CHIRURGIE DU SPORT BORDEAUX-MÉRIGNAC

How I fix a tibial spine avulsion / fracture ?

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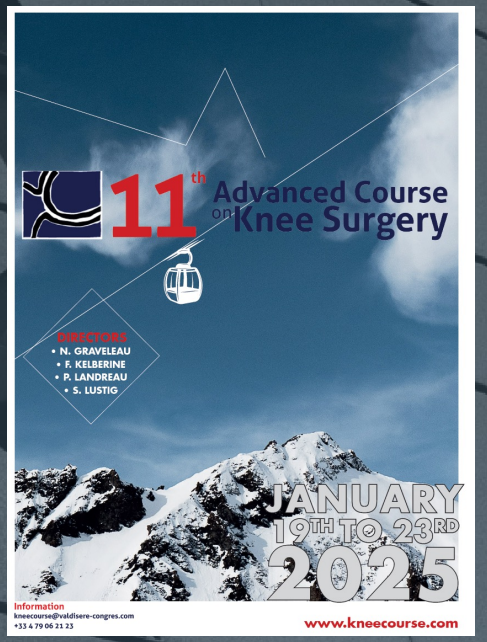

Val d'Isère Advanced Course Knee Course
January2025

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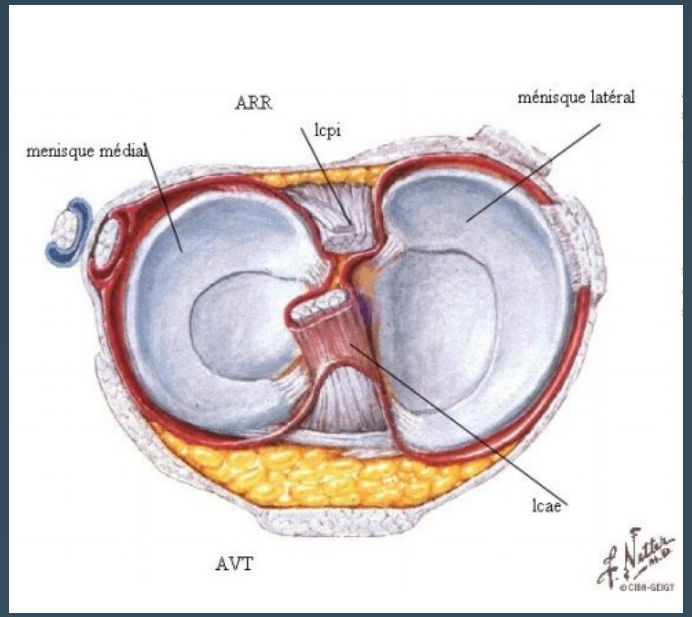
01

Introduction

Name … and shame

Chondroepiphyseal avulsion fracture of ACL / PCL tibial insertion

- Tibial eminense fracture
- Tibial spine fracture
- Intercondylar eminence fracture



General

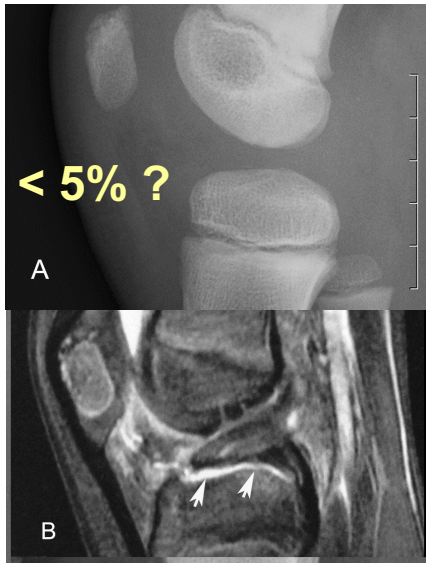
8 to 16 Y.O.
Incidence : 3/100 000 a year
Mecanism : VALFE, VARFI, hyper extension

