

Tibial Spine Fxs



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INTRODUCTION

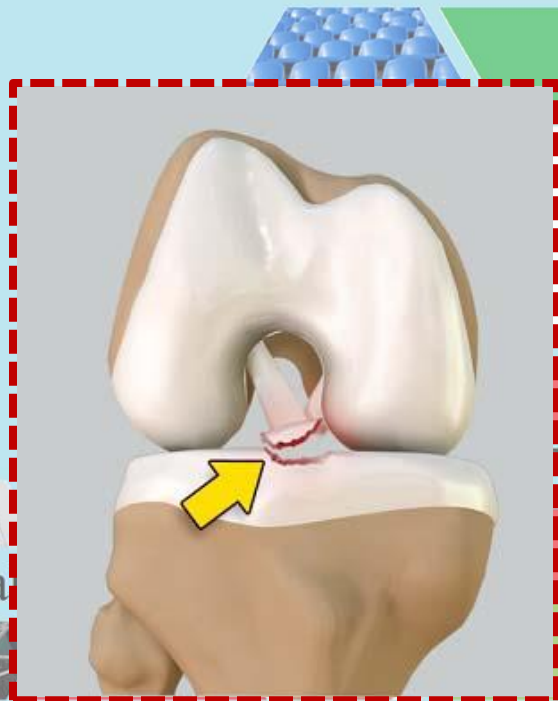
⇒ Kocher et al. :

25 midsubstance ACL tears to 25 spine avulsions → **significantly narrower notch-width index** in ACL tears.

⇒ Meyers and McKeever:

ORIF for all displaced fxs + cast.

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RX IS BASED ON FX TYPE:

⇒ Fxs that are **nondisplaced or minimally displaced** but reducible with knee extension → **immobilization**

⇒ **Hinged and displaced fxs** that do not reduce → **ORIF/ARIF**

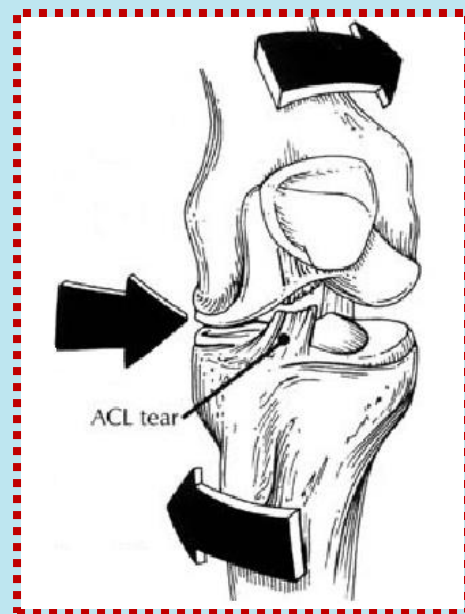
-The **prognosis for closed/operative Rx is good.**

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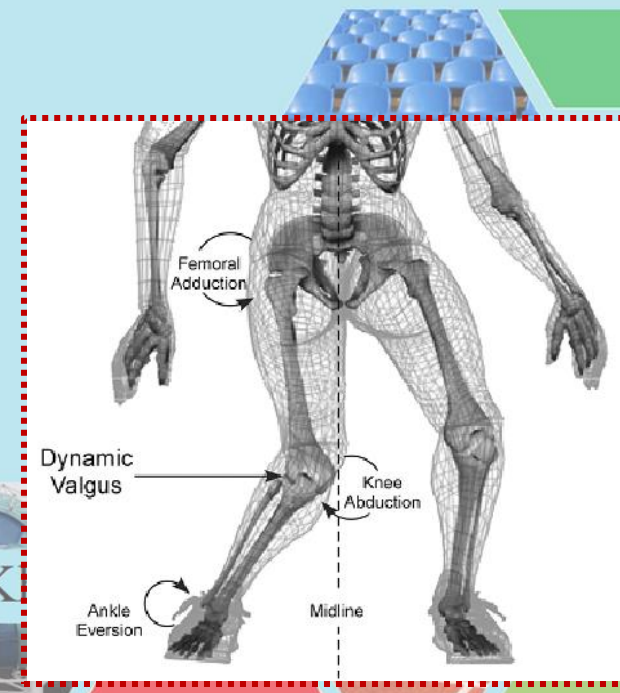
MECHANISM OF INJURY

- Classically, **bicycling accidents**,
- also pedestrian, MVA or sport...
- The most common mechanism :



Tibial valgus + ER

- also **hyperflex.**, **hypertext.**,
- **or tibial Int.Rot.**



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PHYSICAL EXAM.

- large hemarthrosis
- knee is flexed because of hamstring spasm and may lack full extension
- Lachman's test +
- The contralateral knee should be assessed for **physiologic laxity!**

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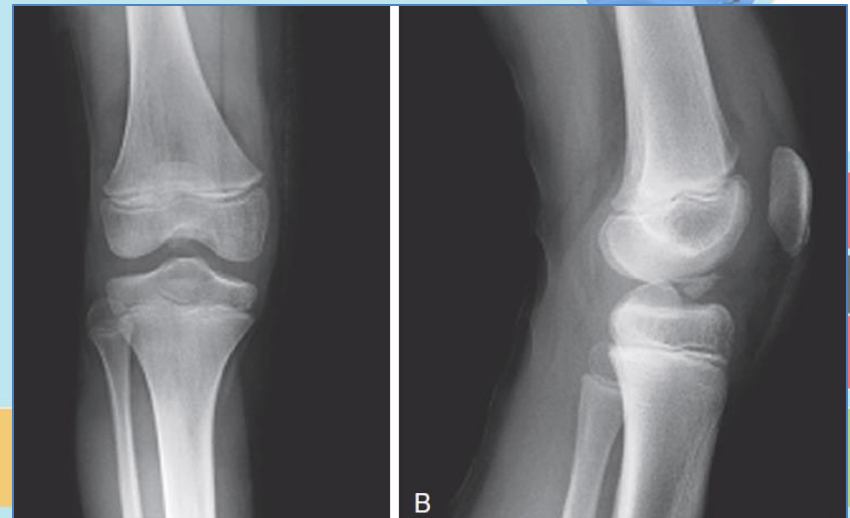
IMAGING

- AP, lateral, and

notch views are usually diagnostic.

