

SUBSPECIALTY PROCEDURES

ARTHROSCOPIC SYNOVECTOMY FOR TENOSYNOVIAL GIANT CELL TUMOR/ PIGMENTED VILLO-NODULAR SYNOVITIS IN THE POSTERIOR KNEE USING THE POSTERIOR TRANS-SEPTAL PORTAL TECHNIQUE

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Published outcomes of this procedure can be found at: *J Orthop Surg* (Hong Kong). 2017 Sep-Dec;25(3): 2309499017727923 and *J Knee Surg*. 2019 May;32(5):427-33.

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Abstract

Background: Tenosynovial giant cell tumor (T-GCT) and pigmented villonodular synovitis (PVNS) are interchangeable terms for an uncommon benign proliferation of synovial tissue¹⁻⁶. Although neoplastic and inflammatory origins have been hypothesized, the etiology of this condition is unknown. There is controversy regarding surgical treatment, as the open and arthroscopic approaches to synovectomy have shown comparable reported outcomes in the literature⁵⁻⁷. However, direct comparison of these 2 operative methods is problematic because of selective bias in the existing literature and the lack of any prospective, randomized controlled trials. In the posterior aspect of the knee, arthroscopic synovectomy is technically challenging because of anatomical blind spots when viewing this space from an anterior portal in a trans-notch fashion¹⁰⁻¹⁵. Additionally, incomplete arthroscopic synovec-tomies increase PVNS recurrence rates, making it imperative to remove the entire lesion⁸. The trans-septal portal (TSP) technique utilizes both postero-medial and posterolateral portals to create an intra-articular portal through the posterior septum that separates the 2 posterior compartments of the knee¹⁰⁻¹⁵. This portal allows working instruments to be passed back-and-forth across the posterior septum and increases the visualization of both the posterosuperior synovial lining of the condyles and the synovial reflection behind the posterior cruciate ligament, enabling a thorough assessment for arthroscopic PVNS resection¹⁰⁻¹⁶. In this video article, we describe a posterior arthroscopic synovectomy with use of a TSP for PVNS within the posterior compartment of the knee.

Description: The patient is positioned such that the contralateral leg will not obstruct the ability to work in the posteromedial portal. Diagnostic arthroscopy is performed through standard anteromedial and anterolateral portals. Next, with visualization from the anterolateral portal and the knee in 90° of

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flexion, the posteromedial portal is created with use of a transilluminated spinal needle. The posterolateral portal is made in the same fashion as the posteromedial portal, with use of a trans-notch view from the anteromedial portal. With the arthroscope in the posteromedial portal, a blunt instrument or motorized shaver can be placed through the posterolateral portal to perforate the posterior septum and create the TSP. The mass can then be identified, biopsied, and removed with use of a motorized shaver or tissue grasper. Arthroscopic exploration through the TSP can then be done to confirm adequate excision.

Alternatives: Alternatives include synovectomy either by arthrotomy, arthroscopy via a posteromedial or posterolateral portal with trans-notch views, or a combination of both. To limit the risk of recurrent diffuse PVNS, radiosynovectomy with yttrium-90 or phosphorus-32, either combined with surgery or alone, has been described^{2,17}. External beam radiation has also been utilized, but radiation toxicity is seen as a major limitation¹⁷. Macrophage-colony stimulating factor (M-CSF) or CSF-1 inhibitors have recently been developed. In 2019, the FDA approved the use of CSF-1 inhibitors, and they are considered an acceptable treatment for patients who are not candidates for surgical resection¹⁷.

Rationale: Advantages involve increased posterior anatomy visualization to ensure adequate synovectomy, more working capacity for instruments, and decreased disruption of anatomical planes and scar tissue formation around neurovascular structures compared with open dissection¹⁰⁻¹⁶.

Expected Outcomes: Excellent clinical results (defined by return to full knee function) have been reported for the TSP technique for PVNS synovectomy. In a study of 10 cases of posterior-knee PVNS masses removed via arthroscopic synovectomy with use of a TSP, Shekhar et al. reported good functional outcomes and no operative complications². Keyhani et al. reported a series of 21 patients who underwent the same procedure for diffuse PVNS with similar findings⁹. Patients can expect to retain close to full knee function following this procedure^{2,9}. Baseline magnetic resonance imaging is recommended for all patients at 3 to 6 months after excision, as asymptomatic recurrence can occur, and patients should be followed for a minimum of 2 years post-excision^{2,3,7,9,18}.

Important Tips:

- Keeping the knee in 90° of flexion provides the furthest distance from the saphenous vein on the medial side, the peroneal nerve on the lateral side, and the popliteal artery near the posterior septum when making the posterior portals¹⁰⁻¹⁶.
- Transillumination of the posterior portals is recommended¹⁰⁻¹⁶.
- Perforation of the septum should be in the posterolateral to posteromedial direction, allowing surgeons to have a wider “safe zone” to decrease the chance of vascular injury to the popliteal artery¹⁴.

Acronyms and Abbreviations:

- CSF = colony-stimulating factor
- MCL = medial collateral ligament
- MRI = magnetic resonance imaging
- PL = posterolateral
- PM = posteromedial
- PA = popliteal artery
- ROM = range of motion
- TS = trans-septal
- IKDC = International Knee Documentation Committee

Acknowledgment

NOTE: Video files 5 (demonstration of creating the posteromedial portal), 6 (demonstration of creating the posterolateral portal), and 7 (video demonstration of perforating the posterior septum with a motorized shaver) were reused from a previous publication by M.D.M., with the permission of Elsevier: Buyukdogan K, Laidlaw MS, Miller MD. Meniscal Ramp Lesion Repair by a Trans-septal Portal Technique. *Arthrosc Tech*. 2017 21;6(4):e1379-e1386. doi: 10.1016/j.eats.2017.05.029. PMID: 29354444; PMCID: PMC5622595.

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