Ligament stronger than growth cartilage

Epidemyology of ACL tears in Childrens

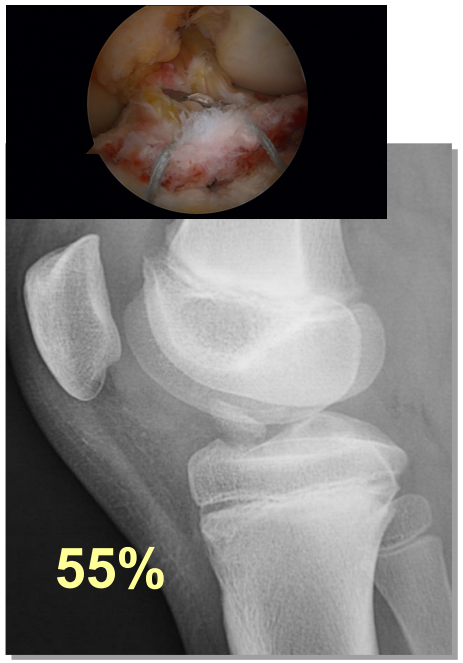
Meniscal risk

< 8 yo



Tibial spine Fracture
Cartilage avulsion

8-14 yo



Tibial spine fracture
Bony lesion

12-18 yo

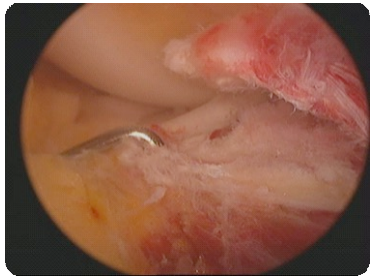
Ligament tears

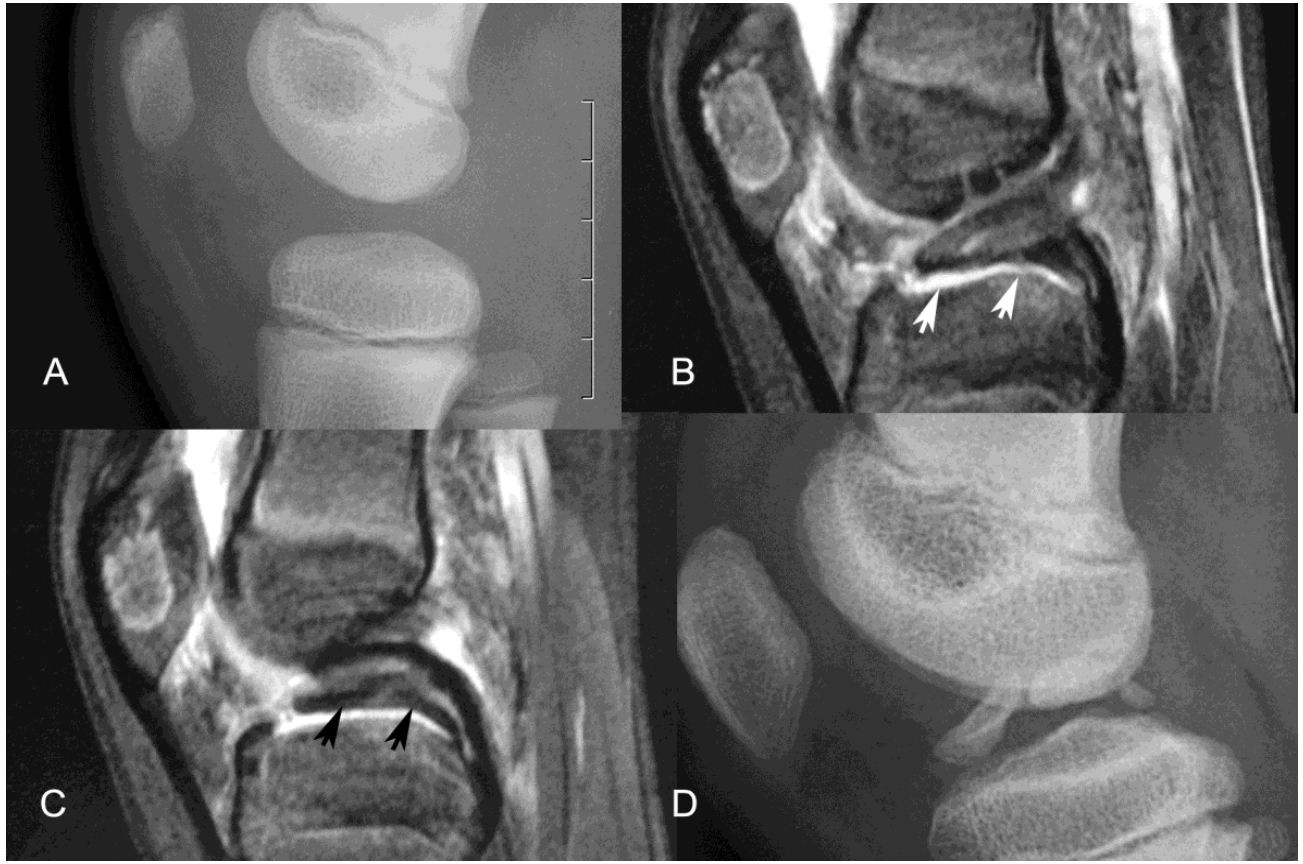
