

# Endoscopic En-Bloc Resection of Lipoma of the Tibialis Anterior Tendon



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**Abstract:** Lipoma is benign soft-tissue tumor that consists entirely of mature fat and can occur in a superficial or deep location. Lipoma of the foot and ankle can even develop within a tendon sheath or joint. Classically, lipoma is resected via open approach, which may result in a lengthy disfiguring surgical scar. Endoscopic en-bloc tumor resection is a minimally invasive approach and can provide a whole block specimen for histologic examination. The purpose of this Technical Note is to describe the details of endoscopic en-bloc resection of lipoma of the tibialis anterior tendon.

Lipoma is benign soft-tissue tumor that consists entirely of mature fat and can occur in a superficial (subcutaneous) or deep location.<sup>1</sup> It can occur at any age and is the most common soft-tissue tumor found in humans, accounting for 50% of all benign soft-tissue tumors.<sup>2</sup> It can occur anywhere in the body where adipose tissue presents.<sup>1,2</sup> Subcutaneous lipomas are usually encapsulated by a thin fascial capsule with lobular patterns, and deeper-seated lipomas have an irregular configuration.<sup>2</sup> The etiology and pathophysiology of lipoma are unknown.<sup>2</sup> On magnetic resonance images of all pulse sequences, lipomas arise with signal intensities similar to those of subcutaneous fat.<sup>1</sup> At histologic examination, the appearance of lipomatous tissue within lipomas differs only slightly from that of normal fat.<sup>1</sup>

Among the benign tumors of the foot and ankle, giant cell tumor, angiomyoma, and lipoma are the most frequent.<sup>3</sup> Lipoma of the foot and ankle can even

develop within a tendon sheath or joint.<sup>1</sup> Classically, lipoma is resected via the open approach, which may result in a lengthy, disfiguring surgical scar.<sup>4,5</sup> Minimally invasive approaches of lipoma resection have been proposed to improve the cosmetic result. Liposuction has been proven to be an effective approach.<sup>5,6</sup> However, it is a blind procedure, complete resection of the tumor cannot be confirmed, and hemostasis of the operated site is not possible.<sup>5</sup> Techniques of endoscopic lipoma resection have been proposed to solve these problems.<sup>4-12</sup> In most of these techniques, lipomas are resected in piecemeal and the tumor is fragmented before it can be determined whether it is benign or malignant.<sup>4-6,9,12</sup> Endoscopic en-bloc tumor resection has been advocated to obtain a whole block specimen for histologic examination.<sup>4,5,8,13-18</sup> The purpose of this Technical Note is to describe the details of endoscopic en-bloc resection of lipoma of the tibialis anterior tendon. It is indicated in case of symptomatic lipoma of the tibialis anterior tendon. It is contraindicated in case of liposarcoma or lipoma encasing the intermediate dorsal cutaneous nerve of the superficial peroneal nerve, the deep peroneal nerve, or the saphenous nerve. It is relatively contraindicated in case of lipoma entrapping the intermediate dorsal cutaneous nerve of the superficial peroneal nerve, the deep peroneal nerve, or the saphenous nerve or noncapsulated lipoma (Table 1).<sup>19</sup>

## Surgical Technique (With Video Illustration)

### Preoperative Assessment and Patient Positioning

Preoperative magnetic resonance imaging provides important information about the size and nature of the lesion, as well as its anatomical relationship with the

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**Table 1.** Indications and Contraindications of Endoscopic En-Bloc Resection of Lipoma of the Tibialis Anterior Tendon

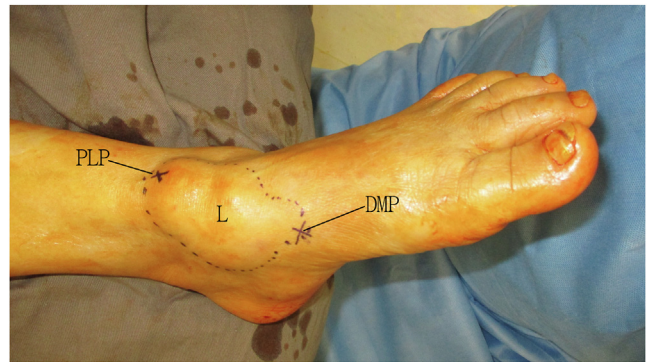
Indications	Contraindications
1. Symptomatic lipoma of the tibialis anterior tendon	1. Liposarcoma
	2. Lipoma encasing the intermediate dorsal cutaneous nerve of the superficial peroneal nerve, the deep peroneal nerve or the saphenous nerve
	3. Lipoma entrapping the intermediate dorsal cutaneous nerve of the superficial peroneal nerve, the deep peroneal nerve or the saphenous nerve (relative contraindication)
	4. Noncapsulated lipoma (relative contraindication)

