

# Dual–Posteromedial Portal Technique for Complex Arthroscopy in the Posterior Knee



Zachary K. Christopher, M.D., Donald L. Dulle, P.A.-C., Justin L. Makovicka, M.D., M.B.A., and Anikar Chhabra, M.D., M.S.

**Abstract:** Arthroscopy in the posterior knee continues to improve as new techniques arise. Traditionally, posterior techniques included posteromedial and posterolateral portals. Although frequently used, these techniques do have some limitations. We propose the use of dual posteromedial portals for complex arthroscopy cases to improve access and instrumentation in the posterior knee. Applications include, but are not limited to, resection of tumors or masses in the posterior knee, meniscal posterior horn repair, ramp lesion repair, repair of posterior cruciate ligament avulsions, and use as accessory portals for arthroscopic posterior cruciate ligament reconstruction. We describe a technique for establishing dual posteromedial portals for complex arthroscopy in the posterior knee, specifically in relation to a case of a posterior knee mass biopsy and resection.

Arthroscopy in the posterior knee was initially described by Burman<sup>1</sup> in 1931 and continues to improve as new techniques are developed. The traditional posterior portals for posterior knee arthroscopy included posteromedial and posterolateral arthroscopic portals. Numerous arthroscopic techniques have emerged to better visualize the posterior compartments of the knee.<sup>2-7</sup> Kim<sup>8</sup> detailed a technique for all-posterior navigation that involved resection of the posterior septum to create a complete view of the entire posterior compartment. Ahn and Ha<sup>2</sup> described the posterior trans-septal portal, which involved posteromedial and posterolateral portals and excision of the septum in a piecemeal fashion from a trans-notch approach. Louisia et al.<sup>4</sup> described the posterior

back-and-forth approach, in which a posterolateral portal was created inside-out from a posteromedial portal. Recently, Choi et al.<sup>3</sup> described the “double cannular sliding technique” as a safe way to improve visualization.

One of the limitations of the previously described techniques is in their utility. They rely on a viewing portal, typically on the contralateral side from the working portal, which can make triangulation difficult in this limited space. In this article, we describe a technique to establish 2 posteromedial portals to allow direct in-line visualization and instrumentation of structures in the posterior knee compartments. The ability to place 2 posteromedial portals safely has previously been described in a cadaveric study by McGinnis et al.<sup>7</sup> Furthermore, Ahn et al.<sup>9</sup> described an all-inside suture technique using 2 posteromedial portals to repair a medial meniscal posterior horn tear. We believe the described technique has an array of applications, and in particular, we describe its use in posterior-compartment mass resection. Potential applications include, but are not limited to, identification and removal of tumors or masses, arthroscopic synovectomy, loose body removal, use as accessory portals during posterior cruciate ligament (PCL) reconstruction, meniscal root repair, posterior horn repair, and ramp lesion repair.<sup>9,10</sup>

## Technique

Before the dual posteromedial portals are established, a standard diagnostic knee arthroscopy is performed. The patient is positioned supine under general

From the Department of Orthopedic Surgery, Mayo Clinic Arizona, Phoenix, Arizona, U.S.A.

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Address correspondence to Zachary K. Christopher, M.D., Department of Orthopedic Surgery, Mayo Clinic Arizona, 5777 E Mayo Blvd, Phoenix, AZ 85054, U.S.A. E-mail: [christopher.zachary@mayo.edu](mailto:christopher.zachary@mayo.edu)

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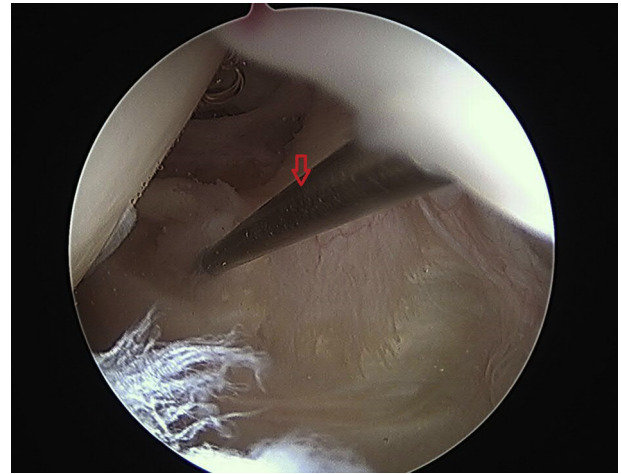
anesthesia, and the knee is flexed to 90°. Standard anterolateral and anteromedial arthroscopic portals are established, and diagnostic arthroscopy of the knee is carried out in the typical manner as dictated by the operating surgeon.

