

Technical Note

The Finochietto Sign as a Pathognomonic Finding of Ramp Lesion of the Medial Meniscus

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Abstract: Ramp lesions are considered hidden injuries of the medial meniscus and are very difficult to diagnose. The Finochietto jump sign is a very specific finding that could be considered pathognomonic regarding ramp lesions. This sign consists of a sudden jerk that appears when the free edge of the posterior horn of the medial meniscus is dislocated anteriorly due to the medial condyle interposition when an anterior drawer test is performed on a knee with a ramp lesion, especially when it is associated with an anterior cruciate ligament tear. In this technical note, the Finochietto sign is described clinically, is correlated with its exploration under anesthesia, and is described for the first time under arthroscopic examination in the case of a ramp lesion, in which this finding can help to the diagnosis when present, especially when associated with anterior cruciate ligament tears.

Meniscal ramp lesions are defined as those including the peripheral insertion of the posterior horn of the medial meniscus, and they are usually associated with anterior cruciate ligament (ACL) tears. These lesions were first described by Strobel in 1988.¹ However, it was in the last decade when their real importance became recognized. The diagnosis can be difficult using preoperative magnetic resonance imaging,² and they can be hidden and missed even during arthroscopic examination because of their location when only standard portals are used.

The incidence of ramp lesions is variable: its prevalence has been reported as between 9% and 42% of ACL tears.³⁻⁶ One of the reasons for this variability is that, in many occasions, this lesion remains hidden from the anterior portals, so an accessory

posteromedial portal is needed to identify it.⁵ Furthermore, there is no consensus on the definition of ramp lesions: Liu et al.,² in 2011, described them as a tear of the peripheral insertion of the posterior horn of the medial meniscus shorter than 2.5 cm, although most authors include in this group all meniscocapsular gaps, all meniscosynovial tears, and even the most peripheral longitudinal tears in the red-red zone of the posterior horn of the medial meniscus: Thaunat et al.⁶ classified ramp lesions as 5 types depending on both tear pattern (partial- or full-thickness tear) and associated meniscotibial ligament disruption: type 1: meniscocapsular

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Fig 1. The patient lays supine on the stretcher, with the right knee flexed 90°. The surgeon stands on the side of the injured knee, holds the calf with his or her left forearm applying anterior load while blocking the patient's foot with this right one.

Table 1. Step-by-Step Details of the Technique

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|-----------------------------|---|
| 1. Physical examination | |
| a. | Patient position: supine with the knee flexed 90° and the foot leaning on the stretcher. |
| b. | The examiner stands on the injured knee side, puts his or her contralateral forearm on the patient's calf, just distal to the popliteal fossa, and holds the patient's foot with his or her homolateral hand. |
| c. | Using the forearm, anterior load is applied, until the "jump sign" appears. |
| d. | The same maneuver is applied with the patient under anesthesia on the surgical table just before surgery. |
| 2. Arthroscopic examination | |
| a. | The assistant surgeon drives the camera, focusing on the medial meniscus. |
| b. | The main surgeon sits on a stool in front of the injured knee and performs the same previously described maneuver (in the surgical setting, the surgeon can switch the forearm employed as needed) but with the patient's foot leaning on the surgeon's knee. |
| c. | The "jump sign" is checked arthroscopically. |

lesions; type 2: partial superior lesions; type 3: partial inferior or hidden lesions; type 4: complete tear in red-red zone; and type 5: double tear.

In 1935, Ricardo Finochietto⁷ described: "The jump sign is a jerk produced during the passive movement of the head of the tibia under the femoral condyle. The most evident pathology of knees demonstrating this sign is the injury to the posterior half of the internal semilunar cartilage; any other intracapsular lesions are accessory," and he found this lesion associated with ACL tears in 80% of the cases. Later, Losee⁸ described the Finochietto "jump sign" (FJS) as a "pathognomonic sign of a posterior longitudinal tear of the meniscus of the knee" in 53 patients, of which 40 (75%) were associated with ACL tear. He recommended surgical treatment of this lesion through total meniscectomy.

To our knowledge, the FJS has not been related to the meniscal ramp lesion according to the current concepts. Moreover, it has not been described arthroscopically previously. The purpose of this work is to describe the FJS from the point of view of physical examination and during the arthroscopic knee examination in cases of medial meniscus ramp lesions (typically associated with ACL tears).