tibialis anterior tendon (Fig 1). The presence of non-adipose tissue components, thick septa with hyperintense T2-weighted signal, or contrast enhancement should raise suspicion of a liposarcoma.<sup>1</sup> However, especially in weight-bearing locations such as the sole of the foot, alterations of the fat signal within lipomas can also occur due to inflammation, hemorrhage, and infarction.<sup>1</sup>

The patient is placed in the supine position with their legs spread. A thigh tourniquet is applied to provide a bloodless operative field. A 4.0-mm, 30° arthroscope



**Fig 1.** Endoscopic en-bloc resection of lipoma of the tibialis anterior tendon of the left foot. The patient is in the supine position with the legs spread. Sagittal magnetic resonance imaging of the illustrated case shows the lipoma of the tibialis anterior tendon. (L, lipoma; TAT, tibialis anterior tendon.)



**Fig 2.** Endoscopic en-bloc resection of lipoma of the tibialis anterior tendon of the left foot. The patient is in the supine position with the legs spread. This procedure is performed via the proximal lateral portal and distal medial portal, which are at the proximal lateral and distal medial corners of the lipoma. (DMP, distal medial portal; L, lipoma; PLP, proximal lateral portal.)

(DYONICS; Smith & Nephew, Andover, MA) is used for this procedure. Fluid inflow is by gravity and arthropump is not used.

#### Portal Placement

This procedure is performed via the proximal lateral portal and distal medial portal which are at the proximal lateral and distal medial corners of the lipoma (Fig 2). Five-millimeter skin incisions are made at the portal sites and the underlying soft tissue is bluntly dissected down to the lipoma by a hemostat. A space is developed just anterior to the superficial surface of the lipoma and this is the initial endoscopic working area of this procedure. The distal medial portal is the primary viewing portal and the proximal lateral portal is the primary working portal. The portals can be switched in order to achieve complete dissection of the lipoma.<sup>20-26</sup>

#### Release of the Superior Extensor Retinaculum

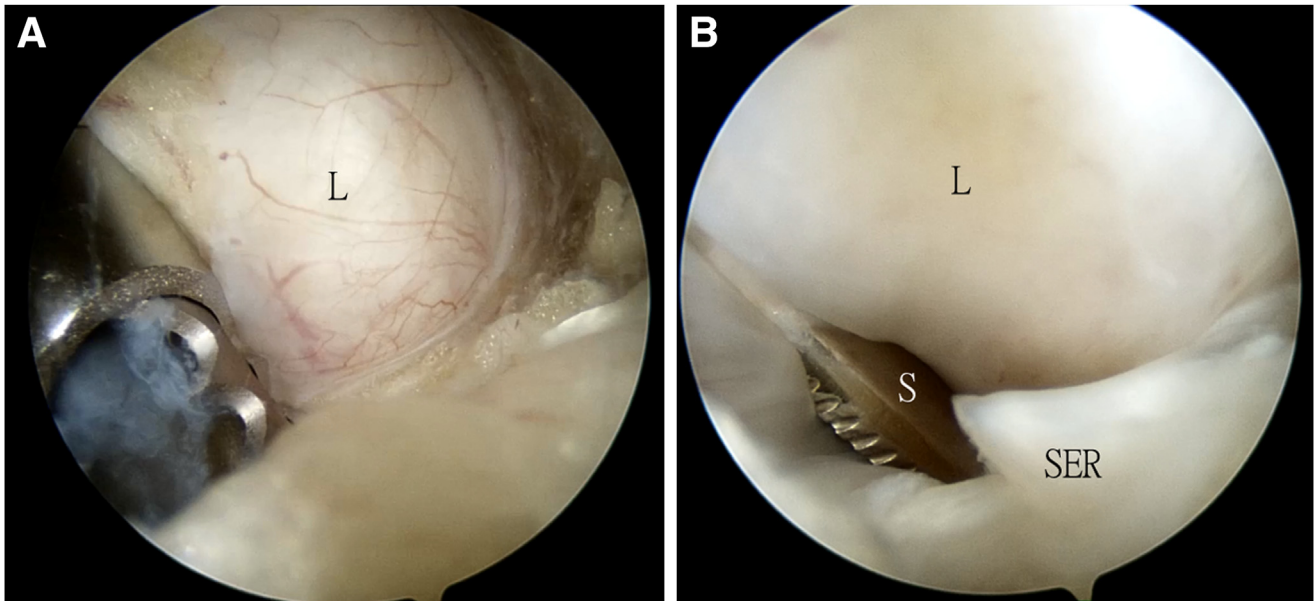
The distal medial portal is the viewing portal and the proximal lateral portal is the working portal. The part of the superior extensor retinaculum constricting the lipoma is released with a SuperCut scissors (Stille, Lombard, IL) (Fig 3).

