Arthroscopic Management of Popliteal Tendon Dysfunction in Total Knee Arthroplasty

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Abstract: Unexplainable knee pain may follow knee replacement surgery. The popliteal tendon should be evaluated as a possible cause of lateral knee pain and dysfunction after knee arthroplasty. The tendon can snap over or impinge on lateral osteophytes or prominent femoral components and produce mechanical symptoms and pain. Ultrasound-guided injections may confirm the diagnosis and provide symptomatic relief in some patients. Those who respond well to injections and in whom conservative management ultimately fails may be offered arthroscopic release of the popliteal tendon. We present the arthroscopic technique for popliteal tendon release in a symptomatic patient whose pain resolved immediately postoperatively. We recommend the use of an anterolateral viewing portal and an accessory lateral working portal to access the posterolateral knee. There can be extensive scar tissue overlying the popliteal tendon after arthroplasty. Arthroscopic tendon transection and excision comprise a reliable procedure for popliteal tendon impingement after knee arthroplasty without compromising knee stability.

Arthroscopic procedures have shown efficacy in treating certain conditions and complications after total knee arthroplasty (TKA).¹⁻⁴ Common indications for arthroscopy after TKA include arthrofibrosis, poor knee range of motion, patellar clunk, and removal of loose bodies or cement. Popliteal dysfunction has been described in native knees,⁵ as well as in the setting of knee arthroplasty.¹,⁶ When snapping or mechanical lateral knee pain is encountered in patients who have undergone knee arthroplasty, the popliteal tendon should be investigated as a causative structure.

The popliteal tendon originates on the posterior tibia and inserts on the lateral femur; the tendon traverses the lateral joint line obliquely, and prominences at the joint such as osteophytes, a deep popliteal sulcus, or prominent lateral femoral condylar TKA components may cause popliteal impingement or may cause the tendon to “snap” anteriorly to posteriorly during range of motion. Careful examination of the TKA through a range of motion after capsular closure usually detects causes of iatrogenic snapping and can be addressed before completion of the knee arthroplasty.⁶ When the diagnosis of popliteal impingement is suspected postoperatively in the clinic, confirmation may be achieved with ultrasound-guided injections. Arthroscopic release may be offered to patients in whom conservative measures fails.

Surgical Technique

Before surgery, the diagnosis was confirmed by an ultrasound-guided injection of the popliteal tendon sheath. The patient was then brought to the operating room and placed supine, and a lateral post was placed on the operative bed. The operative leg was prepared and draped in standard fashion for knee arthroscopy. Preoperative antibiotics were provided, and a preoperative “timeout” was performed. Standard anterolateral and anteromedial portals were used. A 4-mm, 30° arthroscope (Dyonics; Smith & Nephew, Memphis, TN) was placed within the anteromedial portal. A superomedial outflow portal was established under direct visualization. A diagnostic arthroscopy was then carried out viewing from the anteromedial portal. Care was taken to ensure that there was no damage to
the polyethylene components. There was extensive scar tissue anteriorly and anterolaterally. A 4.5-mm arthroscopic full-radius shaver (Dyonics) was inserted into the anteromedial portal while the anterior scar tissue was debrided (Fig 1). The arthroscope was then placed into the anterolateral portal, and an accessory lateral portal was created under direct visualization about 4 cm posterior to the anterolateral viewing portal.

Fig 1. Right knee arthroplasty, viewed from anteromedial portal with 4-mm, 30° arthroscope. (A) The femoral component and (B) patella component articulation are seen. (C) Anterior scar tissue before debridement is seen within the patellofemoral joint. Anterior scar tissue can impede visualization of the lateral compartment after total knee arthroplasty.

Fig 2. Right knee, viewed from anterolateral portal. (C) The lateral compartment and lateral joint show synovium and scar tissue overlying the popliteus between (A) the lateral femoral component and (B) the lateral tibial polyethylene component.

Fig 3. Posterolateral region of right knee after scar resection. (A) The arthroscope is in the anterolateral portal, and this allows direct visualization of the popliteal tendon. Using an accessory lateral portal, (B) the arthroscopic scissors (Acufex) release the popliteal tendon off of its femoral insertion.

Fig 4. View of posterolateral right knee from anterolateral portal. Arthroscopic debridement has been completed, and the popliteal tendon and associated scar tissue have been removed from the knee. There is no evidence of impingement between (A) the femoral component and (B) the tibial component. The black arrow demonstrates the lateral knee after complete popliteal resection from the joint.
Next, we inspected the lateral gutter and lateral compartment. There was a band of scar tissue overlying the popliteal tendon (Fig 2), and this was debrided to visualize the popliteal tendon. There was degenerative fraying of the popliteal tendon. The arthroscopic scissors (Acufex; Smith & Nephew) were placed within the accessory lateral portal, and the popliteus was transected and excised from the joint (Figs 3, 4). Fatty infiltration of the tendon was noted (Fig 5, Video 1). The remnants of the tendon stump were then debrided with an arthroscopic shaver to prevent any further impingement (Fig 4). Once the tendon and all associated scar tissue were released, the arthroscope and shaver were removed, and this completed the procedure. The arthroscopic portals were closed with No. 3-0 Ethilon nylon sutures (Ethicon, Somerville, NJ).