Tibial cartilage avulsion ACL

- Ski injury
- MRI :

  Epiphyseal HYPERsignal

  Double PCL

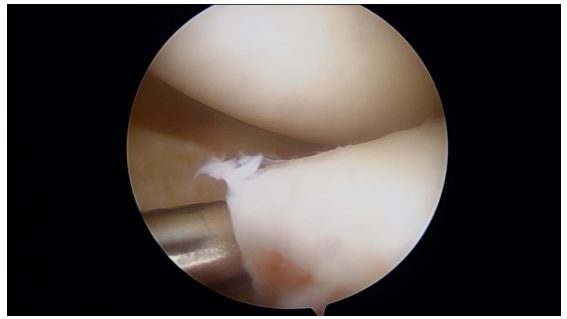


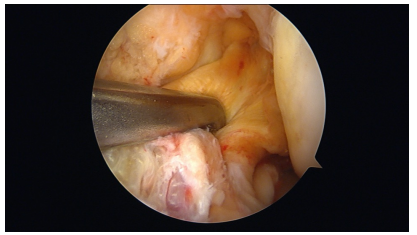


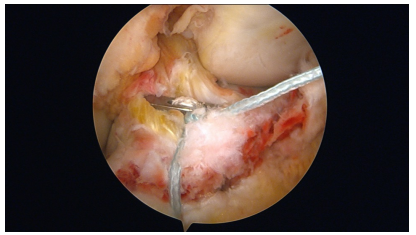
Not a meniscal LESION

Chotel *KSSTA 2013 & 2015*

Tibial Spine fractures







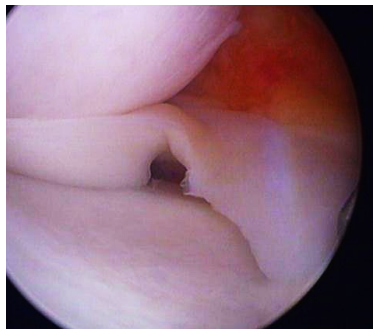
3 à 6 % ?