#### Release of the Lipoma From the Tibialis Anterior Tendon

The distal medial portal is the viewing portal and the proximal lateral portal is the working portal. The tibialis anterior tendon is identified and dissected from the lipoma by means of the scissors and dental swab (Fig 4).

#### Release of the Lipoma from the Surrounding Subcutaneous Tissue

The distal medial portal is the viewing portal and the proximal lateral portal is the working portal. The

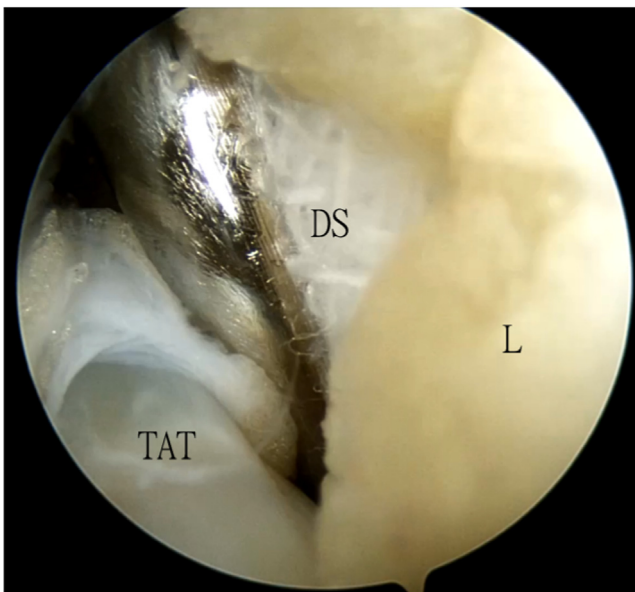


**Fig 3.** Endoscopic en-bloc resection of lipoma of the tibialis anterior tendon of the left foot. The patient is in the supine position with the legs spread. The distal medial portal is the viewing portal and the proximal lateral portal is the working portal. (A) The lipoma is identified. (B) The part of the superior extensor retinaculum constricting the lipoma is released with a SuperCut scissors. (L, lipoma; S, scissors; SER, superior extensor retinaculum.)

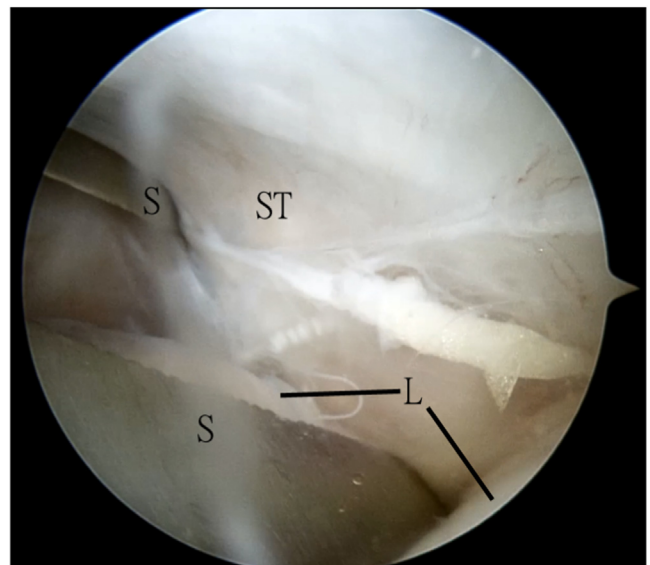
lipoma is dissected from the surrounding soft tissue including the subcutaneous tissue by means of the scissors and dental swab (Fig 5).