Technique

Physical Examination (With Video Illustration)

The patient is positioned supine with the knee flexed 90°, whereas the foot leans on the stretcher, as

Table 2. Tips and Pearls

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| The examiner must warn the patient that the maneuver can be painful when it is performed in the office. |
| When the maneuver is performed arthroscopically, the patient's foot should be supported by the surgeon's knee to prevent it from hanging up. |
| The authors prefer a central portal for the arthroscopic examination because it is usually their viewing portal in cruciate ligament surgery. Furthermore, it allows an easier access to the posterior compartments of the knee. |
| The maneuver must be perfectly coordinated between the surgeon handling the patient's leg and the assistant driving the arthroscopic camera. |

in the examination of the anterior drawer test (ADT) (Fig 1, Tables 1). The examiner holds the calf of the tibia with his or her forearm, just distal to the popliteal fossa, as in the ADT, but applying stronger forward traction. The sign is positive when a visible (and even audible) snapping appears when the tibia slides under the femoral condyles, causing anterior subluxation (Video 1, Tables 2). This maneuver can be painful or can startle the patient when performed at the office.



Fig 2. Surgical setting: the patient is positioned supine on the surgical table, with the left knee on a leg holder, flexed 90°.

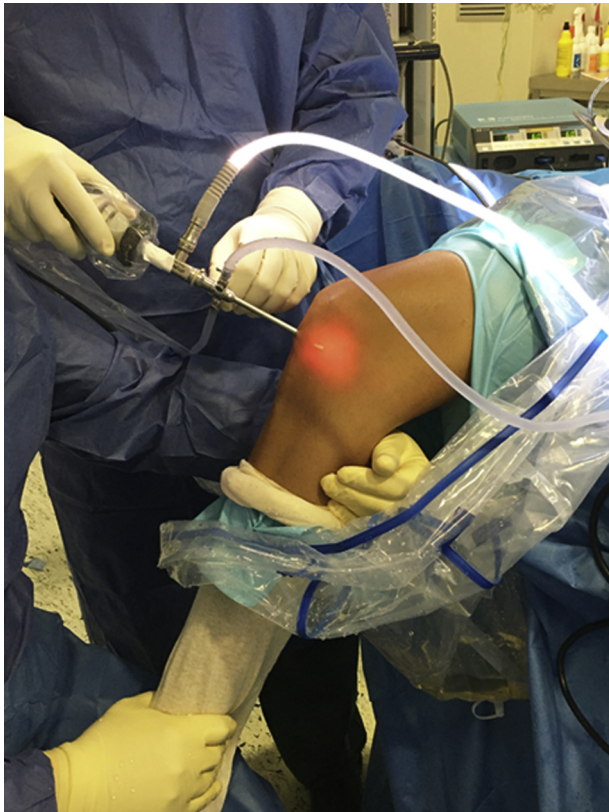


Fig 3. Setting for arthroscopic examination of the Finochietto jump sign. The main surgeon sits on a stool in front of the patient's left knee, holding the calf with his or her left forearm, blocking the patient's foot with their right hand while it leans on the surgeon's knee. Meanwhile, the assistant surgeon drives the arthroscopic camera (through the anteromedial portal in the picture).

Arthroscopic Examination

The patient is given a regional or general anesthetic and positioned supine. An ischemia cuff is used, and the limb is supported by a leg holder with the knee flexed 90° (Fig 2). A central transtendinous portal is generally employed by the authors for cruciate ligament reconstruction.

The examiner sits on a stool in front of the patient, holding the patient's foot on his or her knee; then, they

put their forearm on the patient's calf, just distal to the popliteal fossa, performing an ADT like maneuver. Meanwhile, an assistant surgeon drives the arthroscopic camera, inserted through the transtendinous portal (Fig 3, Tables 3). The test is positive when an anterior subluxation of the posterior horn of the medial meniscus occurs. This maneuver can be positive in both types 1 and 4 in Thauat's classification⁶ (Fig 4, Video 1).

Discussion

Meniscal ramp lesions are a relatively frequent lesion, especially when associated with an ACL tear, that can go unnoticed even under arthroscopic examination.⁵ Given the challenging diagnostic of medial meniscus ramp lesions,² the FJS can be a very useful sign in the detection of such lesions and in their confirmation, especially when associated with ACL tears.

The role of the menisci and their insertions in the biomechanics of the knee is well known. DePhillipo et al.⁹ have demonstrated in a biomechanical study on cadaveric knees that meniscocapsular and meniscotibial lesions of the posterior horn of the medial meniscus increased knee anterior tibial translation, internal and external rotation, and the pivot shift in ACL-deficient knees. Furthermore, in a study with 275 patients who were going to undergo ACL reconstruction, Mouton et al.¹⁰ appreciated that in the examination under anesthesia with an isolated ramp lesion of the medial meniscus in association with an ACL injury displayed a greater amount of dynamic rotational laxity as expressed by the pivot shift test in comparison with patients with isolated ACL injury and no ramp lesion. However, in a biomechanical study in 9 cadaveric knees, Naendrup et al.¹¹ found that isolated ramp lesions did not significantly affect knee biomechanics at the time of surgery.

