroscopic approach for this surgery are displayed in [Table 2](#).

Our article aims to highlight the potential use of arthroscopy for excision of lesions in this region as an alternative to traditional open surgery. Although there is a steep learning curve, there are many advantages for the surgeon as they increase their familiarity with this arthroscopic approach.

Table 2. Advantages and Disadvantages

Advantages	
	Lower risks of complications compared with open surgery
	Quicker recovery due to less invasive surgery
	Allows concurrent treatment of concomitant intra-articular conditions
	Reduced risk of recurrence
Disadvantages	
	Steeper learning curve for arthroscopy in lesser discussed area of the knee
	Longer operative time compared with open surgery
	Increased surgical equipment required

Disclosures

All authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

1. Chatra PS. Bursae around the knee joints. *Indian J Radiol Imaging* 2012;22:27-30.
2. Koh WL, Kwek JW, Quek ST, Peh WC. Clinics in diagnostic imaging (77). Pes anserine bursitis. *Singapore Med J* 2002;43:485-491.
3. Crema MD, Roemer FW, Marra MD, Guermazi A. Magnetic resonance imaging assessment of subchondral bone and soft tissues in knee osteoarthritis. *Rheum Dis Clin North Am* 2009;35:557-577.
4. Telischak NA, Wu JS, Eisenberg RL. Cysts and cystic-appearing lesions of the knee: A pictorial essay. *Indian J Radiol Imaging* 2014;24:182-191.
5. Pankaj A, Chahar D, Pathrot D. Arthroscopic management of popliteal cysts. *Indian J Orthop* 2016;50:154-158.
6. Treuting R. Minimally invasive orthopedic surgery: Arthroscopy. *Ochsner J* 2000;2:158-163.
7. You C, Cheng Z, Xia Y, Deng C, Zhou Y. Comparison of arthroscopic internal drainage and open excision for the treatment of popliteal cysts. *BMC Musculoskelet Disord* 2022;23:732.
8. Chen Y, Lee PY, Ku MC, Wu NY, Lo CS. Extra-articular endoscopic excision of symptomatic popliteal cyst with failed initial conservative treatment: A novel technique. *Orthop Traumatol Surg Res* 2019;105:125-128.
9. Park SE, Panchal K, Jeong JJ, et al. Extra-articular ganglion cysts around the knee joint. *Knee Surg Relat Res* 2015;27:255-262.