-The fx is best seen on **lateral & notch views**.

-Radiographs should be **carefully scrutinized** because the avulsed fragment may be mostly **nonossified cartilage!**



▶ **CT** : size & displacement

- **keep in mind**: these are not “articular” fxs but **rather functional fxs** that contribute to ACL stability → the **most important** aspect is to ensure that the **ACL insertion is reduced**.

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► **MRI** is not typically necessary but may be helpful, in **very thin ossified fragment** and to evaluate associated **collateral lig, chondral, meniscal,...** pathology.



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■ CLASSIFICATION

-The system of **Meyers and McKeever** based on the **degree of displacement** is widely used

-Zaricznyj → **fourth type, comminuted**
fxs



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CLASSIFICATION

Type 1: minimal displacement.

Type 2: hinged on its post. border

Type 3: complete separation

-The **interobserver reliability** between type 1 fxs and type 2 and 3 fxs is good; however, differentiation **between type 2 and 3** fxs may be difficult.



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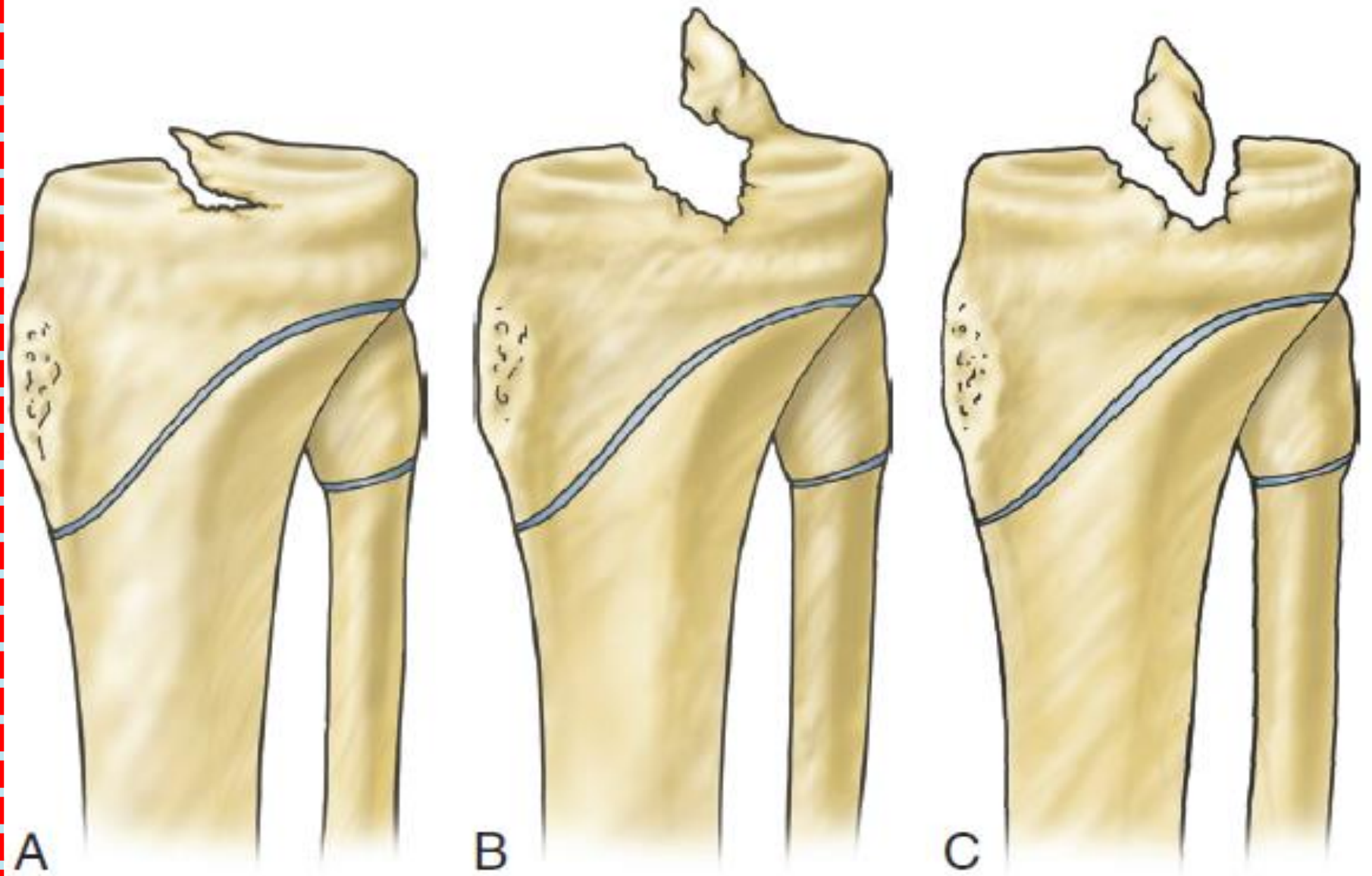
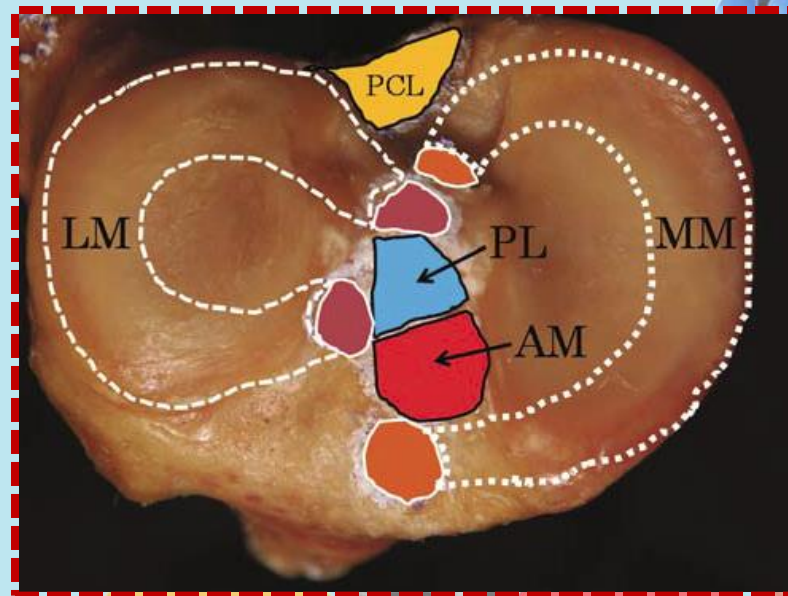


