Endoscopically Assisted En Bloc Resection of Anterior Knee Lipoma

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Abstract: Open resection of a large lipoma requires a large incision that may result in disfigurement from the scar. Endoscopic resection of the lipoma can have better cosmetic results. However, piecemeal removal of the lipoma has the disadvantage of fragmentation of the tumor before it can be determined whether it is benign or malignant. In this Technical Note, the technical details of endoscopically assisted en bloc resection of an anterior knee lipoma are described. This can provide a whole-block specimen for histologic examination.

Lipomas are the most common type of soft-tissue tumor, and they can develop anywhere throughout the body. Traditionally, they are resected in an open manner, requiring a large incision, and patients may not be satisfied by the disfigurement from iatrogenic scars. To minimize the soft-tissue trauma and obtain a better cosmetic result, minimally invasive approaches to lipoma resection have been developed. Liposuction is used for removal of lipomas and has been proved an effective technique. However, it is a blind technique; complete resection of the tumor cannot be verified, and hemostasis cannot be performed. Techniques of lipoma resection under endoscopic visualization have been developed to solve these problems. These endoscopic techniques are used for intraosseous or soft-tissue lipomas. In most of the endoscopic techniques, the lipoma is resected piecemeal and the tumor is fragmented before it can be determined whether it is benign or malignant. En bloc resection of the tumor has been advocated to obtain a whole-block specimen for histologic examination.

The purpose of this Technical Note is to describe the details of endoscopically assisted en bloc resection of an anterior knee lipoma. This technique is indicated for large, encapsulated lipomas of the anterior knee. It is contraindicated for a confirmed high-grade liposarcoma or a noncapsulated or poorly encapsulated lipoma (Table 1).

Technique

Preoperative Planning and Patient Positioning

Preoperative magnetic resonance imaging is essential for confirmation of the diagnosis, study of the anatomic relations between the lipoma and adjacent structures, and exclusion of high-grade liposarcoma. The patient is placed in the supine position with the knee extended. An ipsilateral thigh tourniquet is used to provide a bloodless surgical field. Fluid inflow is driven by gravity, and an arthro-pump is not used. A 4.0-mm, 30° arthroscope (Dyonics; Smith & Nephew, Andover, MA) is used for this procedure.

Portal Placement

The medial, proximal-lateral, and distal-lateral portals are used for this procedure. The medial portal is at the...
midpoint of the medial edge of the lipoma. The proximal-lateral and distal-lateral portals are at the proximal and distal ends of the lateral edge of the lipoma, respectively (Fig 2).

**Dissection of Superficial Surface of Lipoma**

Five-millimeter skin incisions are made in the portal sites. The subcutaneous tissue is bluntly dissected down to the tumor by a hemostat. The portals are interchangeable as the viewing and working portals. The superficial surface of the lipoma is dissected from the subcutaneous tissue by the hemostat under endoscopic visualization. Any adhesions can be released by an arthroscopic shaver (Dyonics; Smith & Nephew). During resection of the adhesions, the suction should be kept at a minimum and the cutting blade of the shaver

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**Fig 1.** Endoscopically assisted en bloc resection of anterior knee lipoma in right knee. The patient is in the supine position with the knee extended. Magnetic resonance imaging of the knee shows a large, encapsulated lipoma (L) superficial to the patellar tendon (PT). (A) Sagittal image. (B) Transverse image. (P, patella.)

**Fig 2.** Endoscopically assisted en bloc resection of anterior knee lipoma in right knee. The patient is in the supine position with the knee extended. Three portals are used for this procedure: distal-lateral portal (DLP), medial portal (MP), and proximal-lateral portal (PLP). (L, lipoma; P, patella.)
should face away from the lipoma.\textsuperscript{2} A small retractor can be inserted into the portal other than the portals occupied by the arthroscope and shaver to elevate the subcutaneous tissue from the lipoma and facilitate the dissection (Fig 3).

**Dissection of Edge of Lipoma**

The portals are interchangeable as the viewing and working portals. With the retractor protecting the lipoma, the junction between the lipoma and the underlying patellar tendon is dissected with SuperCut scissors (Stille, Lombard, IL) and a shaver (Fig 4). Thereafter, the tumor can be retracted to expose the underlying patellar tendon.

**Dissection of Deep Surface of Lipoma**

The portals are interchangeable as the viewing and working portals. The lipoma is retracted from the patellar tendon, and the adhesions between the lipoma and patellar tendon are released with the scissors (Fig 5).
**En Bloc Resection of Lipoma**

After dissection is completed, the lipoma is extracted through the medial portal. The portal incision is enlarged so that the lipoma can just be squeezed out. Because a lipoma is soft and pliant, a comparatively large mass can usually be smoothly removed in one piece through a relatively short incision. After the lipoma has been extracted, a final check should be made under endoscopic visualization to verify that the entire mass has been removed and there is no bleeding (Fig 6. Video 1, Table 2). A suction drain is then inserted into the dead space, and a pressure dressing is applied.

**Discussion**

Endoscopic resection of a lipoma may result in better cosmetic results, and complete resection of the tumor can be verified under an endoscopic view. To achieve complete resection of the lipoma and preservation of the normal tissue, it is important to identify the interface between the lipoma and the adjacent normal tissue.
tissue. This should be started from preoperative magnetic resonance imaging assessment. The structures adjacent to the lipoma and any normal tissue embedded in the lipoma should be noted. Intraoperatively, the surgeon should be careful during dissection of the peripheral rim of the lesion not to breach the capsule of the lipoma and should ensure en bloc resection of the tumor.

The described minimally invasive technique has the advantages of better cosmetic results, less soft-tissue trauma, fewer wound complications, less postoperative pain, a quicker recovery, a faster return to function, and less chance of infection. The potential risks of this technique include cutaneous nerve injury, patellar tendon injury, tumor recurrence, and incomplete resection (Table 3). This technique is not technically demanding and can be attempted by the average knee arthroscopist.

### Table 2. Pearls and Pitfalls of Endoscopically Assisted En Bloc Resection of Anterior Knee Lipoma

| Pearls | Pitfalls |
|--------|---------|
| Preoperative MRI is important to study the extent of the lipoma and its relation to adjacent structures. | Breaching of the capsule may increase the risk of tumor recurrence. |
| The use of a retractor can facilitate endoscopic tumor dissection. | Incomplete mobilization of the lipoma together with forceful squeezing out of the lipoma may result in a tear of the lipoma and retention of residual tumor. |

MRI, magnetic resonance imaging.

### Table 3. Advantages and Risks of Endoscopically Assisted En Bloc Resection of Anterior Knee Lipoma

| Advantages | Risks |
|------------|-------|
| Better cosmetic result | Cutaneous nerve injury |
| Less soft-tissue trauma | Patellar tendon injury |
| Fewer wound complications | Tumor recurrence |
| Less postoperative pain | Incomplete resection |
| Quicker recovery | |
| Faster return to function | |
| Less chance of infection | |

MRI, magnetic resonance imaging.

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