

## Open Excision of a Painful Fabella

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**Abstract:** Fabella syndrome is a relatively rare but potentially debilitating condition that causes posterolateral knee pain and swelling, as well as issues with flexion and/or extension of the knee. Irritation, pain, and cartilage damage ensue as the capsule and fabella make contact with the posterior lateral femoral condyle. This condition should be considered in cases of posterolateral knee pain in which other more common pathologies are not readily identified and when patients present with a positive finding of tenderness on examination at the fabella. Initial treatment consists of activity modification and rest, physical therapy, and potentially cortisone injections. When these fail, surgical excision of the fabella should be considered. Surgery in the posterolateral knee, however, requires careful consideration of the immediate and surrounding anatomic structures and arthroscopy, which can be technically challenging. The objective of this technical note is to describe our open technique for symptomatic fabella excision that is easily reproducible, with pearls to minimize risk to the posterolateral structures of the knee.

The fabella is a sesamoid bone that, when present, is located in the posterior knee within the lateral head of the gastrocnemius. A recent anatomic study has suggested that approximately 36.8% of ossified fabellae are detectable by dissection.<sup>1</sup> Ossified fabellae present about 2.5% more often in men than in women, typically bilaterally, and are more prevalent among individuals of Asian descent.<sup>1</sup> Although not all

fabellae ossify, when ossification does occur, it is more common with older age. Such demographic characteristics should be considered when evaluating patients with atypical chronic posterolateral knee pain.

Fabella syndrome occurs when a fabella becomes symptomatic. Although rare, such symptoms can occur as a result of direct trauma or progressively over time with recurrent compression against the lateral femoral condyle (LFC) with the knee in extension.<sup>2,3</sup> Irritation, pain, and cartilage damage ensue as the capsule and fabella make contact with the posterior LFC. Patients will present with focal tenderness with or without swelling in the area.<sup>2</sup> An osseous fabella will be observed on radiographs, and depending on the chronicity, patients may also show abnormalities on magnetic resonance imaging including thickening of the lateral gastrocnemius tendon, inflammation, grooving of the LFC cartilage, or even degenerative changes because the fabella can have a cartilaginous articular surface.<sup>2-4</sup>

When a fabella is symptomatic, nonoperative therapy is the first line of treatment and includes activity modification with rest and immobilization, physical therapy, and possibly cortisone injections into the local area.<sup>2-6</sup> When nonoperative treatment fails, surgical excision is an option and arthroscopic, open, and combined techniques have been described.<sup>2-4</sup> The lateral knee anatomy can be daunting, and care must be taken to understand the proximity of the posterior and lateral neurovascular structures. Additionally,