NO associated meniscal tears

BUT under evaluated at the time of surgery +++

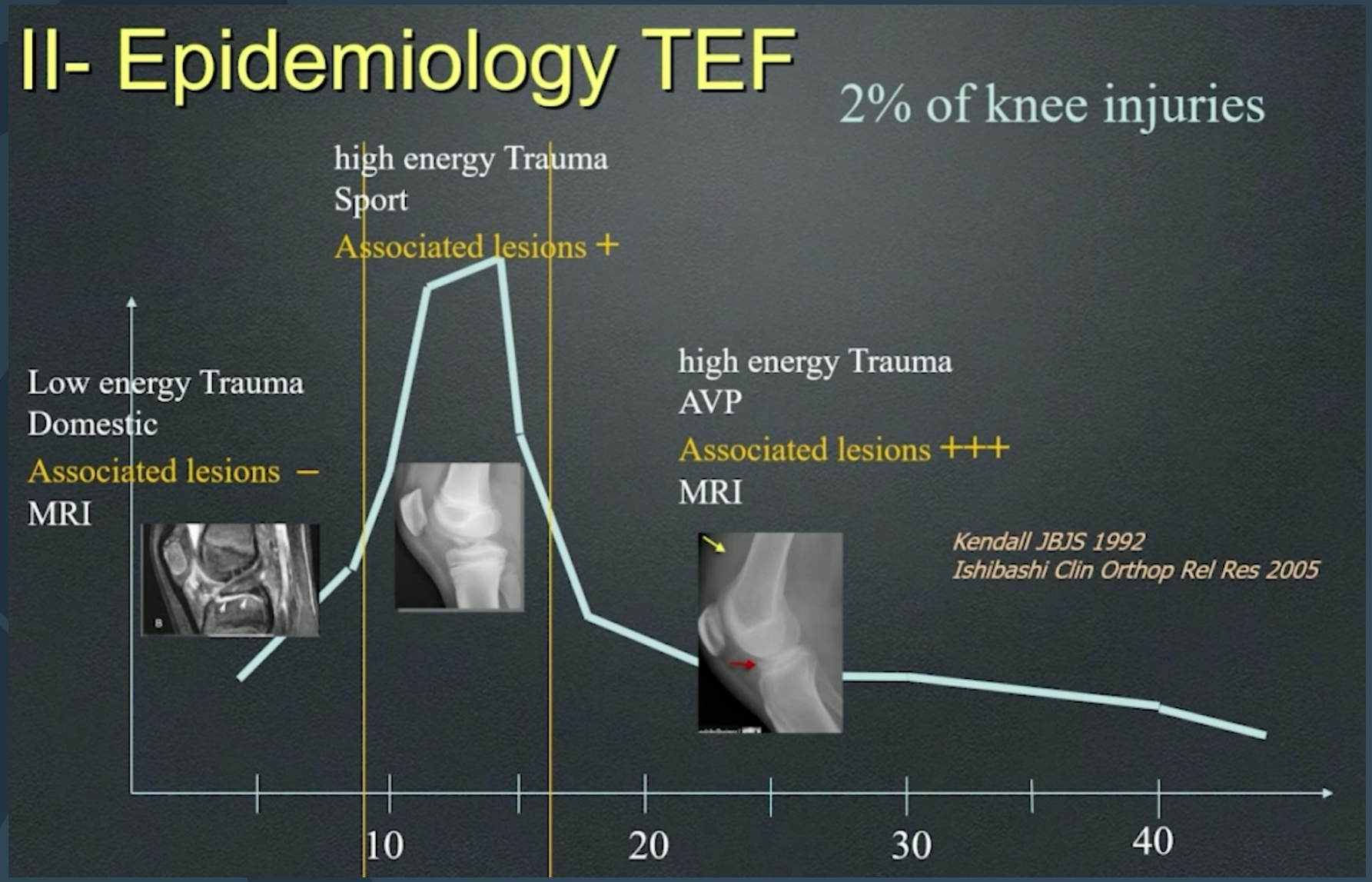
Linked with age and amount of energy in the trauma mechanism