FIG 117.3 Meyers and McKeever Classification System of

☐ SURGICAL AND APPLIED ANATOMY

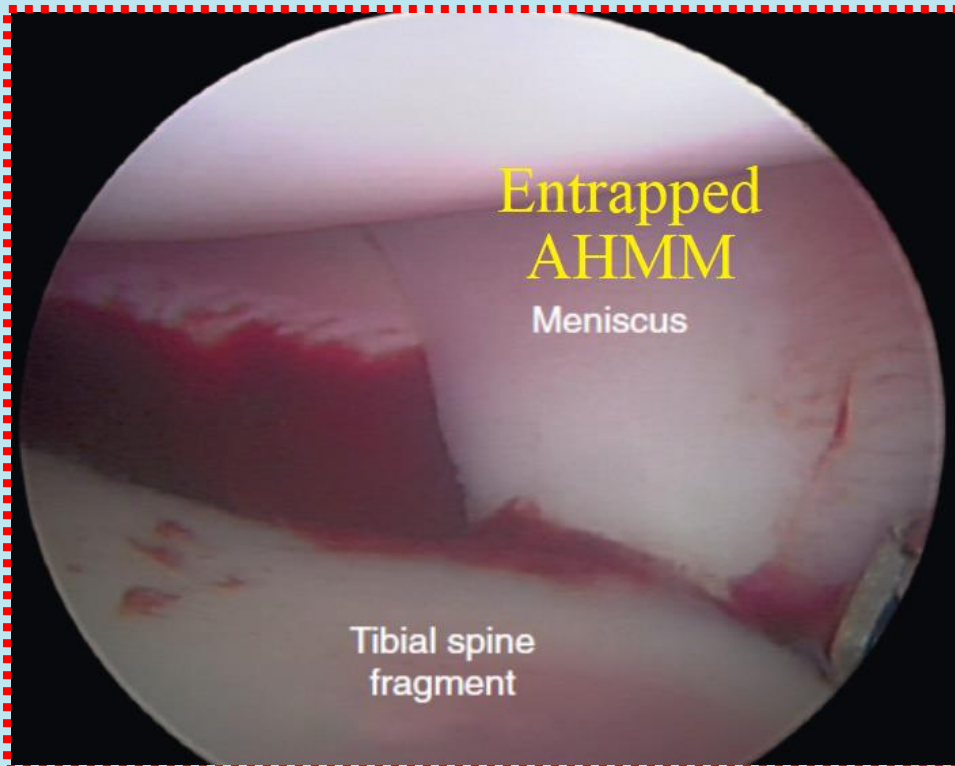
-The ACL attaches distally to the **anteromedial** portion of the tibial intercondylar eminence.

-Both menisci insert into the tibia in the region between the lateral and medial eminences, but there is no direct connection between the ACL and the menisci.



► Lowe et al.: the **AHLM** and the **ACL** are attached simultaneously and pulling in different directions.

-Meniscal or intermeniscal lig. entrapment
under the displaced fragment can be common



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► Kocher et al.: 80 pts-tibial eminence fxs ORIF

-entrapment of the **AHMM** ($n = 36$),

-**intermeniscal lig.** ($n = 6$),

-**AHLM** ($n = 1$)

in 26% of type and

65% of type 3 fxs.

