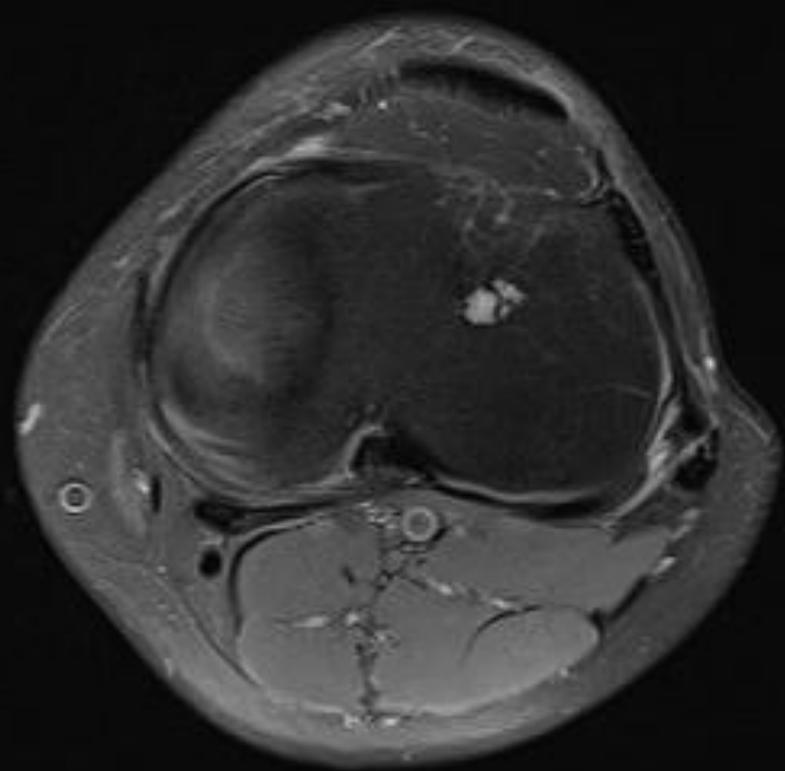
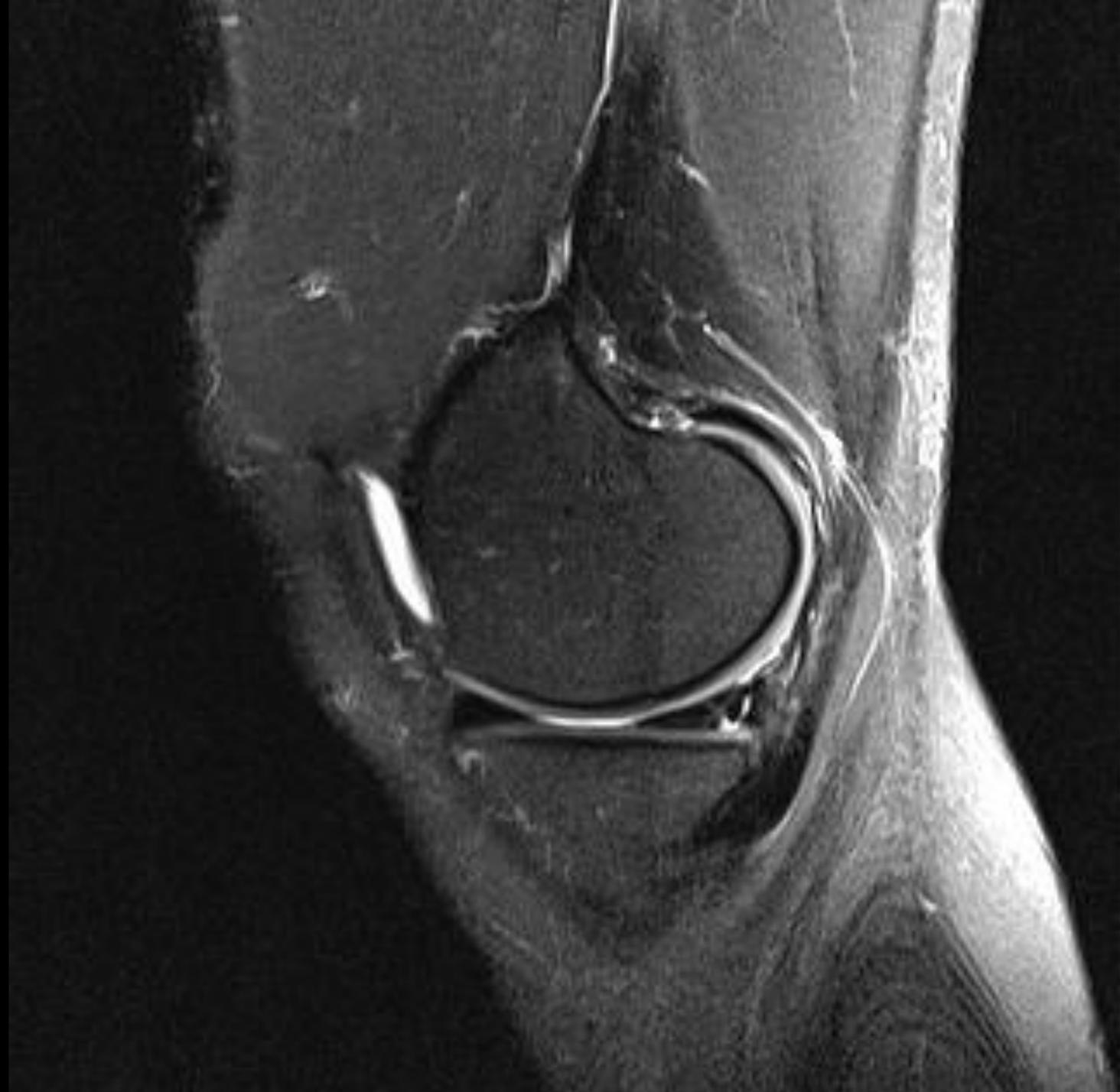


