

# Arthroscopic Osteophyte Resection for Osteophyte-Induced Popliteal Impingement



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**Abstract:** Popliteal tendinitis causes lateral knee pain. A cause is impingement of the popliteal tendon by lateral femoral condylar osteophytes. Conservative and surgical treatments have been reported; however, popliteal impingement is a relatively rare disease, and no treatment has been established. Reduction of mechanical stress is important in the treatment of impingement syndromes. The popliteal tendon is an important tissue that contributes to knee stability and, therefore, usually cannot be transected. On the other hand, osteophyte resection may allow the reduction of mechanical stress. Therefore, we describe an arthroscopic osteophyte resection technique for the treatment of osteophyte-induced popliteal impingement. In brief, this technique involves confirmation of popliteal impingement, osteophyte resection using an osteotome, smoothing of the resected area, and confirmation of the resolution of popliteal impingement.

The causes of posterolateral knee pain include lateral meniscal injury, intra-articular free bodies, lateral collateral ligament injury, snapping biceps femoris tendon, iliotibial band syndrome, and popliteal tendinitis.<sup>1-9</sup> In addition, popliteal impingement is a cause of popliteal tendinitis.<sup>3,4,6</sup> However, no treatment has been established for popliteal impingement because it is a relatively rare disease.<sup>4,6</sup> The popliteal tendon originates from the posterior-distal part of the lateral femoral condyle, passes under the lateral collateral ligament, and attaches above the soleal line at the proximal and posterior parts of the tibia.<sup>10,11</sup>

Osteophytes, a deep popliteal sulcus, and prominent lateral femoral condylar total knee arthroplasty (TKA) components may cause popliteal impingement.<sup>4,6,12</sup> Such components may cause mechanical irritation by snapping during the range of motion. It is important to reduce mechanical irritation during the treatment of impingement syndrome. In addition, satisfactory clinical outcomes via osteophyte resection for impingement have been reported in the shoulder and ankle joints.<sup>13,14</sup> Therefore, arthroscopic osteophyte resection can improve popliteal impingement for minor invasion. In this article, we describe an arthroscopic osteophyte resection technique for popliteal impingement caused by osteophytes.

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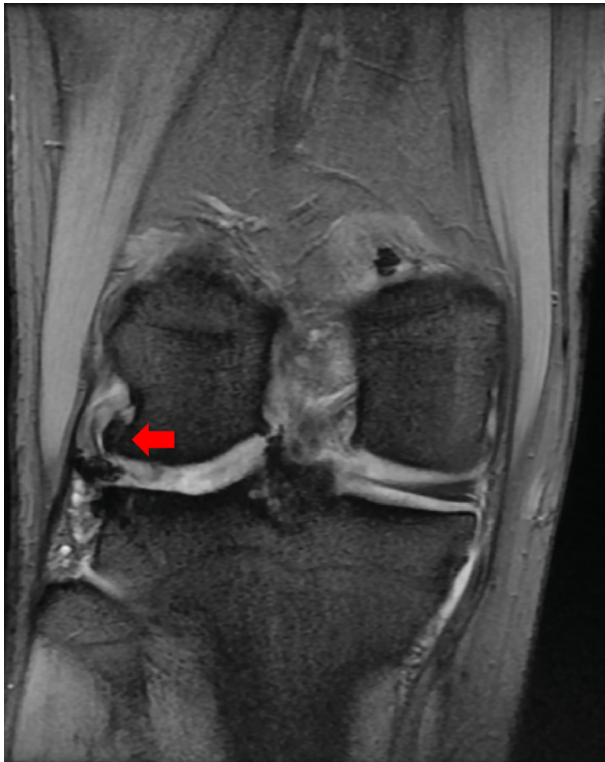
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## Surgical Technique