The FJS can be found clinically at the office when performing an ADT, although a stronger anterior traction load is usually needed and, in case of a positive test, the maneuver can be painful for the patient. This test also can be recognized arthroscopically with relative ease and can help to visually understand the contribution of the medial meniscus to the stability of the knee, especially when the ramp lesion is associated with an ACL tear, as previous biomechanical studies have demonstrated.⁹

In conclusion, the authors believe that the performance of the FJS can help in the diagnosis of ramp lesions both clinically and arthroscopically and, furthermore, in decision-making about their treatment, so it could be employed in cases of suspicion or doubt regarding such lesions.

Table 3. Advantages and Disadvantages

Advantages

This maneuver can be easily performed during clinical and arthroscopic examination when dealing with a meniscoligament knee injury.

It is easy to perform and it's not time-consuming both in the clinical and surgical setting.

It can be very helpful in the diagnosis of the ramp lesion.

Disadvantages

The maneuver can be painful when performed in a clinical setting at the office.

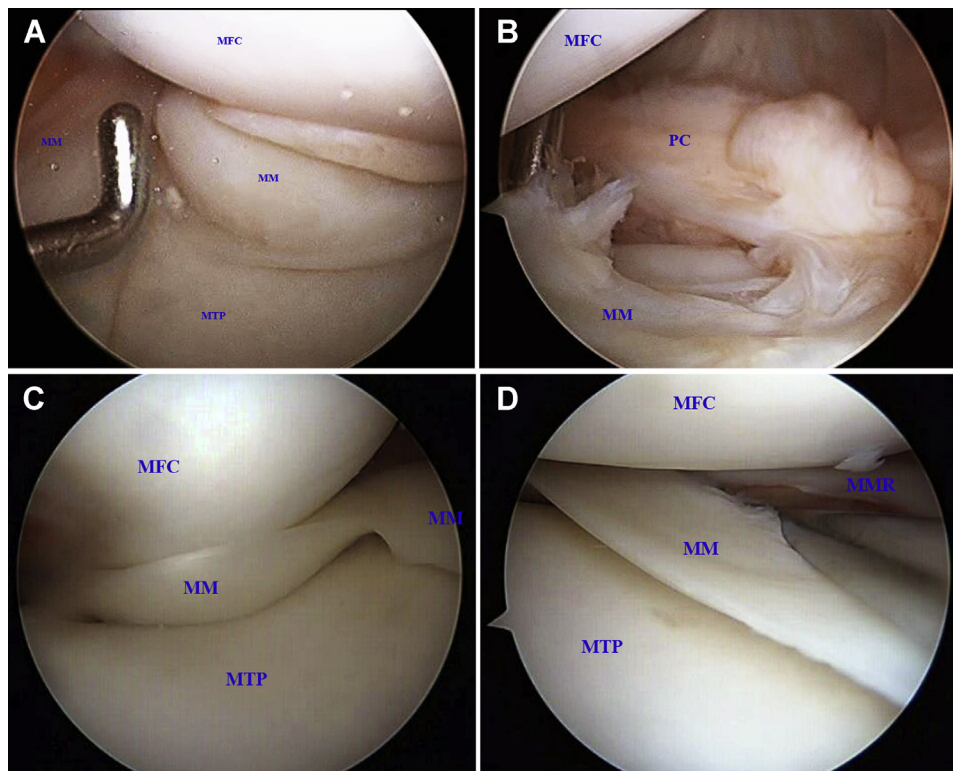


Fig 4. (A) Arthroscopic view of the medial meniscus of a left knee, with the arthroscope through a central transtendinous portal and the probe through the anteromedial one. The posterior horn of the medial meniscus is anteriorly dislocated in a Thaanat type 1 meniscal ramp lesion. A piece of the synovial sheath can be seen between the medial meniscus and the medial femoral condyle. (B) Arthroscopic view of the medial meniscus of a left knee, with the arthroscope through a central transtendinous portal and the probe through the anteromedial one. The Thaanat type 1 ramp lesion is shown. (C) Arthroscopic view of the medial meniscus of a right knee, with the arthroscope through a central transtendinous portal. The posterior horn of the medial meniscus is anteriorly dislocated in a Thaanat type 4 ramp lesion. (D) Arthroscopic view of the medial meniscus of a left knee, with the arthroscope through a central transtendinous portal and the probe through the anteromedial one. The Thaanat type 4 ramp lesion is shown (MFC, medial femoral condyle; MM, medial meniscus; MMR, medial meniscus rim; MTP, medial tibial plateau; PC, posterior capsule.).

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