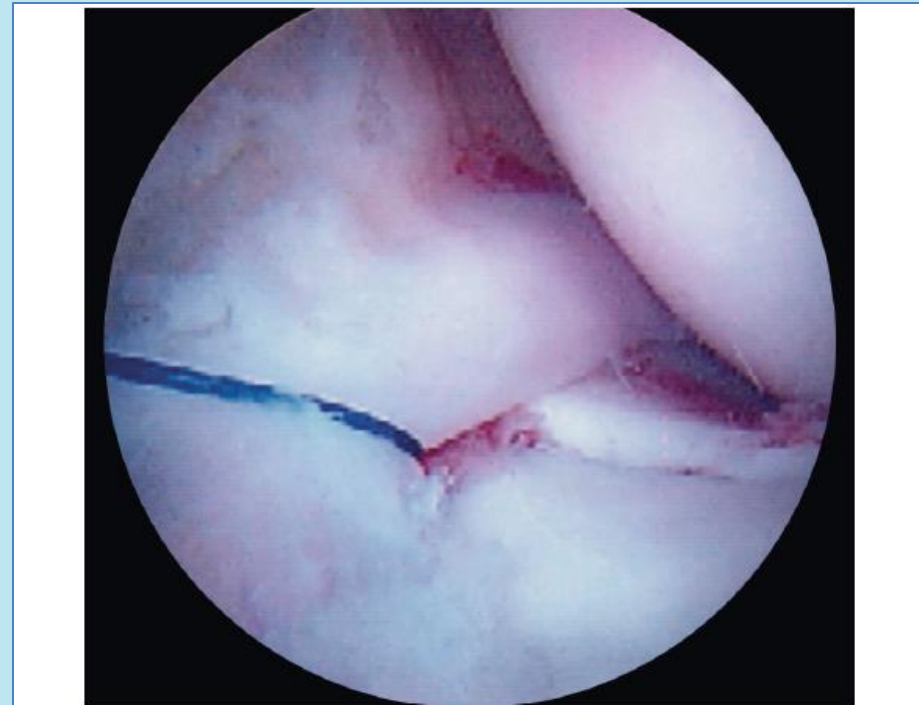


FIG 117.6 Use of a retention suture to retract the anterior horn of the medial meniscus.

■ CURRENT RX OPTIONS

- include CR & cast immobilization, ORIF & ARIF
- ARIF: **suture ,wire , screw, anchor, suture-button, suture bridge(anchors), bioabsorbable nail fixation.**
- most common methods are **suture or screw.**
- **biomechanical studies**→ ↑↑ **construct strength** for **suture repair**, clinical studies have not shown a clear advantage!

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-The **goal is anatomic reduction**, but there is controversy that fx should be **over-reduced**.

-well-reduced eminence fxs shows subtle increases in **AP knee laxity** without functional deficit.



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⇒ **CLOSED RX:**

for type 1 & 2 or 3 that can be successfully reduced by CR

-Aspiration of the hematoma is performed first and CR by the knee in **full extension / 20-30° of flexion.**

-If the fx fragment extends into the medial or lateral plateaus, full extension may aid reduction.



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► Kocher et al.:

-CR in $\approx 50\%$ of type 2 (26/49),

-unsuccessful in all 57 of type 3!



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AUTHOR'S PREFERRED RX:

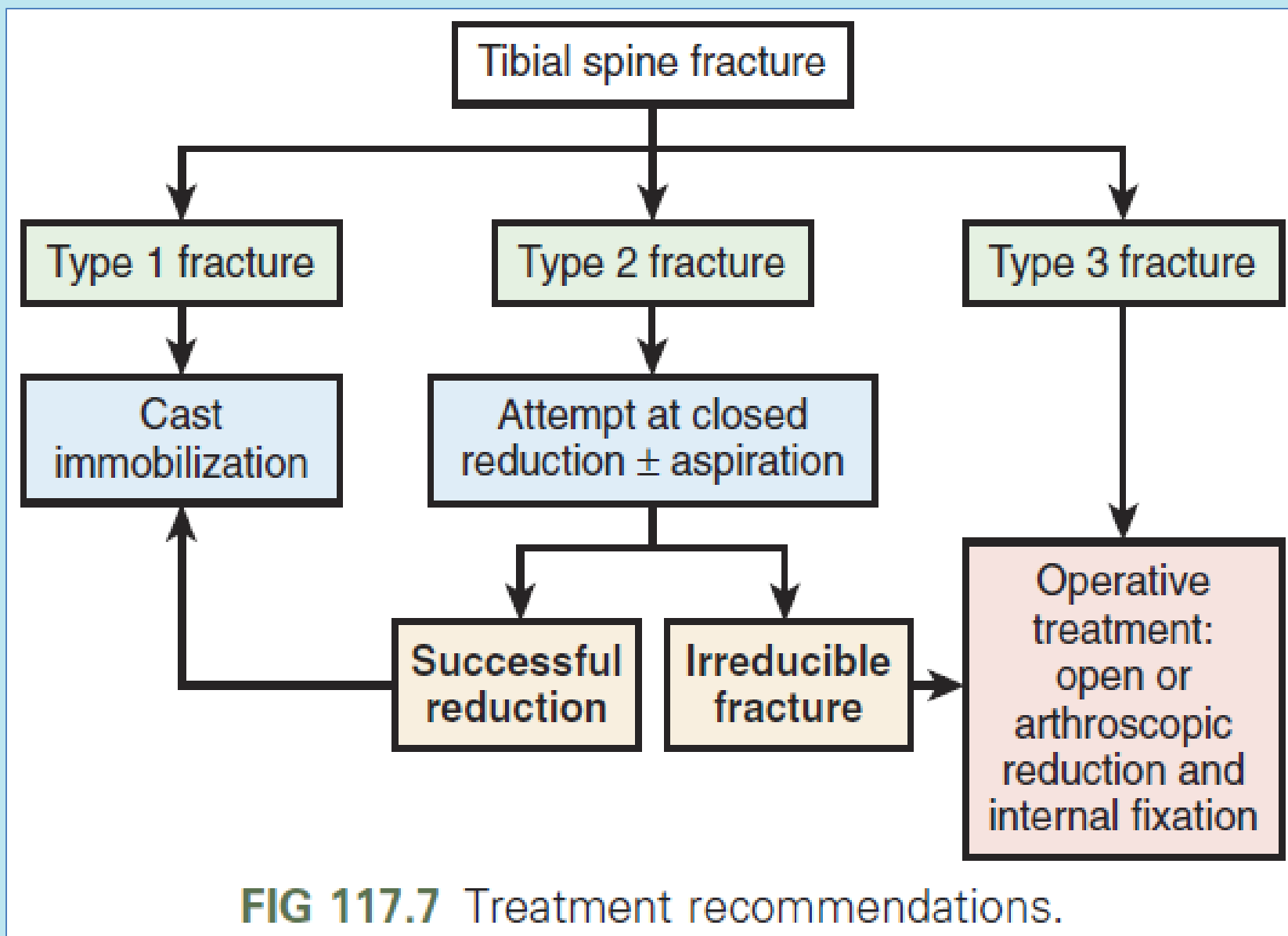


FIG 117.7 Treatment recommendations.

⇒ **TYPE 1 FXS:** immobilization

- A local anesthetic can be injected.
- A long-leg/cylinder cast, or locked hinged brace in 0-20° of flexion.
- Radiographs are repeated in 1-2 weeks .
- Immobilization(6 weeks)
- **Hinged brace** and physical therapy is initiated.
- Return to sports at 3 months**
- A sports **ACL brace** for the **first 6-12 months.**

⇒ **TYPE 2 FXS:** attempt at CR.

-The hematoma is aspirated and local anesthetic is injected

-CR at **full extension/ 20-30° of flexion.**

-If reduction is obtained → immobilization

-If the fx does not reduce → operative Rx.

⇒ **TYPE 3 FXS:** attempt CR;

-The author's preferred ARIF/ ORIF (medial parapatellar incision)



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ARIF WITH EPIPHYSEAL CANNULATED SCREWS

-A **high anterolateral viewing portal** is made at the inferolateral border of the patella, and a **lower anteromedial working portal** is placed at the joint line, just medial to the patellar tendon.

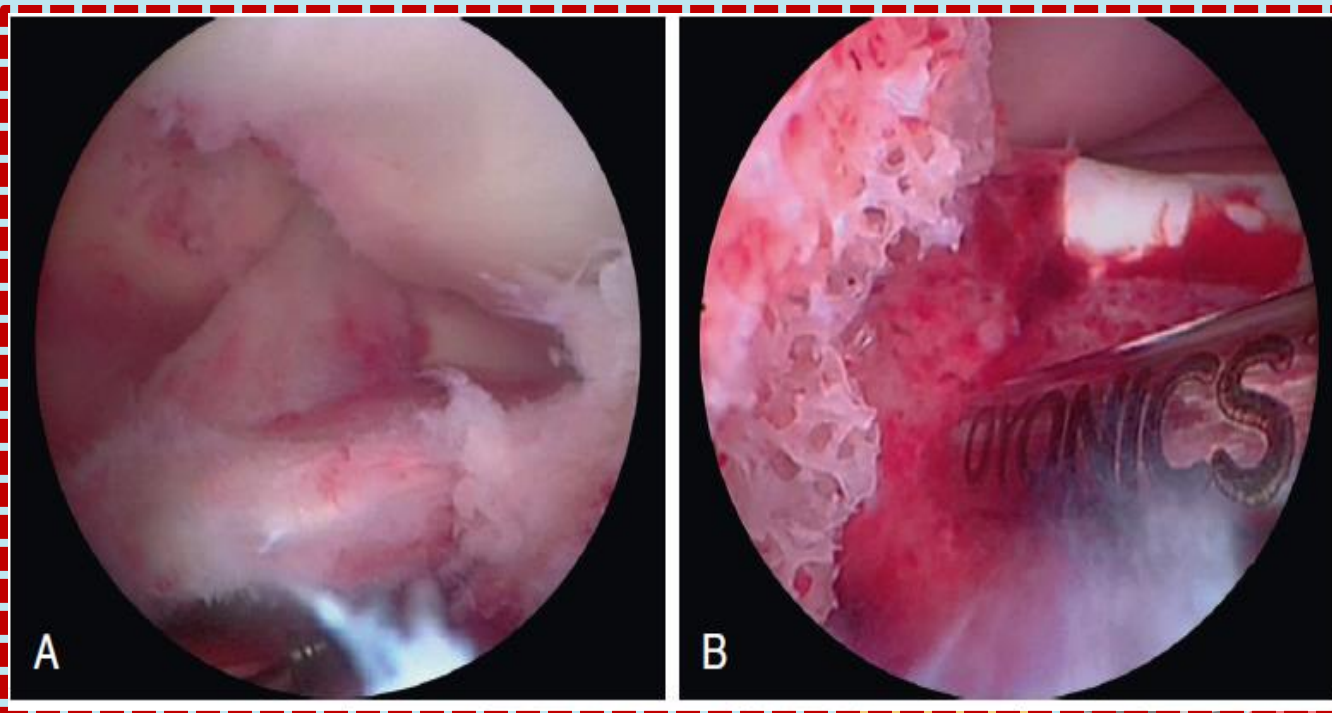
-**Accessory superomedial and superolateral portals** are necessary for screw insertion.