MRI : 40 % ?
Medial AND lateral
Adolescents



Shea *JPO 2011*
Kocher *Am J Sport Med 2003*
Ishibashi *Clin Orthop Res 2007*

Pr Franck CHOTEL - Lyon



Classification of MEYERS & Mc KEEVER

Based and bone an displacement – Therapeutic interest

Type I
Minimal displacement

Type II
anterior displacement
Posterior hinge

Type III
COMPLETE separation

Type IV
Comminuted fracture

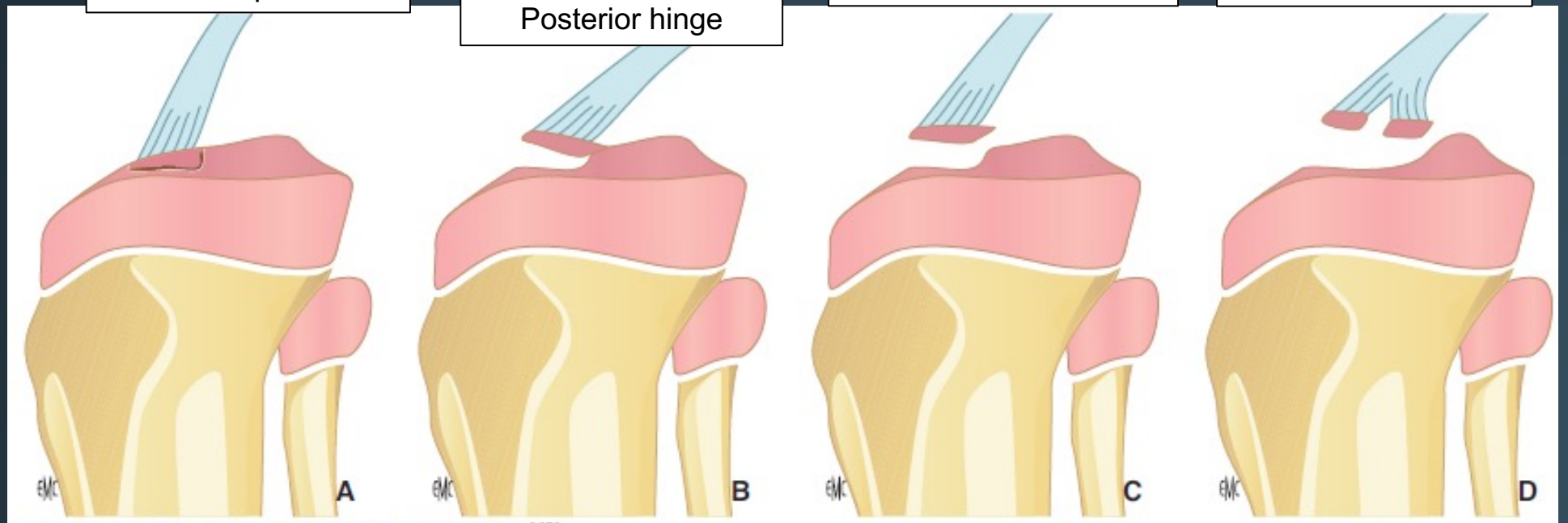


Figure 12. Classification de Meyers et McKeever [62].
A. Stade I : pas de déplacement (20 %).
B. Stade II : soulèvement antérieur en « bec de canard », avec continuité postérieure du fragment (50 %).
C. Stade III : soulèvement complet du fragment (III+ : rotation) (30 %).
D. Un stade IV a été ajouté en cas de fragment déplacé et comminutif (< 5 %).

Imaging = MRI

Ligament status :

- Tears
- entrapments

Meniscal status

Bone bruise

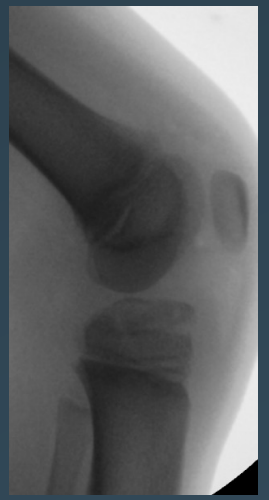
Associated MCL lesions

Adults > children : LIGAMENT

Classification ?

Ishibashi COR 2007
Shea JPO 2011

Abandoned treatments



1. **CONSERVATIVE treatment** :

Casting in extension / hyperextension :

- Hemarthrosis puncture
- Cruro maleolar plaster in extension
- General anesthesia for type 2
- Fluoroscopique assesment +/- CT scanner
- Casting : 4 - 6 semaines, FWB

= poor tolerance

Indirect reduction = lateral cartilage flaps pushed by condyles

2. **Open reduction**

Not easy and meniscal status

Technical challenges

1. Meniscal / anterior intermeniscal ligament entrapments
2. Anterior horn of lateral meniscus (LMAH)
3. Associated meniscal lesion
4. Plastic elongation of ACL prior to avulsion & partiel ACL tear

…be ready to FIX a fracture … but not only
Coul be ACL reconstruction + meniscal repair

ACL displaced fractures : Myers & Mc Kevers II-III-IV Arthroscopic treatment

Delayed : 5-15 days (bleeding and vision)

Arthroscopic exploration first : associated lesions

GOALS :

restore joint congruency to avoid residual flessum
restore anterior laxity control by tensioning the ACL