#### En-bloc Resection of the Lipoma

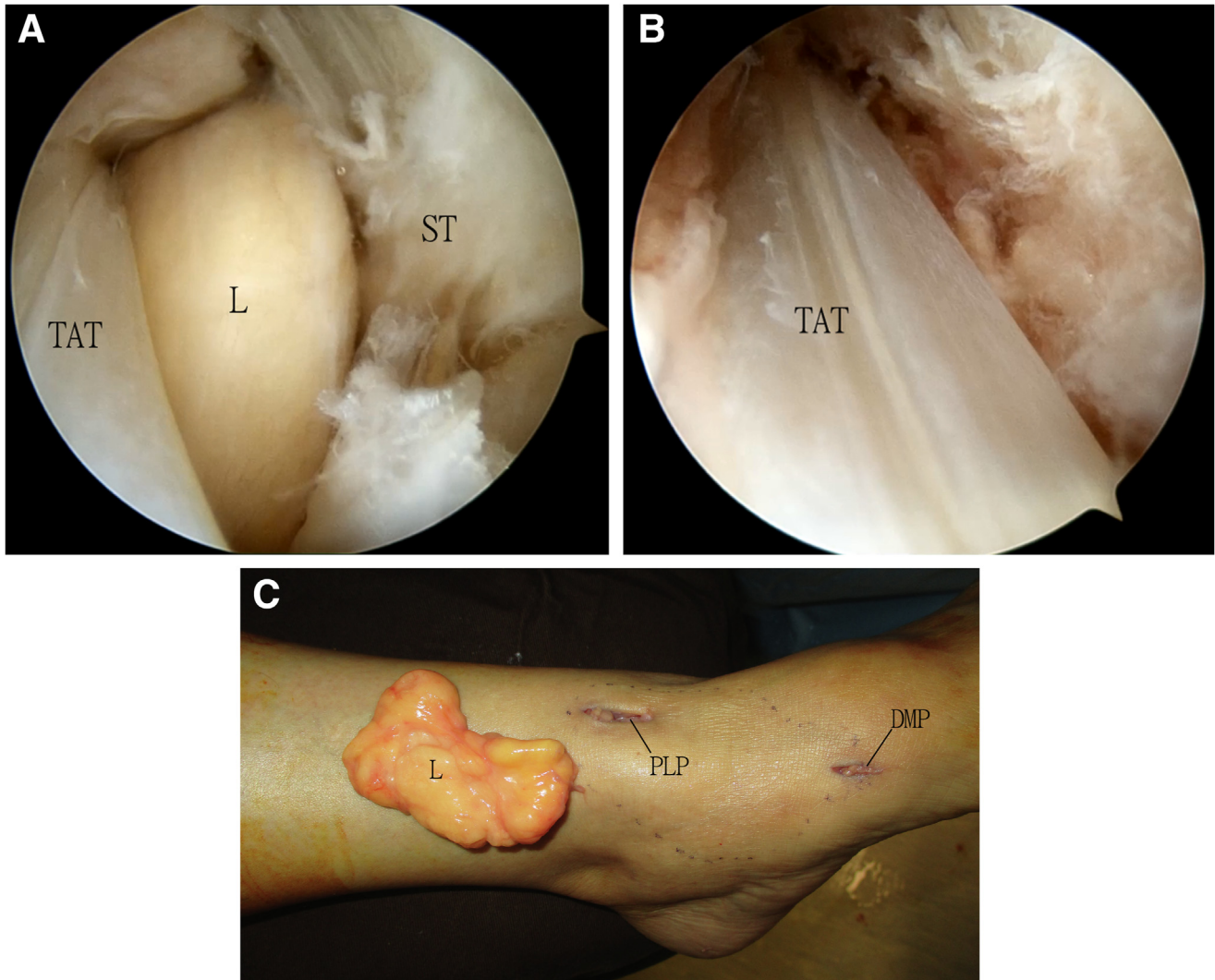
The distal medial portal is the viewing portal and the proximal lateral portal is the working portal. After complete dissection of the lipoma from the surrounding tissue, the proximal lateral portal is enlarged and the



**Fig 4.** Endoscopic en-bloc resection of lipoma of the tibialis anterior tendon of the left foot. The patient is in supine position with the legs spread. The distal medial portal is the viewing portal and the proximal lateral portal is the working portal. The tibialis anterior tendon is dissected from the lipoma by means of a dental swab. (DS, dental swab; L, lipoma; TAT, tibialis anterior tendon.)