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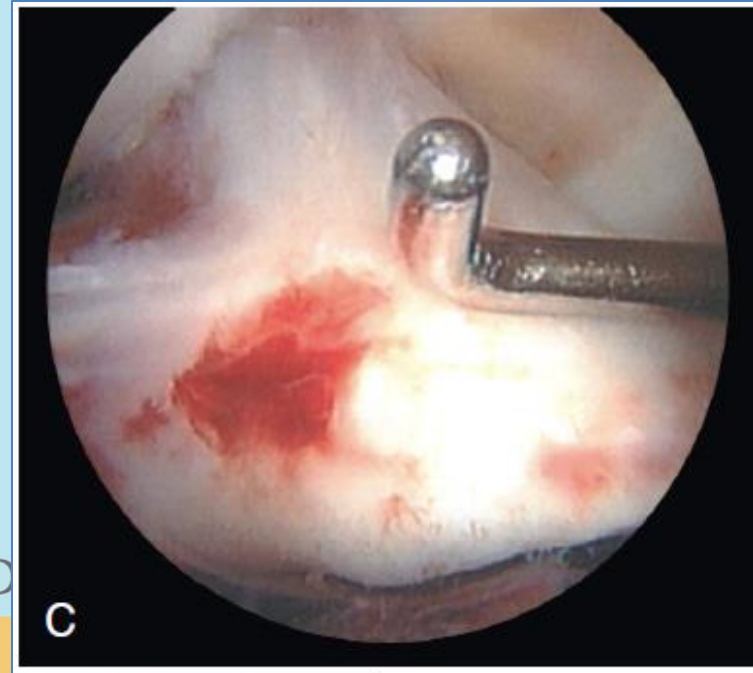
-A small amount of excess subchondral cancellous bone can be removed from the base of the fx for **over-reduction** and better tension the ACL.



-The spine fragment is often **thin**→ avoid removing any bone from spine .

-Screw fixation is most applicable to larger (**>1 cm²**) fragments.

-The tibial spine fragment is often hinged laterally and this **hinge** can be used as a **key to reduction**.



-Over-reduction by 1-2 mm is preferable.

-Cannulated guide wires are placed just off the superomedial and superolateral borders of patella.

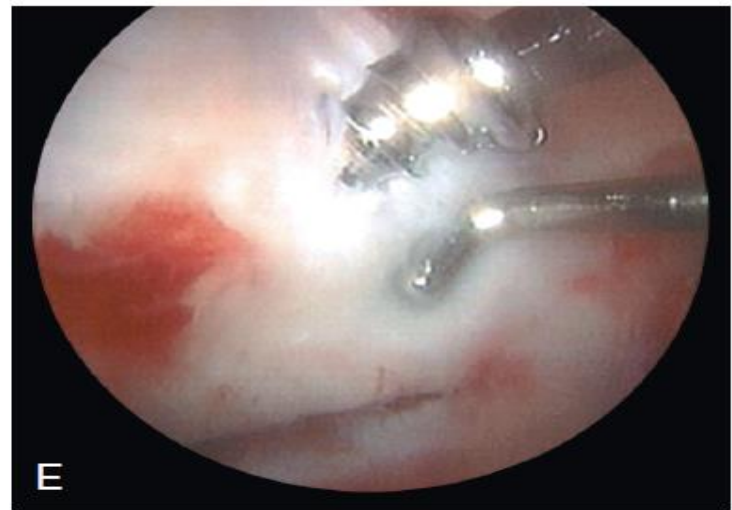
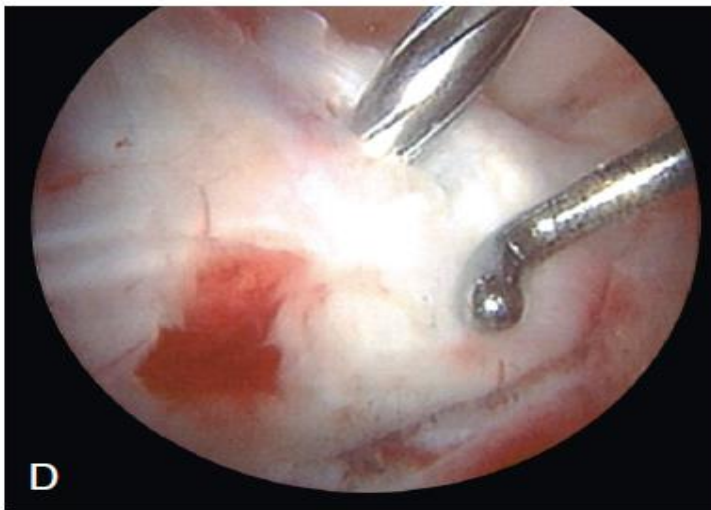


FIG 117.8 Arthroscopic Reduction and Insertion of Cannulated Screw Internal Fixation for a Displaced Tibial Spine Fracture. (A) Tibial spine fragment. (B) Elevation and débridement of the fracture bed. (C) Reduction of tibial spine fragment. (D) Drilling with a cannulated screw system. (E) Insertion of 3.5-mm screw.

- 1-2 screws are inserted based on the size of fragment.
- Partially threaded 3.5-mm diameter screws are most commonly used .
- It is recommended to use a **tap** prior to placing the screw to prevent fragmenting.



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-The knee is evaluated through a full ROM to ensure **rigid fixation and there is no impingement.**



FIG 117.9 Type 3 Tibial Spine Fracture Treated With Arthroscopic Reduction and Screw Fixation. (A) Preoperative anteroposterior radiograph. (B) Preoperative lateral radiograph. (C) Postoperative anteroposterior radiograph. (D) Postoperative lateral radiograph.

- Postoperatively, pts are placed in a **hinged brace and touchdown weight bearing for 6 weeks.**
- Motion is restricted to 0-30° for first 2 weeks, then slowly increased toward full ROM at 6 weeks.
- The **brace is locked in extension for sleeping.**
- Radiographs are obtained to evaluate maintenance of reduction and fx healing at 2 and 6 weeks.
- Cast immobilization in **20-30° of flexion** for 4 weeks postoperatively may be necessary in **younger children.**



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-Pts are typically allowed to return to sports at 12-16 weeks.