Once the surgeon is ready to proceed with access to the posterior compartments of the knee, a modified Gillquist maneuver is performed<sup>11</sup> with the knee flexed to 90° to visualize the posterior compartments of the knee. We perform an additional modification of this maneuver that entails using a blunt trocar through the anterolateral portal, passing between the medial femoral condyle and the medial border of the PCL, without the use of a switching stick. The arthroscope is then inserted through the cannula. A standard 30° arthroscope can be used, or for slightly better visualization, a 70° scope can be used. We then perform diagnostic arthroscopy of the posterior compartment of the knee, removing any loose bodies and optimizing visualization.

Establishing 2 posteromedial portals is performed initially by identification of superficial landmarks and then by direct visualization (Video 1). Attention is turned to the superficial aspect of the medial knee where incisions will be made. The safe zones for posteromedial portal placement have previously been described by McGinnis et al.<sup>7</sup> A soft spot located between the femoral condyle and the proximal tibia is palpated, about 1 cm posterior to the edge of the joint line. This soft spot is formed by the medial head of the gastrocnemius, the medial collateral ligament, and the semimembranosus. A line is drawn in line with the posterior edge of the long axis of the femur

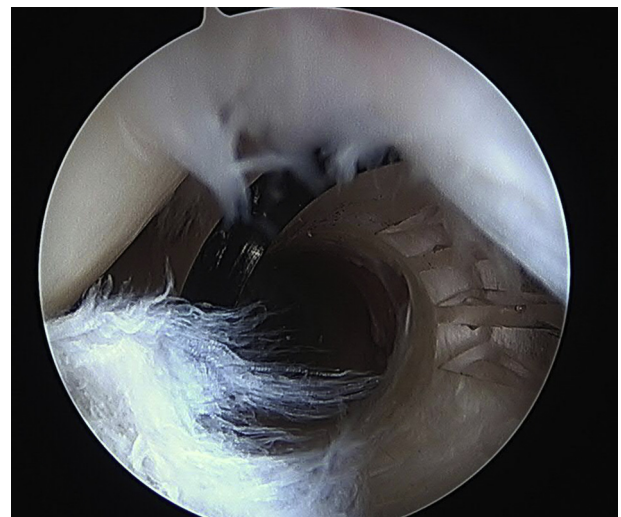


**Fig 1.** Left knee, knee flexed. Medial knee with skin markings to establish dual posteromedial portals. The joint line is marked by the longer dotted line, and the medial epicondyle is marked with a small circle. The line parallel to the posterior edge of the femur is marked with the shorter dotted line. The blue arrow indicates the posterior and proximal portal, and the red arrow indicates the anterior and distal portal.

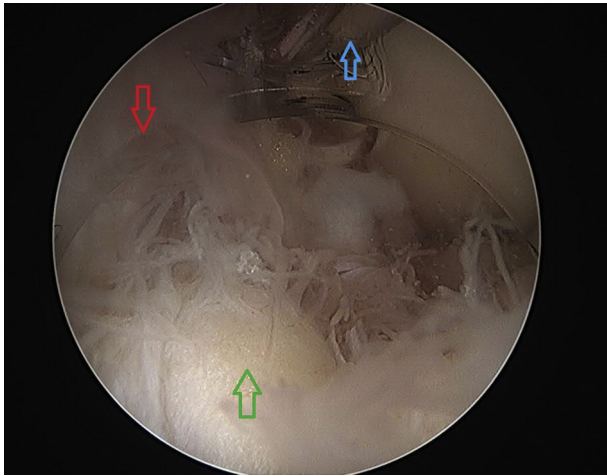


**Fig 2.** Left knee, flexed position. Direct visualization of spinal needle (arrow) to establish first posteromedial portal. This view is from the anterolateral portal.

centered over the soft spot, and the 2 portal locations will be created, centered around the soft spot. The first portal is marked 1 cm posterior and 1 cm proximal to the center of the soft spot to create a large enough skin bridge. The second portal is drawn just anterior and distal to the previously drawn line (Fig 1). Starting with the proximal and posterior portal, an 18-gauge spinal needle is inserted under direct visualization with the arthroscope located in the anterolateral portal (Fig 2). A No. 11 blade knife is used to make a stab incision at this location, penetrating the capsule. A snap is inserted and used to spread the soft tissues, followed by insertion of a Twist-In or PassPort cannula (Arthrex, Naples, FL) to maintain the portal for ease of access (Fig 3). The steps are then repeated for the second, more anterior and distal portal with a second cannula inserted.