### Preoperative Assessment and Patient Positioning

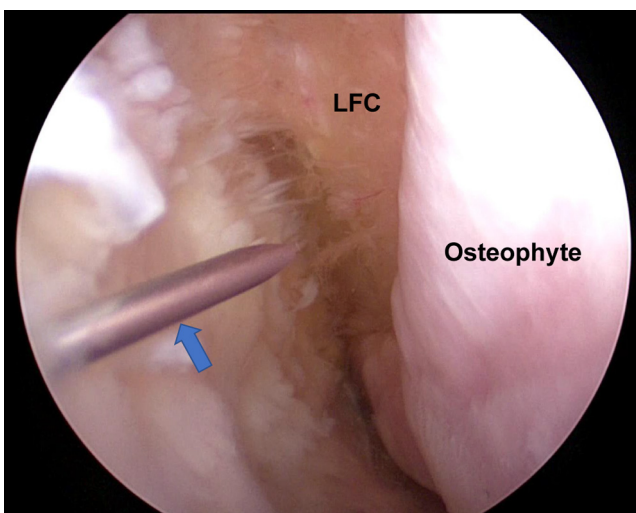
Because osteophytes may not be identifiable on radiography, preoperative confirmation and diagnosis of osteophyte-induced popliteal impingement via magnetic resonance imaging are essential (Fig 1). The patient is placed in the supine position and, more specifically, in the standard arthroscopy position. A thigh tourniquet is used to procure a bloodless operative field. The affected limb is disinfected and draped in the standard manner. A 4-mm, 30° arthroscope (Integrated Camera System; Smith & Nephew, London, England) is used for this procedure. Gravity fluid flow is used rather than an arthroscopic pump.



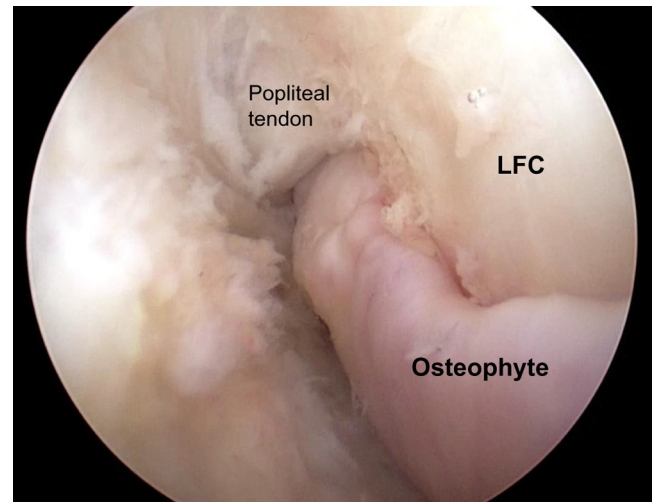
**Fig 1.** Magnetic resonance images showing impingement of osteophyte at femoral lateral condyle against popliteal tendon in right knee. The impingement area (red arrow) is evaluated using a coronal view on T2-weighted magnetic resonance imaging.

### Lateral Synovial Debridement and Confirmation of Osteophytes

The standard anterolateral, anteromedial, and accessory lateral portals are used. The anterolateral portal is used for viewing; the other 2 portals are used as



**Fig 2.** View from anterolateral portal in right knee. An accessory lateral portal is created after confirmation of the required location and angle by using a Cathelin needle (blue arrow). (LFC, lateral femoral condyle.)

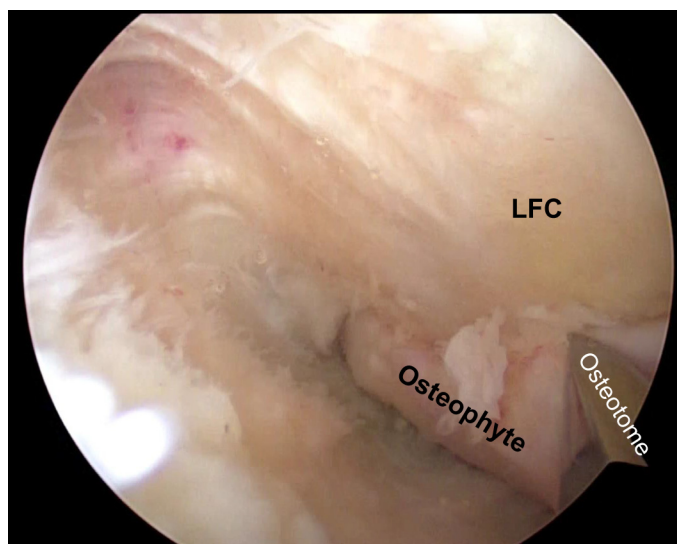


**Fig 3.** View from anterolateral portal in right knee. The popliteal tendon is compressed by an osteophyte of the lateral femoral condyle (LFC).

working portals. The accessory lateral portal is created after confirmation of the required location and angle by using a 23-gauge Cathelin needle (Nipro, Osaka, Japan) (Fig 2). Osteophytes of the lateral femoral condyle are identified via the viewing portal. With viewing from the anterolateral portal, the lateral synovium is debrided using a 4.5-mm arthroscopic shaver (Merlin; Zimmer Biomet, Warsaw, IN), which is inserted through the accessory lateral portal. Subsequently, popliteal tendon impingement on and over the osteophytes is confirmed during extension and flexion of the knee (Fig 3).