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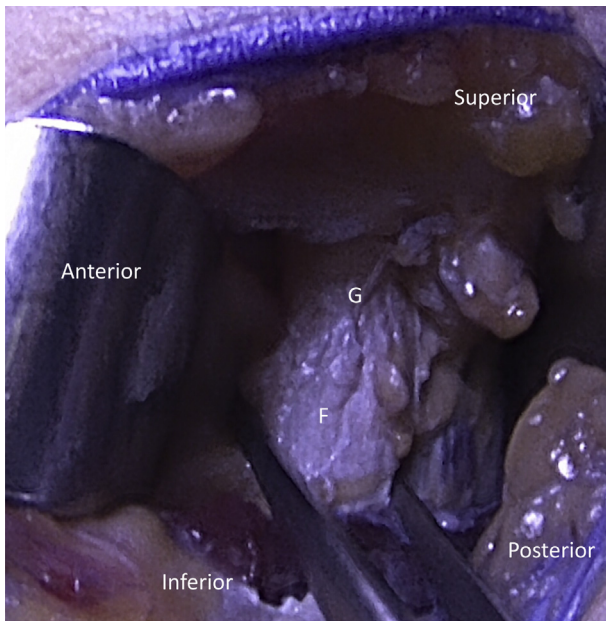
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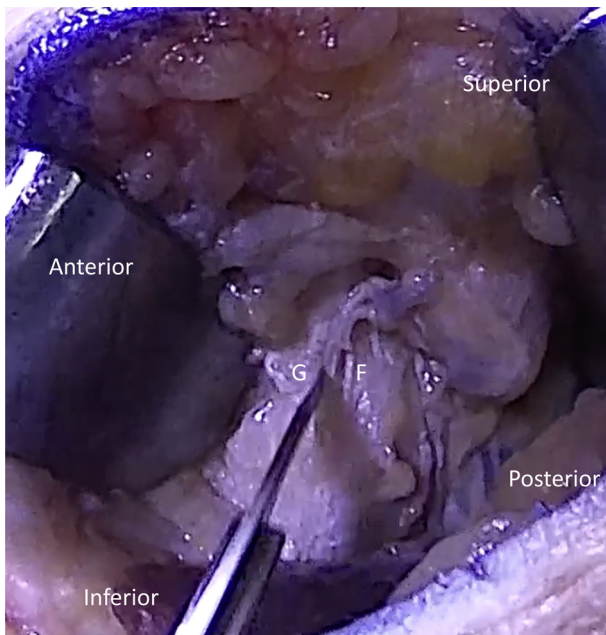
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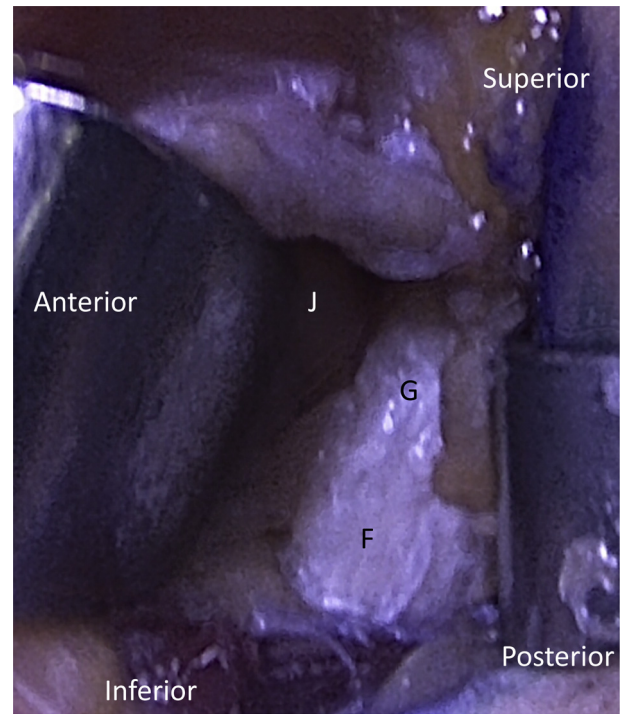


**Fig 1.** In a left knee flexed 90° with the patient supine, the fabella (F) is palpated and grasped within the lateral head of the gastrocnemius (G).

arthroscopy in the posterolateral compartment of the knee is challenging. The purpose of this technical note is to describe an open technique that is focused on predictable anatomic landmarks so that fabella excision can be safely, efficiently, and effectively reproduced.



**Fig 2.** In a left knee flexed 90° with the patient supine, a knife is used to incise the lateral head of the gastrocnemius (G), revealing the fabella (F).

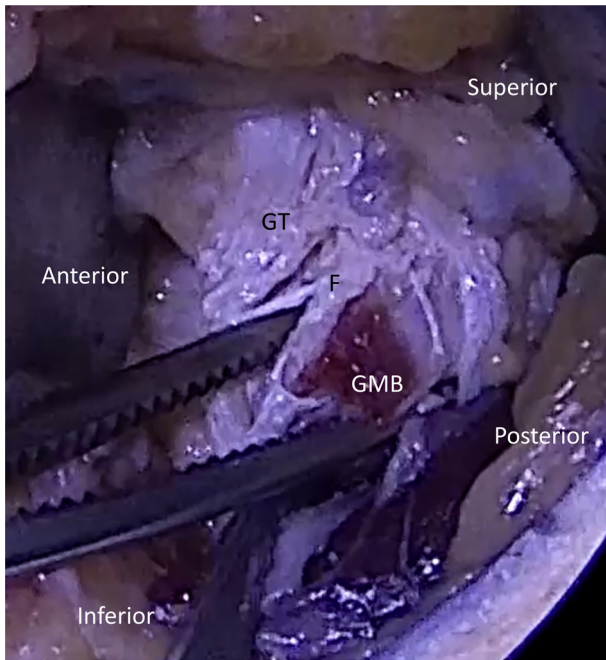


**Fig 3.** In a left knee flexed 90° with the patient supine, the joint capsule (J) is opened deep to the lateral head of the gastrocnemius (G) to facilitate fabella (F) excision.