**Fig 3.** Left knee, flexed position. Insertion of first cannula visualized from anterolateral portal.



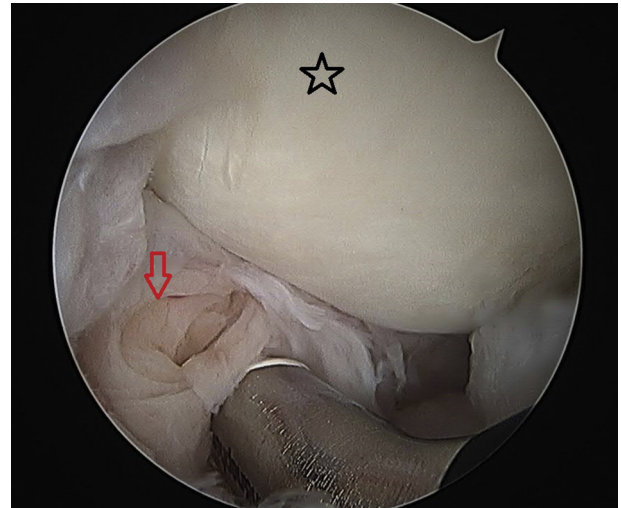
**Fig 4.** Left knee, flexed position. View is from the posterior/proximal posteromedial portal. Instruments working in line with cannula using dual posteromedial portals. The red arrow indicates the viewing portal; the blue arrow, the working portal; and the green arrow, the mass.

The arthroscope can now be inserted through either posteromedial portal for viewing of the posterior compartments of the knee. In addition, 1 posteromedial portal can serve as a viewing portal while the other posteromedial portal serves as a working portal. These can be used interchangeably depending on the location of the pathology. The working portal allows for the use of instruments including biters, graspers, and probes to work in line with the arthroscope (Fig 4). If access to the posterolateral knee is desired, resection of the septum may be performed to improve visualization.

In the case presented, we planned biopsy and resection of a soft-tissue mass in the posterior knee (Fig 5). While viewing from 1 posteromedial portal, we inserted a biter through the other posteromedial portal



**Fig 5.** Left knee, flexed position. Posterior-compartment mass visualized well from one of the posteromedial portals.

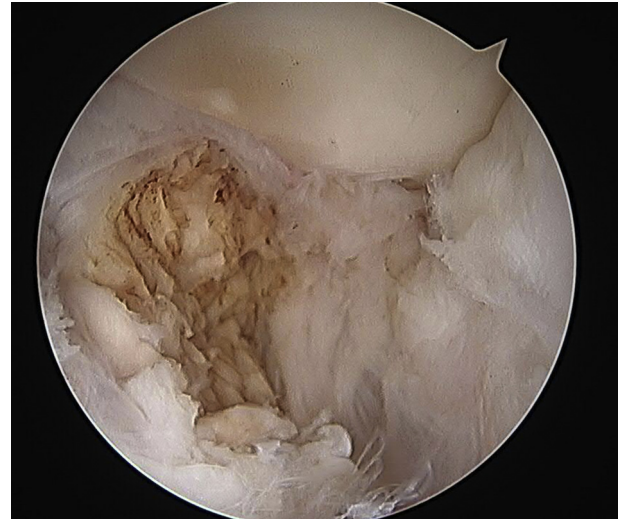


**Fig 6.** Left knee, flexed position. Posterior knee mass prior to ablation with Werewolf Coblation device. This view is using dual posteromedial portals, with the cannula and arthroscope in the posterior and proximal portal and the instrument in the anterior and distal portal. The posteromedial femoral condyle is represented by the black star, and the mass is indicated by the red arrow.

and used it to biopsy the specimen located in the midline along the septum. After adequate tissue was obtained, the lesion was cauterized using a Werewolf Coblation wand (Smith & Nephew, Andover, MA), followed by debridement with a shaver (Figs 6 and 7).