### Confirmation of Popliteal Impingement and Osteophyte Resection

An osteotome (ACUFEX; Smith & Nephew) is inserted through the accessory anterolateral portal and used for osteophyte resection. With viewing from the anterolateral portal, the osteophyte resection starts at the boundary between the anterior osteophytes and the normal cartilage (Fig 4). The excised osteophytes are removed with a grasper (ACUFEX) to prevent them from becoming free bodies. After anterior osteophyte resection, the posterior osteophyte is excised by extending the excision from the anterior osteophyte because they are a continuous entity. The osteophytes found at the back can be visualized via knee flexion and resected with an osteotome. The resection area is smoothed with a shaver (Fig 5). After the osteophyte resection, knee extension and flexion are performed to confirm that there is no remaining popliteal impingement (Fig 6, Video 1). Table 1 summarizes pearls and pitfalls, and Table 2 summarizes the advantages and disadvantages of the arthroscopic osteophyte resection technique for osteophyte-induced popliteal impingement.



**Fig 4.** View from anterolateral portal in right knee. Osteophyte resection begins at the boundary between the anterior osteophyte and the normal cartilage, through the accessory lateral portal. (LFC, lateral femoral condyle.)

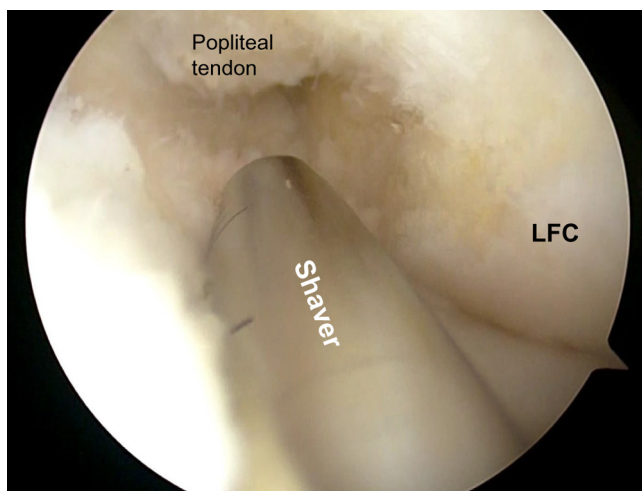
### Discussion

Osteophytes of the lateral femoral condyle may cause popliteal impingement. We describe an arthroscopic technique involving osteophyte resection for popliteal impingement.

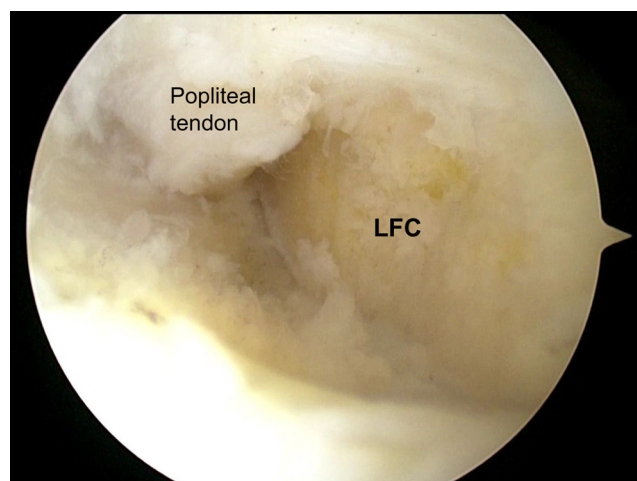
Popliteal tendinitis has been reported as snapping popliteal tendon, popliteal impingement due to osteophytes or nodules, and popliteal dysfunction after TKA.<sup>3-6,12,15</sup> Rehabilitation, rest, nonsteroidal anti-inflammatory drugs, and localized corticosteroid injections are recommended as treatments for popliteal tendinitis.<sup>5</sup> On the other hand, if no improvement is observed with conservative treatment, surgical treatment has been reported; however, such treatment is

relatively rare and cohesive reports have not been published.