Clinical History

- 38F with left knee pain. MRI of the left knee from nearly six years earlier with reported ACL tear and no meniscal tear.









◀ **Fig. 2.1-49 a–d.** Fringe degeneration of the anterior horn of the lateral **meniscus**. **a** Though the knee has been moved to the figure-four position, the shaggy meniscal tissue (*arrowheads*) obscures the view into the lateral compartment (*T* lateral tibial plateau, *F* lateral femoral condyle). **b** The mirror (*MI*) demonstrates the fraying (*arrowheads*) on the anterior horn (*AH*) of the lateral **meniscus** (*L*) and the inferior free edge of the **meniscus** (*arrows*). **c** The shreds are removed with a shaver (*S*), and **d** the mirror is used to assess the result. No tears are seen in the anterior horn. The free edge of the **meniscus** (*arrowhead*) is clearly visible

2.1.8 Ramp Lesions

A special type of meniscal injury involves the peripheral attachment of the posterior horn of the **medial meniscus** and is typically associated with an ACL deficiency. We call this tear a “**ramp lesion**” to distinguish it from other types of posterior longitudinal tears.

Therapeutic Management

Ramp lesions most commonly occur in association with ACL ruptures. They may result from an acute rupture or may develop in a knee with chronic ACL deficiency.

During arthroscopy, the posterior peripheral attachment of the **medial meniscus** should be inspected in any patient who presents with an acute or chronic ACL tear. Often this will reveal severe lesions that would otherwise be missed and left untreated. Extension of the **lesion** toward the middle third could easily destabilize the entire posterior **meniscus**. Since resective surgery in these cases would most likely consist of a total meniscectomy, repair should always be attempted.

Arthroscopic Findings

The **ramp** area of the **medial meniscus** is inspected by passing the arthroscope through the intercondylar area into the posteromedial recess and flexing the knee to 90°. Rotation of the light cord (to the 1 o'clock position for the right knee, to the 11 o'clock position for the left knee) should bring the **ramp** area into view (Fig. 2.1-50).

▶ **Problem:** Arthroscope too short. Various manufacturers offer arthroscopes with barrel lengths of 14–16 cm. This is adequate in most knee joints but is too short to evaluate the **ramp** area in large knees or in obese patients (see Sect. 1.2.1, Fig. 1.2-3).

A distinction is drawn between old lesions and acute tears. The latter can be classified as follows:

- **Intrasubstance hemorrhage** (Fig. 2.1-50b).
- **Partial tear.** Usually a partial **ramp** tear can be accurately localized by selective probing. Visual inspection often reveals only blood staining.
- **Complete tear.** Portions of the tibial plateau or posterior upper tibia may be visible through the tear.