### Surgical Technique

The patient is positioned supine on the operating room table with a post and undergoes induction with general anesthesia. Prophylactic intravenous antibiotics are administered. Anatomic landmarks are identified including the Gerdy tubercle, fibular head, lateral joint line, lateral epicondyle of the femur, and posterior apex of the LFC. The leg is exsanguinated, and a thigh tourniquet is inflated. With the knee flexed to 90° (an assistant can manually hold the foot or a commercial foot holder can be used), a 6-cm incision is made on the posterior border of the LFC centered at the apex because this is typically where the fabella will lie. Skin flaps are elevated anteriorly, posteriorly, superiorly, and inferiorly, with care taken to note that the common peroneal nerve (CPN) will be exiting from deep and posterior to the biceps femoris (BF) as it courses across the proximal fibular neck. Neurolysis of the CPN around the fibula may be performed.

A window is sharply created between the inferior border of the iliotibial band and the superior border of the BF, posterior to the lateral collateral ligament (Video 1). After some blunt finger dissection, the lateral head of the gastrocnemius should be readily viewable adjacent to the posterior knee capsule. The fabella can be readily palpated within the tendinous portion but will not yet be visualized because it is typically deep to the tendon, within the capsular layer (Fig 1). An

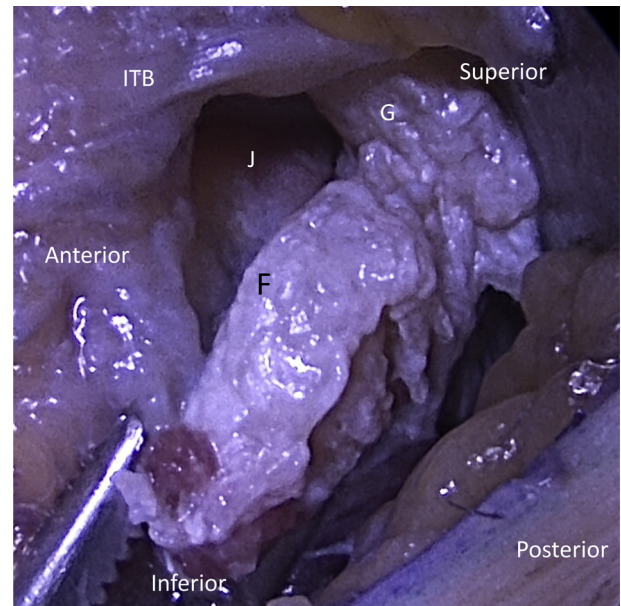


**Fig 4.** In a left knee flexed 90° with the patient supine, the fabella (F) is isolated with a clamp while the gastrocnemius tendon (GT) superiorly and the gastrocnemius muscle belly (GMB) inferiorly are elevated sharply.

arthroscope can also identify the fabella posterolaterally. Occasionally, the capsule and gastrocnemius are scarred and inflamed. In this scenario, a tissue plane needs to be developed further with blunt dissection to assist in removal.

The medial and lateral borders of the fabella are identified. An incision with a No. 15 blade scalpel is performed over the central portion of the fabella (Fig 2). Tendinous flaps are elevated medially and laterally off the superficial surface so that the gastrocnemius defect can later be repaired, after repair of the knee joint capsule. Once the medial and lateral borders are clearly delineated, the fabella is grasped with a small Kocher clamp for control. Depending on the depth and size of the fabella, the posterolateral knee capsule may need to be incised deep to the fabella to completely shell it out (Fig 3). As dissection is carried deep and medial (Fig 4), the cartilaginous surface of the deep fabella should be visible. Externally rotating the Kocher clamp medially with dorsal tension, away from the capsule, will help as further dissection of the fabella is performed off the capsule until it completely releases, and removal is complete (Fig 5, Table 1). This rotational maneuver also pulls the dissection away from the more midline neurovascular structures.

Absorbable sutures (No. 0 Vicryl; Ethicon, Somerville, NJ) are used to close all deep layers—the capsular defect (Fig 6), the split in the lateral head of the gastrocnemius tendon, and the defect between the