In a case report of a snapping popliteal tendon in a 21-year-old woman, the tubercle on the lateral condyle was removed.<sup>16</sup> In another 3 cases of snapping popliteal tendon, the tendon was secured to the bone by using a suture anchor.<sup>6</sup> Popliteal tendon dysfunction after TKA can be treated with arthroscopy-guided popliteal tendon transection.<sup>12</sup> The popliteal tendon contributes to posterolateral stability and should not be resected except in posterior-stabilized TKA.<sup>12</sup> In a series of 3 cases of osteophyte impingement, osteophyte resection resulted in the resolution of lateral joint symptoms.<sup>4</sup> Although arthroscopic osteophyte resection can reduce mechanical irritation in the treatment of



**Fig 5.** View from anterolateral portal in right knee. The area where the osteophytes have been resected is smoothed with a shaver. (LFC, lateral femoral condyle.)



**Fig 6.** View from anterolateral portal in right knee. There is no popliteal impingement. (LFC, lateral femoral condyle.)

**Table 1.** Pearls and Pitfalls

Pearls
Osteophytes are whiter than normal cartilage; resection should be started precisely at the border of the osteophytes and the normal cartilage.
The resected osteophytes should be removed with a grasper to prevent them from becoming free bodies.
The resection surface should be smoothed with a shaver.
Pitfalls
If the resection is not performed exactly between the osteophyte and the cartilage, there is a risk of residual osteophytes and/or damage to the cartilage.
If the osteotome is inserted too deeply, posteriorly, there is a risk of injury to the popliteal tendon and neurovascular bundle.

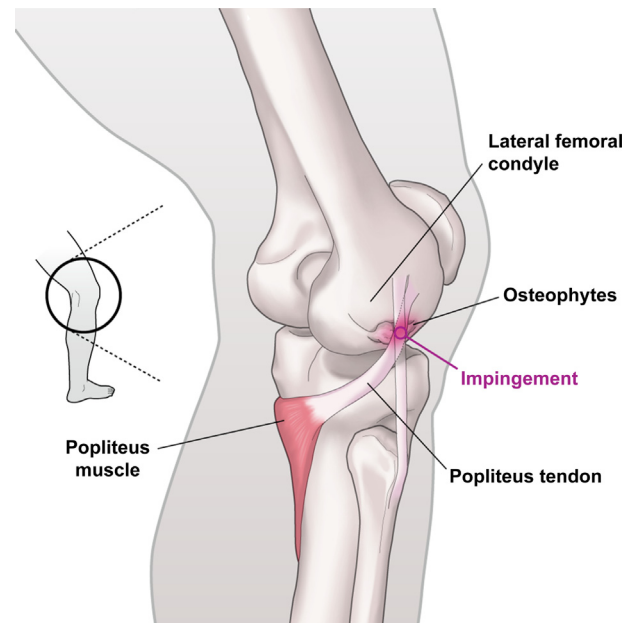
impingement syndromes, it does not involve removal of the popliteal tendon, posing no risk of knee instability. Therefore, it may be a useful procedure in the treatment of osteophyte-induced popliteal impingement.

Osteophytes of the lateral femoral condyle can cause popliteal impingement because they form posterior to the lateral condyle (Fig 7).<sup>4</sup> A wide lateral condyle and a deep popliteal sulcus are potential causes of popliteal impingement, possibly via the formation of osteophytes causing popliteal impingement.<sup>17</sup> Gaine and Mohammed<sup>4</sup> similarly reported that the diagnosis of osteophytes formed posteriorly is complicated with radiography. However, arthroscopy is useful for the diagnosis of osteophytes<sup>4,6</sup>; in fact, osteophytes and impingement can be confirmed under arthroscopy (Video 1). With the described procedure, damage or partial rupture of the popliteal tendon can be confirmed along with popliteal impingement.

This article provides a detailed description of osteophyte resection for popliteal impingement at the lateral femoral condyle, which is common in lateral knee osteoarthritis. This technique may improve results not only in the case of popliteal impingement but also in conjunction with osteotomies and other treatments for lateral knee osteoarthritis. However, with this method, there is a possibility of osteophyte regrowth, and studies of long-term results will be required in the future.

**Table 2.** Advantage and Disadvantages of Technique

Advantages
This technique can be used to relieve posterolateral pain caused by popliteal impingement. Dynamic evaluation can be performed during arthroscopy for accurate evaluation and treatment of the impingement.
Concomitant pathologies can be treated under arthroscopic guidance in conjunction with the target treatment.
The addition of this procedure may improve the results of other surgical procedures (e.g., osteotomy for advanced knee osteoarthritis).
Disadvantages
Iatrogenic injury to the cartilage and popliteal tendon may occur during osteophyte resection.
Regrowth of osteophytes may occur.

**Fig 7.** Lateral aspect of right knee with osteophytes and popliteal tendon impingement.

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