Lateral Meniscus: Fibrillation of the Free Edge

(Fig. 2.1-49)

1. **Probing.** The **meniscus** is probed to determine the extent of the degenerative changes. If the changes consists only of fine strands, resection is not indicated.

▶ **Note:** Fine fringe is normal in patients over 35 years of age and does not require treatment.

2. **Partial resection.** If the fibrillation extends into zone 2, the unstable portions of the **meniscus** are carefully and sparingly resected. This can be done with a shaver (synovial resector) or basket forceps (Fig. 2.1-49). If a basket forceps is used, the resection should be performed under constant visual control. If the lateral compartment is difficult to visualize (e.g., due to synovitis), a partial synovectomy should be performed to improve vision.

3. **Trimming.** Final trimming should be done very sparingly if at all. If trimming is done with an aggressive shaver attachment such as a **meniscus** cutter, the resection can easily violate zone 2 and become much more extensive than intended due to the “mushy” consistency of the central meniscal tissue.

4. **Probing.** The remaining **meniscus** is probed to exclude areas of instability. A small degree of residual instability is considered acceptable.

Lateral Meniscus:

Fibrillation Extending into the Peripheral Zone

The treatment is basically the same as that described for the **medial meniscus**. It should always be considered, however, whether lateral meniscal tissue really needs to be resected. This is decided by correlating the meniscal changes with clinical symptoms.

Commonly in association with ACL ruptures

- Acute or chronic
- Tear at the peripheral attachment of the medial meniscus
- Severe lesions often not seen on arthroscopy
- Traditional anterolateral portal used for ACLRs limited for evaluation of posterior medial compartment

Strobel MJ. Menisci. In: Fett HM, Flechtner P, eds. *Manual of Arthroscopic Surgery*. New York, NY: Springer; 1998:171-178.

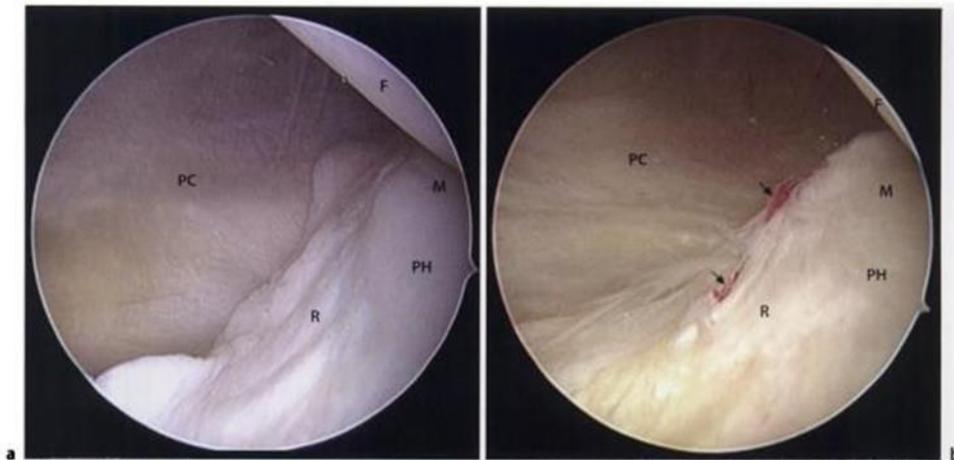


Fig. 2.1-50 a,b. View of the ramp area of the medial meniscus. **a** The posterior horn (PH) of the medial meniscus (M) is inspected by passing the arthroscope into the posteromedial recess. The area on the posterior aspect of the meniscal rim adjoining the meniscocapsular junction is called the meniscal ramp (R) (PC posteromedial capsule, F medial femoral condyle). **b** Streaklike hemorrhagic areas (arrows) are often seen in this area following trauma (e.g., an ACL rupture)

Old Lesions

Old lesions are classified as follows:

- **Scarring.** A partial tear or intrasubstance hemorrhage may give rise to conspicuous scar-tissue bands that run parallel to the posterior circumference of the meniscus.
- **Elongation.** Loosening of the posterior meniscal attachment can be detected by probing the area with a percutaneous needle. The increased mobility of the posterior meniscus can also be appreciated by probing the posterior horn area from an anterior portal.
- **Complete tear.** The posterior margin of the tear presents a bulge that may be covered by synovial tissue. Also, it is not unusual to find perifocal synovitis in the posteromedial recess. Sometimes the tibial plateau can be seen through the tear. Inspection is facilitated by passing a needle into the posterior tear fragment and angling the needle posteriorly. This is an effective maneuver for demonstrating the extent of the tear.