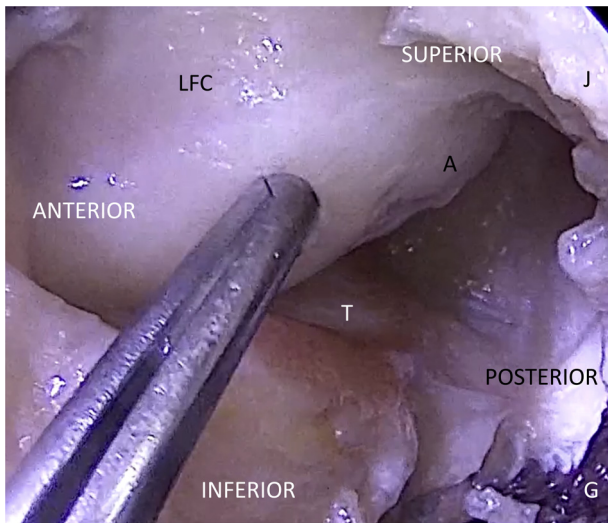
**Fig 5.** In a left knee flexed 90° with the patient supine, after elevation of the surround soft tissues, eversion of the fabella (F) reveals arthritic change to the articular surface of the fabella. (G, lateral head of gastrocnemius; ITB, iliotibial band; J, joint.)

iliotibial band and BF (Fig 7). The subdermal layer and skin are closed per surgeon preference. Postoperatively, range of motion is initiated immediately, and no brace

**Table 1.** Pearls and Pitfalls of Open Fabella Excision

Pearls	
The knee should be positioned at 90° to relax the posterior soft-tissues and neurovascular structures.	
The deep interval should be identified—posterior to the LCL, proximal to the fibular head, between the biceps femoris and iliotibial band.	
The fabella should be palpated and identified. The medial and lateral gastrocnemius tendon sleeves should be elevated, and the fabella should be clamped for control.	
The fabella should be delivered with external rotation and dorsal tension as it is shelled out to protect the deep structures.	
Meticulous capsular closure with absorbable suture should be performed to prevent synovial fluid extravasation but also to ensure minimal capsular scarring and/or contracture.	
Pitfalls	
Although not in immediate danger, the neurovascular structures are not far and need to be considered.	
Lack of preoperative knowledge of the anatomy can result in iatrogenic injury to the ligamentous, muscular, and tendinous structures—especially the lateral gastrocnemius, joint capsule, and lateral meniscus.	
Loss of control during excision could cause the fabella to fall into the deeper, midposterior structures of the knee or proximal tibia.	
Poor capsular closure could lead to synovial fluid extravasation, causing swelling and seroma formation.	
Ensuring the correct diagnosis is critical to achieving successful outcomes.	

LCL, lateral collateral ligament.



**Fig 6.** In a left knee flexed 90° with the patient supine, removal of the fabella reveals the articulation (A) that was present between it and the lateral femoral condyle (LFC). The joint capsule (J) can now be repaired. (G, gastrocnemius; T, tibial plateau.)

is needed. The patient is allowed to progressively bear weight as tolerated, with crutches used for comfort assistance only. Physical therapy involves gait training, range-of-motion exercises, and gentle resistance. Return to play is allowed at approximately 10 to 12 weeks after the tendinous and capsular tissues have fully healed.

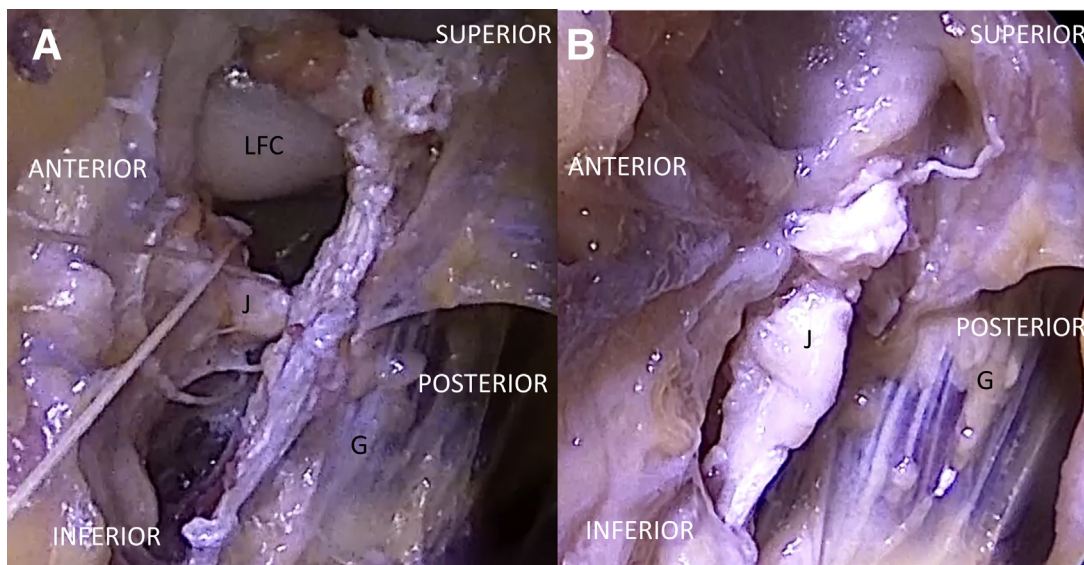
### Discussion

This technical note provides a safe, efficient, and effective technique for excision of the symptomatic