**Discussion**

Pain after knee replacement is common and often leaves patients with significant symptoms without a specific explanation. Between 15% and 20% of patients are left symptomatic and unsatisfied after knee arthroplasty. This presents a troublesome clinical situation. Investigation of specific and reversible factors should be carried out. Few studies have reported the popliteal tendon as a structure potentially responsible for pain after knee arthroplasty. We hypothesize that this diagnosis may easily be missed or dismissed given the prevalence of dissatisfaction in the TKA population. When pain is localized to the posterolateral knee after arthroplasty, popliteal dysfunction should be considered and investigated. Patients may or may not present with mechanical symptoms or snapping. Ultrasound-guided injections may be helpful in confirming the diagnosis. Our described technique, in the correct patient, offers relief of symptoms without compromising knee stability.

The role of the popliteal tendon in knee stability continues to be debated. Although we know the structure is important in native knees, its role in knee stability after arthroplasty is less clear. The popliteal tendon is commonly released during balancing for coronal deformity. In a blinded study, Kesman et al. showed equivalent outcomes in patients undergoing TKA with and without release of the popliteal tendon. In a cadaveric study, resection of the popliteal tendon was not associated with knee instability in posterior-stabilized (PS) TKA implants. For these reasons, resection of the popliteal tendon after TKA with PS implants may be considered safe.

**Table 1. Advantages of Arthroscopic Popliteal Release in Total Knee Arthroplasty**

<table>
<thead>
<tr>
<th>Advantages</th>
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<tbody>
<tr>
<td>Safe</td>
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<td>Quick recovery</td>
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<tr>
<td>Does not compromise knee stability</td>
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**Table 2. Indications and Contraindications**

<table>
<thead>
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<th>Indications</th>
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<td>Lateral mechanical knee pain or snapping after TKA</td>
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<td>Posterior-stabilized knee design</td>
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<td>Failure of conservative management</td>
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<th>Contraindications</th>
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<tr>
<td>Infection</td>
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<tr>
<td>Loose components or extensive osteolysis</td>
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<tr>
<td>Knee instability</td>
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<td>Pain not relieved by ultrasound-guided injections</td>
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TKA, total knee arthroplasty.

**Table 3. Treatment Algorithm**

**Intraoperative (at time of TKA)**

After capsular closure, bring the knee through its range of motion and palpate the popliteal tendon for impingement or snapping over the lateral femoral condyle. If impingement or snapping is detected, open the joint capsule and release the popliteal tendon from the femoral insertion.

**Postoperative**

Evaluate patients for lateral knee pain after TKA. Assess for impingement or snapping over the lateral femoral condyle on physical examination. If suspected, use diagnostic ultrasound-guided injection to confirm the diagnosis. Note that patients who respond well to injections can be offered arthroscopic release.

TKA, total knee arthroplasty.
An alternative treatment for popliteal dysfunction in TKA would be to address the impinging lesion by either resecting the osteophyte or revising the femoral component. This option may be effective for isolated snapping. Often, dysfunction of the popliteal tendon may be accompanied by an extensive scarring reaction in the lateral knee. It is our opinion that arthroscopic debridement of the scar formation coupled with arthroscopic release best addresses this problematic pathology. To prevent this condition, the knee may be carefully examined during index TKA. In a series of 300 consecutive TKAs, popliteal snapping was detected in 8 cases (2.7%) intraoperatively and treated with release from the femur.

The popliteal tendon should be evaluated for dysfunction or impingement with laterally based knee pain after TKA. This structure can be safely released after TKA with PS components without compromising knee stability. This report provides a background for diagnosis, indications, and a surgical technique for arthroscopic management of popliteal dysfunction after TKA (Tables 1-4).

### Table 4. Pearls and Pitfalls

**Pearls**
- Viewing through the lateral portal provides the best view of the popliteal tendon.
- It is necessary to remove anterolateral scar tissue that has formed adjacent to the TKA components to visualize the native anatomy. An accessory lateral portal provides direct access for scar resection and transection and excision of the popliteal tendon.

**Pitfalls**
- Incomplete scar resection will not permit access to the popliteal tendon.
- Care should be paid to avoid damage to the TKA components.

TKA, total knee arthroplasty.

### References