Operative Technique

Repair

(Figs. 2.1-51 to 2.1-55)

1. **Inspection.** The arthroscope is passed into the posteromedial recess, the knee is flexed to 90°, and the light cable is rotated for optimum visualization of the ramp area. Accurate positioning of the arthroscope is particularly important for visualizing this hard-to-detect lesion. Vision may be obscured by synovitis in the posteromedial recess or by osteophytes. If a ramp lesion is strongly suspected but cannot be confirmed or excluded by viewing via an anterolateral portal, inspection can be aided by inserting a mirror through the medial instrument portal (if the portal has been placed just anterior to the medial collateral ligament). The mirror is passed through the medial recess to the posteromedial corner. As the posteromedial recess is viewed through the anterolateral portal, the mirror can be seen on the medial side of the posteromedial recess. The mirror can be rotated to inspect the peripheral attachment of the posterior horn (Fig. 1.5-2).
2. **Needling** (Fig. 2.1-51). The posteromedial recess is distended with fluid while the knee is in 90° of flexion. A needle is inserted from the posteromedial corner of the joint until its tip appears in the posteromedial recess. Under visual guidance, the needle is inserted into the posterior part of the meniscal attachment or the posterior part of the tear. Moving the needle posteriorly will now open up the tear and more clearly define its location and extent (Fig. 2.1-51 c). When a

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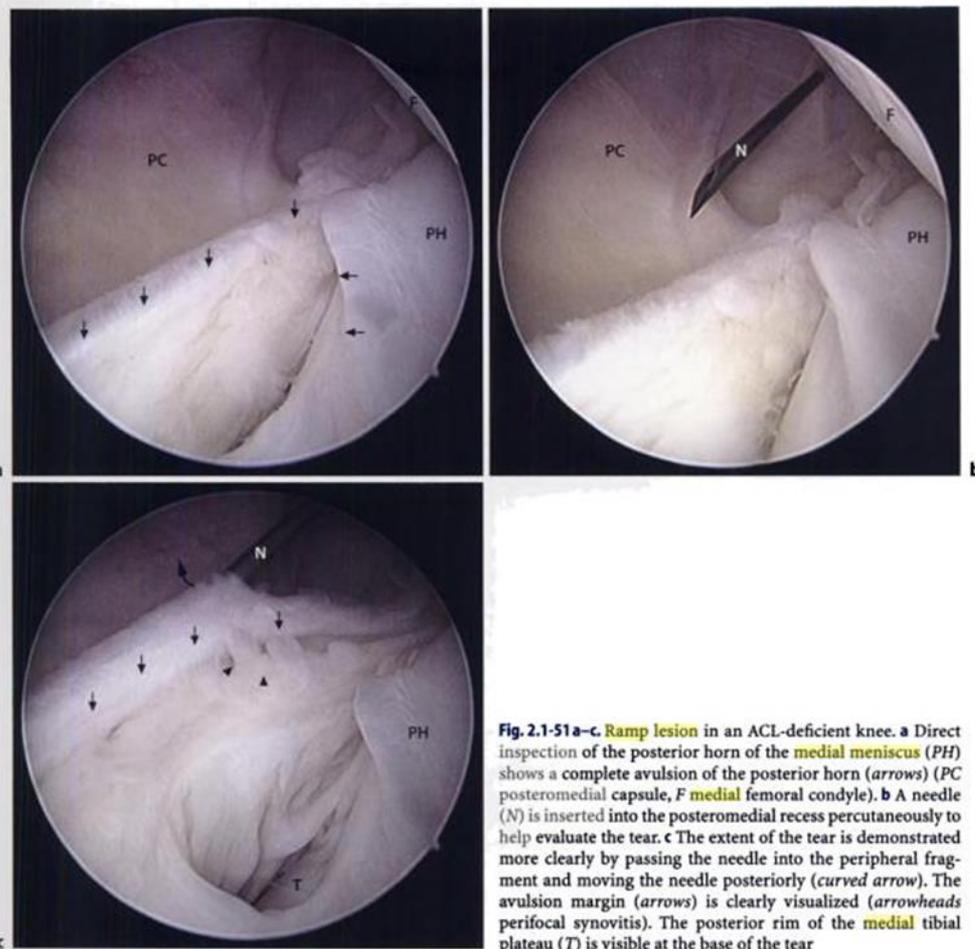