-Screws are not routinely removed.

-Functional ACL bracing is used for 6-12 months.

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Arthroscopic Reduction And Suture Fixation

-It is important here to maintain at least a **1-cm tibial bone bridge** between the guide wires at the proximal medial tibia.



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-The guide wires are exchanged for looped suture passers and two sutures are passed through the suture passers and the base of the ACL using a suture passing instrument.

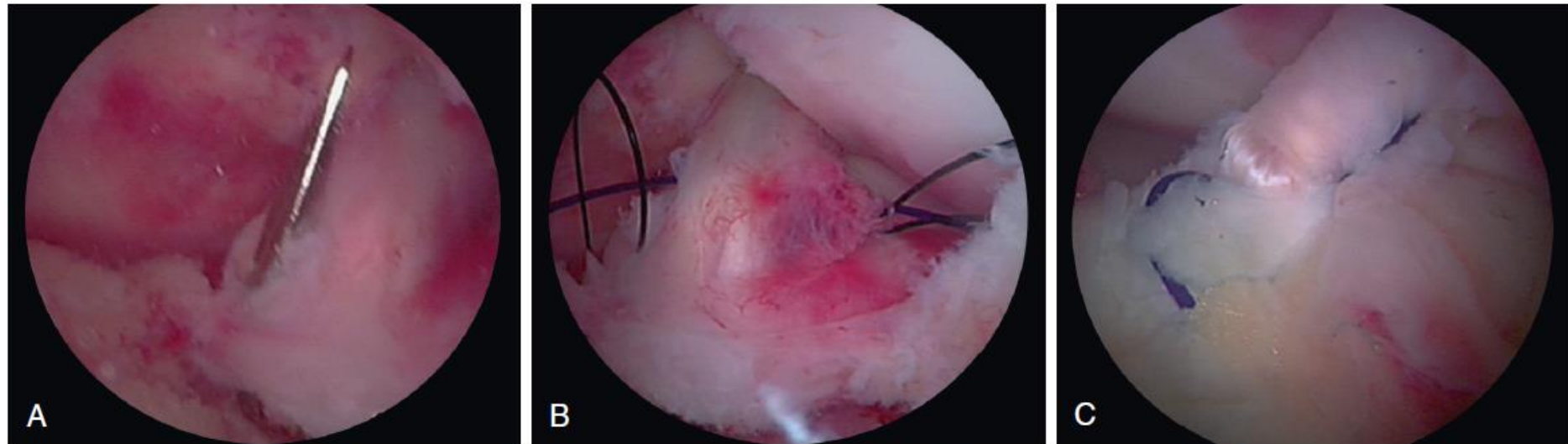


FIG 117.10 Treatment of a Type 2 Tibial Spine Fracture With Arthroscopic Reduction and Suture Fixation. (A) Drilling of a guide wire with an ACL guide system. (B) Hewson suture passers on each side of the ACL and passage of absorbable sutures through the ACL. (C) Final appearance after suture fixation.