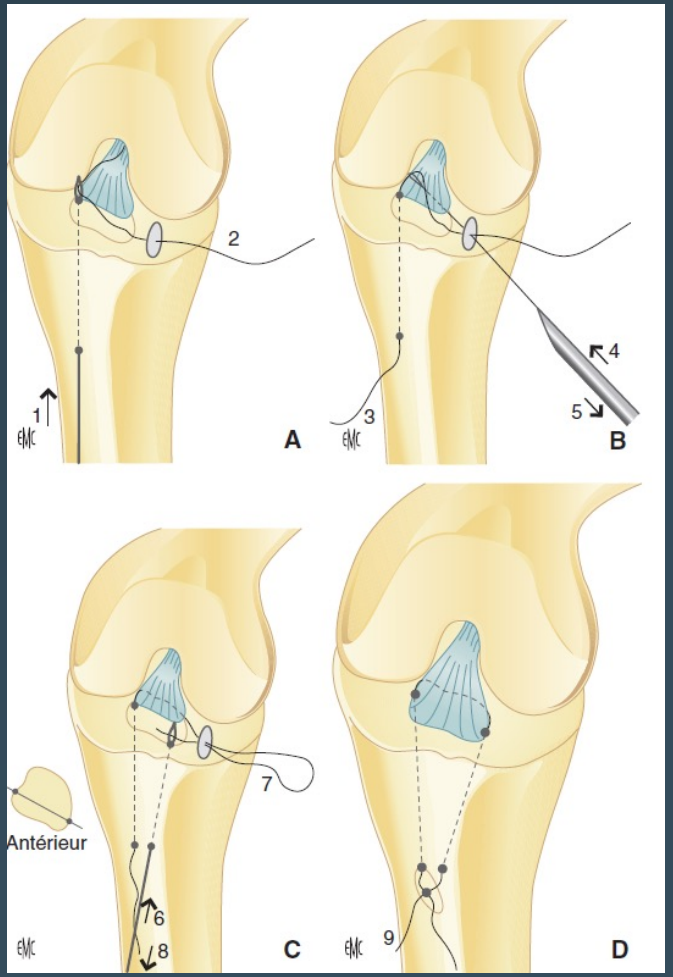
Pull-out sutures

Efficient and all type of fracture

Anterior drilling holes if posterior hinge

Retensioning of streched ACL , countersinking

Additional anterior anchoring

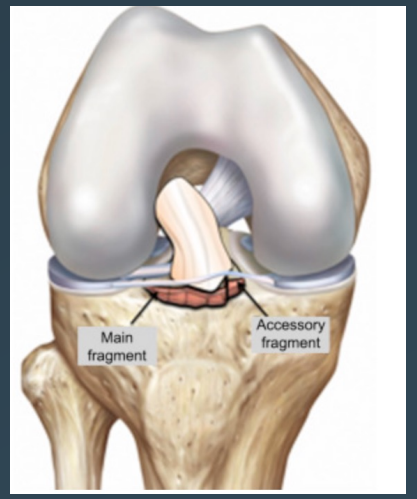


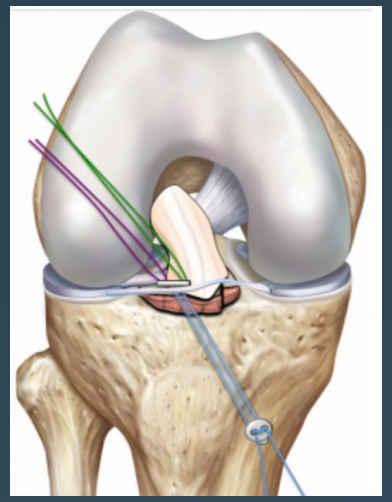