Fig. 2.1-51 a-c. Ramp lesion in an ACL-deficient knee. **a** Direct inspection of the posterior horn of the medial meniscus (PH) shows a complete avulsion of the posterior horn (arrows) (PC posteromedial capsule, F medial femoral condyle). **b** A needle (N) is inserted into the posteromedial recess percutaneously to help evaluate the tear. **c** The extent of the tear is demonstrated more clearly by passing the needle into the peripheral fragment and moving the needle posteriorly (curved arrow). The avulsion margin (arrows) is clearly visualized (arrowheads perifocal synovitis). The posterior rim of the medial tibial plateau (T) is visible at the base of the tear

tear has been confirmed, a posteromedial instrument portal is established for performing the repair. Care is taken not to place this portal too high; it should be just proximal to the medial joint line to provide a favorable angle of approach for the suturing instruments.

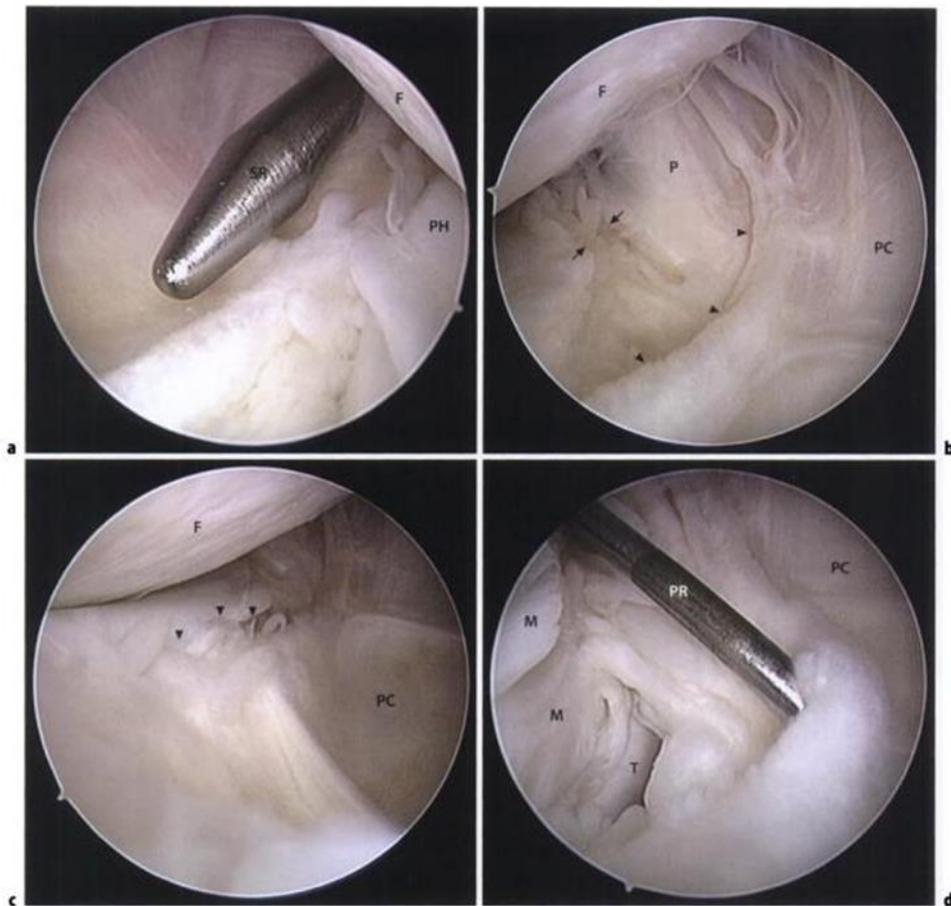
Once it has been decided to repair the ramp lesion, the leg is elevated and the tourniquet on the thigh is inflated. This will prevent troublesome bleeding from the posteromedial capsule or freshened tear site.