fabella using very distinct and easily recognizable landmarks in the posterolateral knee. There is no need for identification of the CPN and no risk of injury from dissection or traction. This technique also prevents the need for deeper dissection and the potential risk of vascular injury. Moreover, there is no need to perform arthroscopy, which can be technically challenging in this region of the knee (Table 2).

The proposed technique is simple for isolated excision of a symptomatic fabella; however, it does not preclude one from performing concomitant procedures in the knee. Standard diagnostic arthroscopy can be performed. We recommend performing it after fabella excision so that the fluid distention of the capsule and surrounding structures does not interfere with anatomic landmark identification. We have found that with a tight capsular closure as described earlier, fluid extravasation is not an issue (Table 1). Additionally, although identification of the CPN is not necessary with our proposed technique, it can still be easily performed because neuropathy can be present in some cases of fabella syndrome.<sup>7</sup>

Fabella syndrome can be difficult to diagnose given its rare nature. Additionally, it can often be confused with other posterolateral knee injuries including lateral meniscal tears, capsular sprains, bone contusions, gastrocnemius strains, injuries to the posterolateral corner structures, or proximal tibiofibular joint injuries. As such, there are limited data concerning the outcomes associated with operative treatment of fabella syndrome. Dekker et al.,<sup>2</sup> in 2020, described the largest series of isolated fabella excisions, involving 11 fabellae in 10 patients with a minimum 21-month follow-up. They found that 80% of patients returned to their full activities and sports; Western Ontario and McMaster



**Fig 7.** In a left knee flexed 90° with the patient supine, the joint capsule (J) can now be repaired (A), resulting in closure of the joint defect (B). (G, gastrocnemius; LFC, lateral femoral condyle.)

**Table 2.** Advantages and Disadvantages of Open Fabella Excision

Advantages	
The readily identifiable landmarks make for easy localization of the fabella.	
There is no worry regarding distortion of the anatomy owing to arthroscopic fluid extravasation.	
There is no need for the technical complexity involved with arthroscopy of the posterolateral knee joint.	
Additional lateral-based procedures, such as peroneal nerve neurolysis, or posterolateral corner work can be performed as needed, which may be necessary concurrently in acutely injured fabellae.	
Disadvantages	
There are critical ligamentous, capsular-muscular, tendinous, neurologic, and vascular structures at risk.	
The incision is not as cosmetic as that with an arthroscopic approach.	
There is a risk of synovial fluid extravasation and seroma formation.	

Universities Osteoarthritis Index and Lysholm scores significantly improved overall; and the patient satisfaction rating was  $8.8 \pm 1.6$  at final follow-up.

In conclusion, with thorough preoperative planning and understanding of the anatomic landmarks, our proposed technique for open fabella excision in patients

with fabella syndrome can be performed in a safe, efficient, and effective manner with minimal risk to the surrounding neurovascular and soft-tissue structures.

## References

1. Berthaume MA, Bull AMJ. Human biological variation in sesamoid bone prevalence: The curious case of the fabella. *J Anat* 2020;236:228-242.
2. Dekker TJ, Crawford MD, DePhillipo NN, et al. Clinical presentation and outcomes associated with fabellectomy in the setting of fabella syndrome. *Orthop J Sports Med* 2020;8. 2325967120903722.
3. Provencher MT, Sanchez G, Ferrari MB, et al. Arthroscopy-assisted fabella excision: Surgical technique. *Arthrosc Tech* 2017;6:e369-e374.
4. Dannawi Z, Khanduja V, Vemulapalli KK, Zammit J, El-Zebdeh M. Arthroscopic excision of the fabella. *J Knee Surg* 2007;20:299-301.
5. Weiner DS, Macnab I. The "fabella syndrome": An update. *J Pediatr Orthop* 1982;2:405-408.
6. Weiner D, Macnab I, Turner M. The fabella syndrome. *Clin Orthop Relat Res* 1977;(126):213-215.
7. Patel A, Singh R, Johnson B, Smith A. Compression neuropathy of the common peroneal nerve by the fabella. *BMJ Case Rep* 2013;2013:bcr2013202154.