## Discussion

Arthroscopy of the posterior knee continues to evolve, and several novel techniques have been described to improve both visualization and navigation.<sup>2,3,5,8,9</sup> Despite benefits of some previously described methods, limitations still exist. Most posterior



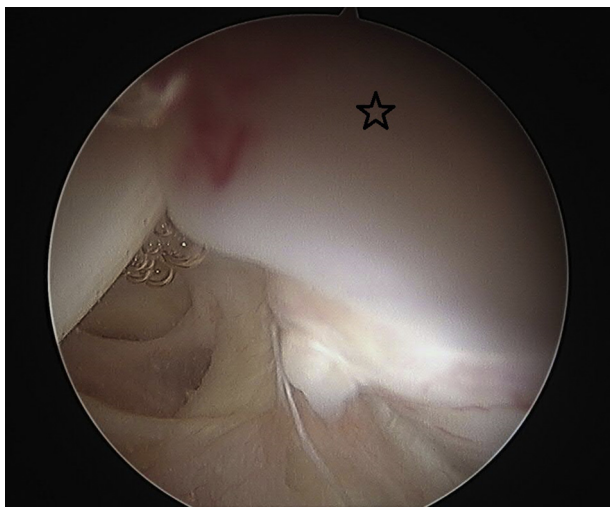
**Fig 7.** Left knee, flexed position. Posterior knee mass after removal and debridement viewed from posteromedial portal.

**Table 1.** Pearls and Pitfalls of Dual–Posteromedial Portal Technique

Use a 70° scope for better visualization of the posterior compartments.
Perform the Gillquist maneuver using a blunt trocar.
Place the portals in relation to a line drawn parallel to the posterior border of the femur centered over the medial soft spot.
Ensure an adequate skin bridge between the portals.
Resect the septum to view the posterolateral knee.

techniques require posteromedial and posterolateral portals, making triangulation challenging. This also limits the ability to work in line with the camera. With limited space in the posterior compartment, being able to visualize masses, meniscal tears, or PCL injuries while working in the same plane as the arthroscope may be favorable and useful. Our dual–posteromedial portal technique provides this ability (Table 1).

As previously mentioned, the potential utility of this portal technique includes mass identification and resection, pigmented villonodular synovitis removal, posterior horn meniscal repair, ramp lesion repair, or use of the portals as accessory portals for PCL reconstruction. We have found this technique particularly useful for exploration and resection of masses or loose bodies, particularly if they obscure the midline of the posterior compartment (Fig 8). The typical posteromedial and posterolateral portals may be limited in these scenarios when the mass obscures a large portion of the posterior knee. Establishing 2 portals adjacent to one another allows for an easier biopsy and resection with improved visualization. Ahn et al.<sup>9</sup> previously described a similar technique for an all-inside medial meniscal posterior horn repair. We propose that a modification of this previously described technique grants excellent access for the repair of ramp lesions



**Fig 8.** Left knee, flexed position. An arthroscopic view from the anterolateral portal shows that some masses (star) or lesions are difficult to visualize and work around using standard portals. These may be better visualized and instrumented with the use of dual posteromedial portals.

**Table 2.** Advantages and Disadvantages of Dual–Posteromedial Portal Technique

Advantages
Improved access and instrumentation
Easier triangulation because working portal is not contralateral
Allows direct in-line visualization and work
Disadvantages
Less familiar technique
Restricted motion in small space
Limited visualization of posterolateral knee
Increased fluid loss through additional portals

and use as an accessory portal in PCL reconstruction. Using the working portal in line with the camera provides a different angle than standard portals, which may help in addressing these pathologies.

As with any surgical approach, there are risks and limitations (Table 2). The major limitations of this technique include (1) restricted motion in a small space with cannulas, (2) limited visualization of the posterolateral knee, and (3) possible increased fluid loss through an additional portal. Risks include injury to vital posterior knee structures including the popliteal artery, injury to the sartorial branch of the saphenous nerve, or injury to the long saphenous vein. Previous studies have evaluated the safety of the posteromedial portal and the proximity to vital structures during posterior-compartment arthroscopy. McGinnis et al.<sup>7</sup> described that 2 posteromedial portals can be safely placed using the soft spot as a landmark. In all cadaveric specimens, there was at least 1.5 cm between the popliteal artery and these portals after placement. Ahn et al.<sup>9</sup> also described the safe and successful use of 2 posteromedial portals. However, in their study, they devised this technique specifically for an all-inside medial meniscal posterior horn repair. As we have outlined, the utility of this portal technique extends beyond meniscal repair, and we have shown its use in posterior knee arthroscopy for the biopsy and resection of lesions. For these reasons, surgeons should understand the dual–posteromedial portal technique and include it as an available tool in their skill set.

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