3. Probing and inspection (Fig. 2.1-52). The lesion is probed through the posteromedial portal, and a mirror is passed through the posteromedial portal to inspect the peripheral meniscal attachment from the

posterior side. To inspect the area directly, a switching rod is placed into the posteromedial portal, a sheath is introduced over the switching stick, and the rod is exchanged for the arthroscope (Fig. 2.1-52 a). At least a portion of the lesion can be probed through the anterior portals (Fig. 2.1-52 d).

4. Freshening the tear (Fig. 2.1-53). The tear site is freshened with a meniscal rasp or power shaver (meniscus cutter). Partial synovectomy should be performed on rounded, synovium-covered tear margins and on capsular areas adjoining the tear. Also, a needle can be inserted percutaneously into the posteromedial recess to create vascular-access channels across the tear.

Strobel MJ. Menisci. In: Fett HM, Flechtner P, eds. *Manual of Arthroscopic Surgery*. New York, NY: Springer; 1998:171-178.



5. Suturing the tear. The all-inside technique is indicated for repairs in this region. A special instrument set is required (see Fig. 2.1-6 b).

The tear is repaired using a curved suture hook angled approximately 90° at the tip (angled to the right for the left knee, to the left for the right knee). An operative cannula passed into the posteromedial compartment will make it easier to place and tie the sutures. This requires a correspondingly large posteromedial instrument portal, however, resulting in profuse fluid leakage if suture placement will be followed by an ACL reconstruction or other arthroscopic measures. Thus, the use of an operative cannula is reserved for a few selected indications.

Tip: When placing the suture, pierce the posterior tear fragment before piercing the posterior horn.

Fig. 2.1-52a–d. Repair of a ramp lesion of the medial meniscus (continued from Fig. 2.1-51). **a** A switching rod (SR) is inserted into the posteromedial recess (F medial femoral condyle, PH posterior horn). **b** The sheath has been inserted and the arthroscope exchanged for the switching rod, demonstrating the posteromedial recess with the medial femoral condyle (F), posteromedial capsule (PC), and the PCL (P), which is covered with synovium. A variable bandlike ridge (arrowheads) runs along the wall of the posteromedial recess. An area of synovitis (arrows) is also visible at the tear site. **c** When the scope is retracted, the ramp lesion (arrowheads) is barely perceptible. **d** When the posteromedial capsule (PC) is moved posteriorly with a probe (PR) passed through the anterolateral portal, the full extent of the ramp lesion can be appreciated (T posterior margin of medial tibial plateau)

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Fig. 2.1-55 a–d. Repair of a ramp lesion of the medial meniscus (continued from Fig. 2.1-54). **a** After a minimum of five knots have been tied and pushed into place, the suture is trimmed with a straight punch (*P*), and the strength of the knot is tested by probing. **b** The placement of the knot (*arrows*) is also inspected with a mirror (*MI*) introduced through the postero-medial instrument portal. If the tear is extensive, a second suture should be placed medial to the first suture (*S1*). **c** Just like before a trial excursion is made with the knot pusher (*K*). **d** The mirror (*MI*) is used to check the placement of the second suture (*S2*, *arrows*) and evaluate the coaptation of the tear

6. **Grasping the suture.** The end of the suture is grasped with a fine forceps passed through the posteromedial portal parallel to the suture hook. Then the release button on the handle of the suture hook is pressed so that the grasped suture can be pulled out of the joint (Fig. 2.1-54), and the suture hook is removed.
7. **Excluding a soft-tissue bridge.** The knot pusher cannot be used properly if there is an obstructing soft-tissue bridge between the suture tails. Thus, before the sutures are tied, the knot pusher is passed over both sutures and advanced to the meniscal surface to make sure that the path is clear. If this can be done without difficulty, the sutures may be tied (Fig. 2.1-54b).

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Internal Derangements of Joints



2nd Edition

DECember 2006

- Longitudinal vertical tears are common in the posterior horn of the medial meniscus, a site at which resistance to tensile, or hoop, stress is the weakest.
- In rare circumstances, more than one such tear occurs at the time of injury; double vertical longitudinal tears are termed **ramp lesions**.