**Fig 5.** Endoscopic en-bloc resection of lipoma of the tibialis anterior tendon of the left foot. The patient is in supine position with the legs spread. The distal medial portal is the viewing portal and the proximal lateral portal is the working portal. The lipoma is dissected from the surrounding soft tissue including the subcutaneous tissue by means of the scissors. (L, lipoma; S, scissors; ST, subcutaneous tissue.)



**Fig 6.** Endoscopic en-bloc resection of lipoma of the tibialis anterior tendon of the left foot. The patient is in supine position with the legs spread. (A) The distal medial portal is the viewing portal and the proximal lateral portal is the working portal. The lipoma is removed through the proximal lateral portal incision. (B) The distal medial portal is the viewing portal and the proximal lateral portal is the working portal. Complete tumor resection is confirmed endoscopically. (C) Clinical photo of the lipoma excised. (DMP, distal medial portal; L, lipoma; PLP, proximal lateral portal; ST, subcutaneous tissue; TAT, tibialis anterior tendon.)

lipoma is removed through this portal incision (Fig 6, Table 2, Video 1).

### Discussion

About 78% foot and ankle tumors are benign and 22% are malignant.<sup>3</sup> Therefore, malignant tumors are often unsuspected at this site and misdiagnosed clinically, especially if occurring in young individuals with non-specific or long-standing clinical symptoms.<sup>1</sup> Moreover, some types of musculoskeletal tumors can have equivocal imaging features make it difficult to determine if they will show aggressive behavior and atypical lipomatous tumor or grade 1 liposarcoma is one of them.<sup>1,2,27</sup> If diagnostic imaging is not fully conclusive for a benign lipoma, differentiation of lipoma variants from liposarcoma is required.<sup>2</sup> Many biopsy

**Table 2.** Pearls And Pitfalls of Endoscopic En-Bloc Resection of Lipoma of the Tibialis Anterior Tendon

Pearls	Pitfalls
1) The axis between the portals should be oblique to the axis of the leg and foot so that instrumentation mobility will not be hindered by the leg and foot.	1) Failure of development of the initial endoscopic working area just anterior to the superficial surface of the lipoma will lead to incomplete tumor resection.
2) Release of the lipoma from the surrounding soft tissue should be performed by blunt dissection	2) Dissection of the lipoma from the surrounding tissue using motorized shaver may cause injury to the surrounding nerves and artery.
3) The proximal lateral portal incision is gradually enlarged to a size just enough for removal of the lipoma.	

**Table 3.** Advantages and Risks of Endoscopic En-Bloc Resection of Lipoma of the Tibialis Anterior Tendon

Advantages	Risks
1) Small incisions and better cosmetic outcome,	1) Injury to the superficial peroneal nerve, the deep peroneal nerve or the saphenous nerve
2) Minimal soft tissue trauma	2) Tibialis anterior tendon injury
3) En-bloc resection of the lipoma	3) Injury to the dorsalis pedis artery
	4) Incomplete tumor resection

techniques have been proposed, including fine-needle aspiration, core needle biopsy, and incisional biopsy.<sup>2</sup> However, open excisional biopsy and histopathologic examination remain the gold standard for diagnosis of lipoma.<sup>2</sup> In this reported technique, en-bloc excision of the lipoma can be performed via minimally invasive approach and this can provide a whole piece of the tumor for histopathological examination.

The advantages of this technique include small incisions and better cosmetic outcome, minimal soft-tissue trauma, and en-bloc resection of the lipoma. The potential risks of this technique include injury to the superficial peroneal nerve, the deep peroneal nerve or the saphenous nerve, tibialis anterior tendon injury, injury to the dorsalis pedis artery, and incomplete tumor resection (Table 3).<sup>25</sup> This procedure is not technically difficult and can be managed by averaged foot and ankle arthroscopists.

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