Speed-bridge

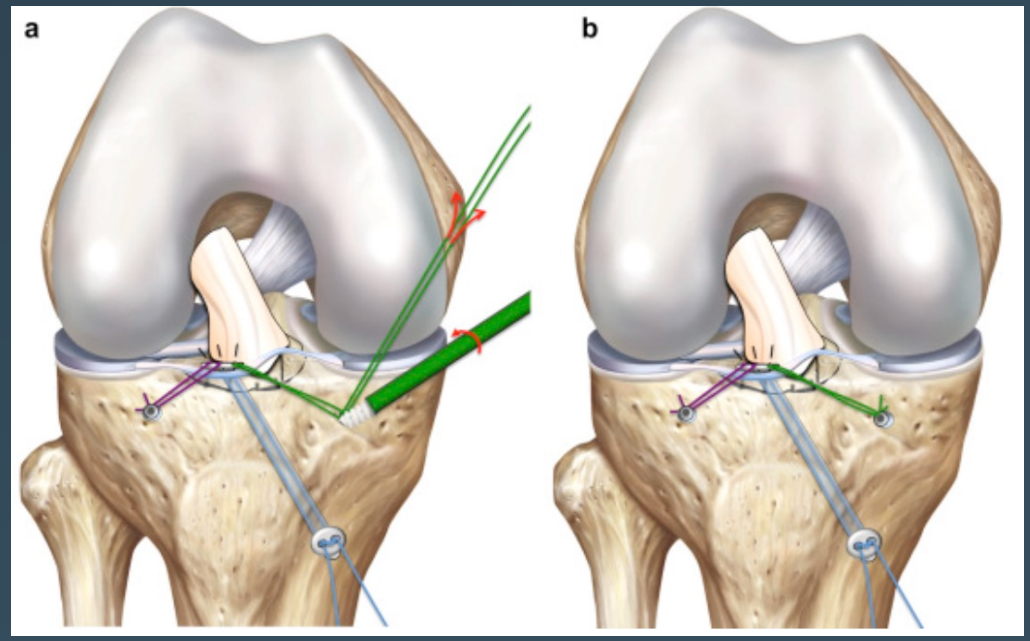
Inspired by shoulder cuff repair

Additional anterior anchoring

Avoid anterior bone overlaping



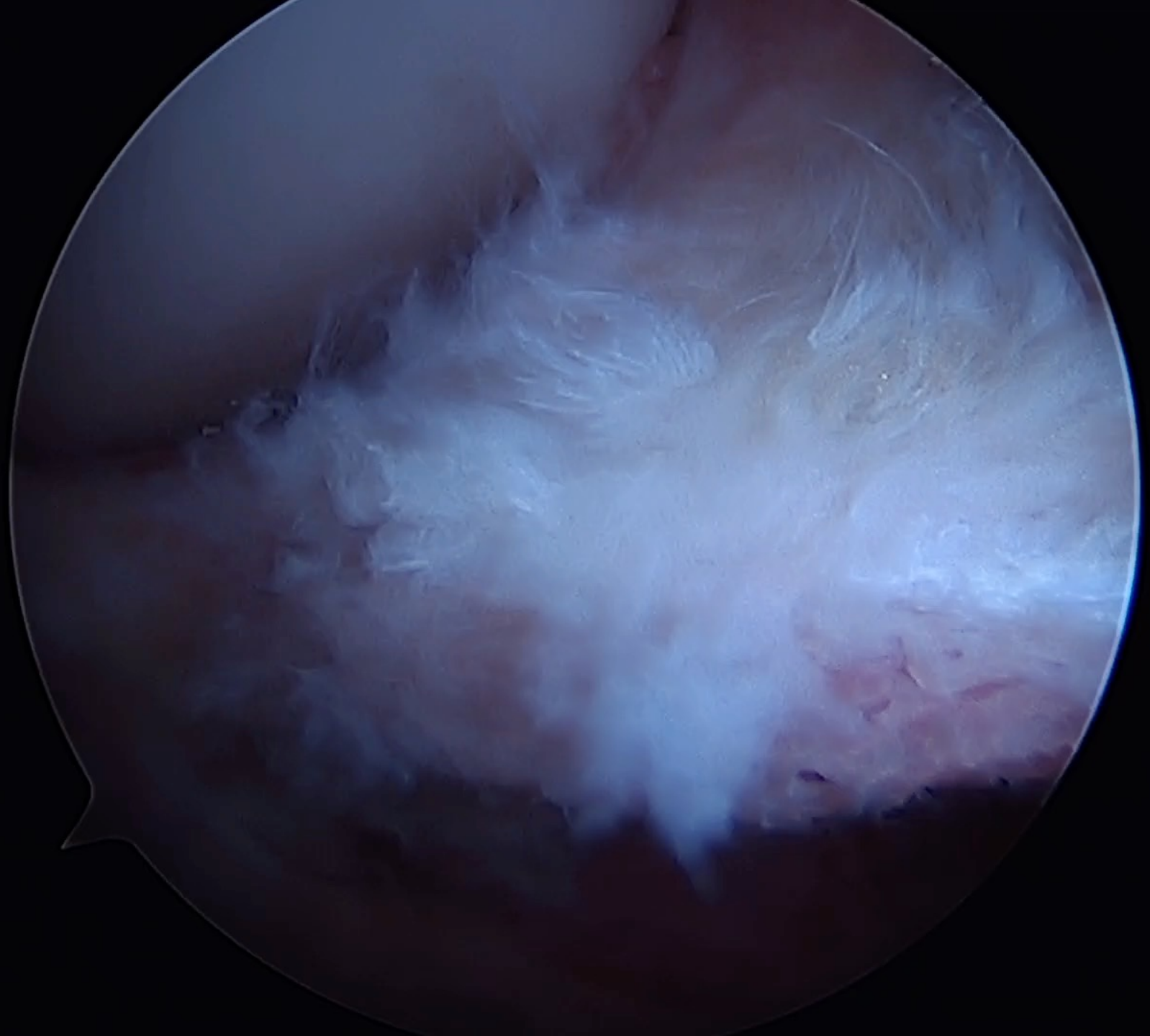




Technical note

Speed-Bridge arthroscopic reinsertion of tibial