Menisci: Longitudinal Vertical Tears

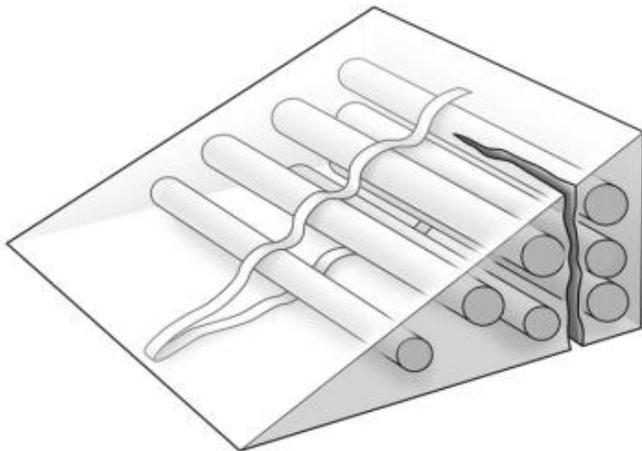


Figure 25-98. Menisci: longitudinal vertical tears
Longitudinal vertical tears propagate along the line of least resistance and therefore parallel the course of the longitudinal collagen bundles. As they lengthen, the tears violate more and more of the radial tie fibers; and at some point, central displacement of the inner margin of the torn meniscus may occur, resulting in a bucket-handle tear.

FEBRUARY 2010



Posteromedial meniscocapsular injury associated with rupture of the anterior cruciate ligament

A PREVIOUSLY UNRECOGNISED ASSOCIATION

S. R. Bollen

From Bradford Teaching Hospitals Trust, England

While injury to the posterolateral corner is accepted as a relatively common occurrence associated with rupture of the anterior cruciate ligament, posteromedial meniscocapsular injury has not previously been recognised as such. In a prospective assessment of 183 consecutive reconstructions of the anterior cruciate ligament this injury was observed in 17 cases, giving it an incidence of 9.3%. Clinically, it was associated with a mild anteromedial rotatory subluxation and it is important not to confuse this with posterolateral rotatory subluxation. In no case was this injury identified by MRI. The possible long-term clinical relevance is discussed.

FEBRUARY 2010

- Prospective study
- All arthroscopic procedures performed over a 14 month period with careful inspection of the posteromedial recess
- Two groups of arthroscopic patients
 - ACL reconstruction for isolated injury (meniscal tear not visible on mri)
 - 17 of 183 with meniscocapsular injury
 - Other
 - None with meniscocapsular injury

JANUARY 2011

Arthroscopic Prevalence of Ramp Lesion in 868 Patients With Anterior Cruciate Ligament Injury

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Investigation performed at Beijing Jishuitan Hospital, Beijing, People's Republic of China

Background: A special type of repairable meniscal lesion involving the peripheral attachment of the posterior horn of the medial meniscus is commonly associated with anterior cruciate ligament deficiency and is termed a “ramp lesion.” However, there are no previously published articles reporting the epidemiologic characteristics of ramp lesions.

Hypothesis: The ramp lesion is a special type of medial meniscal tear with high prevalence associated with anterior cruciate ligament rupture; the prevalence increases with time from anterior cruciate ligament injury. Age and gender are risk factors affecting the prevalence of the ramp lesion.

Study Design: Cross-sectional study; Level of evidence, 3.

Methods: From April 2002 to October 2007, 868 consecutive knees were diagnosed as having an anterior cruciate ligament injury and received arthroscopic surgery for anterior cruciate ligament reconstruction. All the patients had verified tears of the ramp area under arthroscopy. The prevalence of the ramp lesion was evaluated retrospectively. Then, all cases were divided into different groups depending on the time interval from anterior cruciate ligament injury to anterior cruciate ligament reconstruction and other relevant risk factors such as age and gender. The effects of age, gender, and time from injury on the prevalence of ramp lesions were analyzed.

Results: Among 868 knees that underwent surgery for anterior cruciate ligament reconstruction, 144 knees were diagnosed as having a ramp lesion. The mean age was 24.7 years; there were 113 male and 31 female patients. The mean time from injury to anterior cruciate ligament reconstruction was 27.2 months. The prevalence of ramp lesions was 16.6%, which was analyzed as a logarithmic correlation with time from injury. Patients younger than 30 years of age and male patients had a significantly higher prevalence of ramp lesions.