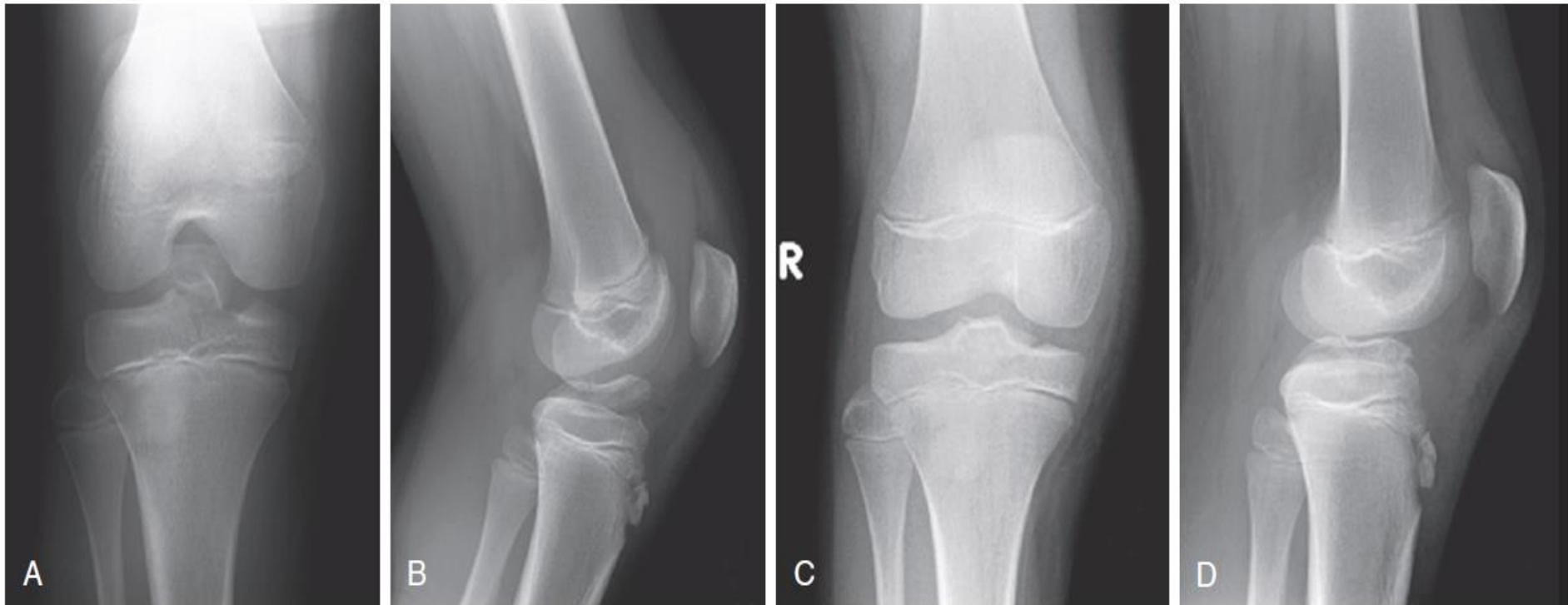


FIG 117.11 Type 2 Tibial Spine Fracture Treated With Arthroscopic Reduction and Suture Fixation. (A) Preoperative anteroposterior radiograph. (B) Preoperative lateral radiograph. (C) Postoperative anteroposterior radiograph. (D) Postoperative lateral radiograph.

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⇒ No differences in clinical outcome with different suture material **(Absorbable and nonabsorbable)**.

⇒ cadaveric study → **FiberWire yielded a superior ultimate failure load,**

Vicryl presented comparable results, and **PDS was inferior.**

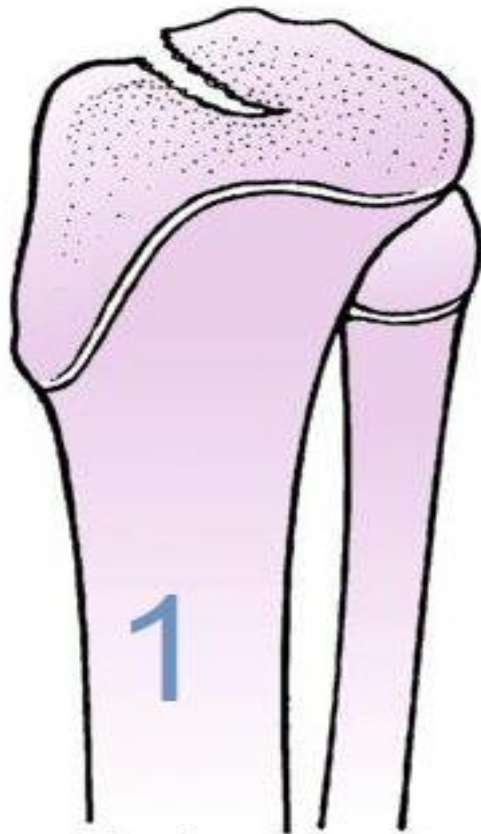


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The classification system of
Meyers & McKeever

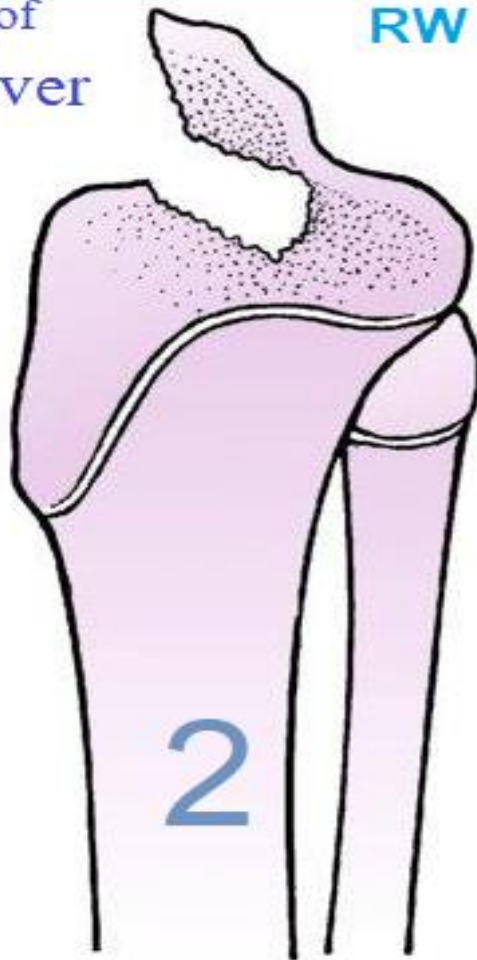
RW 2020



1

minimal
displacement

Rx: Cast 6w
(extension)
sport: 3-4m



2

remains
hinged

Rx: CR+?(OR?)
cast 20° flex
6w



3

complete
separation

CR+/-?
usually unsuccessful!!!
author's preferred Rx **ARIF**

0-30°

2w

30-60°

4w

60-90°

6w

Full
flexion

postop

Outcomes of Pediatric **Posterior** Cruciate Ligament Reconstruction

Review

A Systematic Review

The Orthopaedic Journal of Sports Medicine
2021

Michael J. Scarcella,^{*†} MD, Sercan Yalcin,[†] MD, Nicholas R. Scarcella,[†] MD,
Paul Saluan,[†] MD, and Lutul D. Farrow,[†] MD



Investigation performed at Cleveland Clinic Sports Medicine, Cleveland, Ohio, USA

Background: Little has been reported in the literature regarding surgical treatment of posterior cruciate ligament (**PCL**) injuries in **pediatric patients**.

Four articles comprising
43 knees in 42 pts

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▶ CONCLUSION

-PCL injuries in pediatric pts are **infrequent** and often occur with **concomitant injuries**.

-This is the **first systematic review** addressing the outcomes of operative management of pediatric PCL injuries.

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- Successful repair and reconstruction can be obtained with **acceptable risk to open physes.**

- **Good** outcomes and return to activity can be obtained using **repair/reconstruction.**

- **OA in 21%** of knees.

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M. Khalilzad - Knee fellow