Conclusion: The ramp lesion is a common meniscal injury that can occur at the time of anterior cruciate ligament rupture or as a result of knee laxity associated with anterior cruciate ligament insufficiency. The prevalence of ramp lesion in this patient group was 16.6%, which increased with time until 24 months after initial injury. Patients younger than 30 years of age and male patients had a higher prevalence of ramp lesions.

Keywords: ACL reconstruction; ramp lesion; meniscus; prevalence; correlation analysis

JANUARY 2011

- 868 consecutive knees with ACL reconstruction
- 144 with ramp lesion identified arthroscopically
 - “no well-defined description of ramp lesion in the published literature”
 - Study definition: longitudinal tear of the peripheral attachment of the posterior horn of the medial meniscus, less than 2.5cm in length
 - Exclusion of pts with:
 - Other injuries (PCL, posterolateral corner)
 - Tear > 2.5cm
 - Revision reconstruction
 - Bony lesion

JANUARY 2011

Prevalence of Ramp Lesion

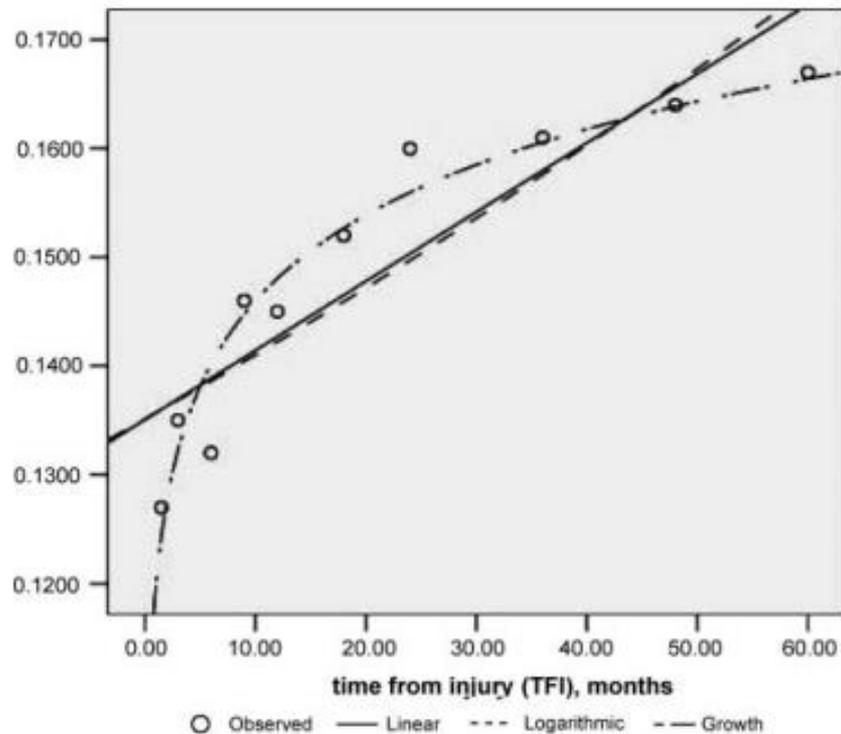


TABLE 3
Analysis of Patient Groups

Time From Injury	No. of Patients (%)	No. With Ramp Lesion (%)
<6 wk	308 (35.5)	39 (12.7)
>1.5-3 mo	77 (8.9)	13 (16.9)
>3-6 mo	78 (9)	9 (11.5)
>6-12 mo	89 (10.3)	19 (21.3)
>12-24 mo	114 (13.1)	26 (22.8)
>24 mo	202 (23.3)	38 (18.8)
Total	868	144 (16.6%)

TABLE 4
Comparison Between Male and Female Patients

Gender	No. of Patients	Ramp Lesion Total	Prevalence
Male	609	113	18.56%
Female	259	31	11.97%
Statistical study	$\chi^2 = 5.696$	$P = .017$	

TABLE 5
Patient Age Demographics

Age, y	No. of Patients	Ramp Lesion Total	Prevalence, %
10-20	221	46	20.81
20-30	307	68	22.15
30-40	233	24	10.30
>40	107	6	5.61
Total	868	144	16.59