eminence fracture (complementary to the adjustable button fixation technique)

A. Hardy [a b], L. Casabianca [a b], O. Grimaud [c], A. Meyer [c]



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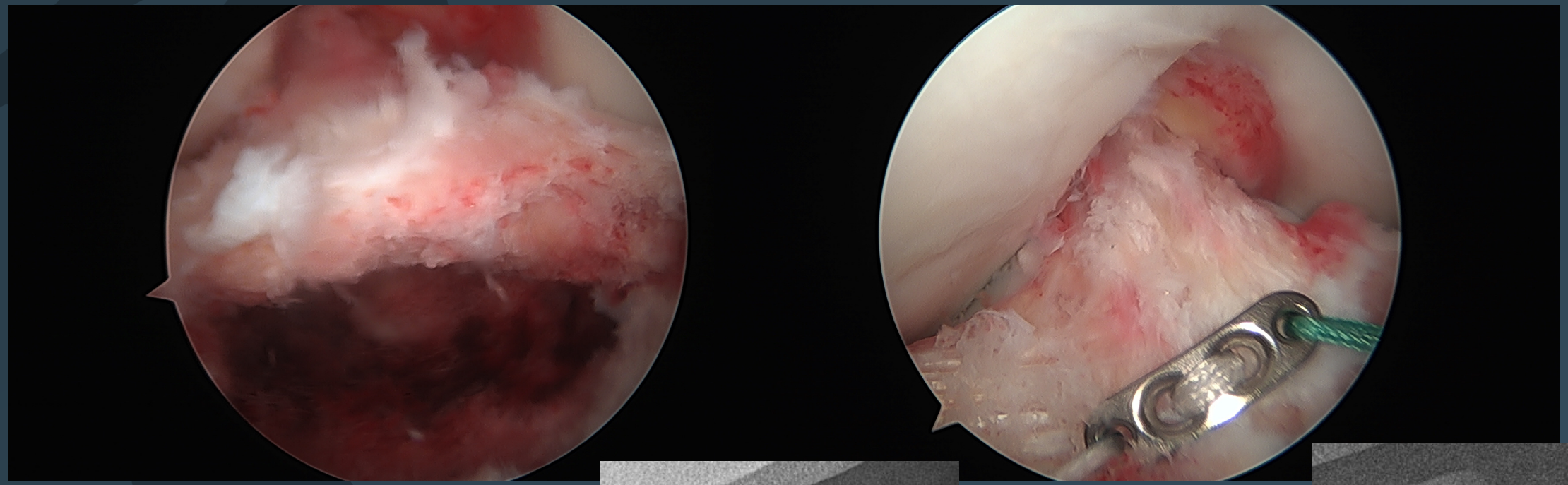

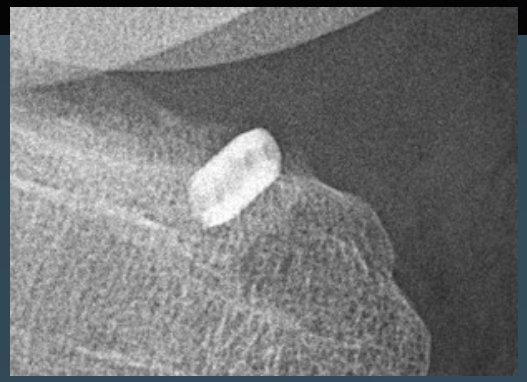

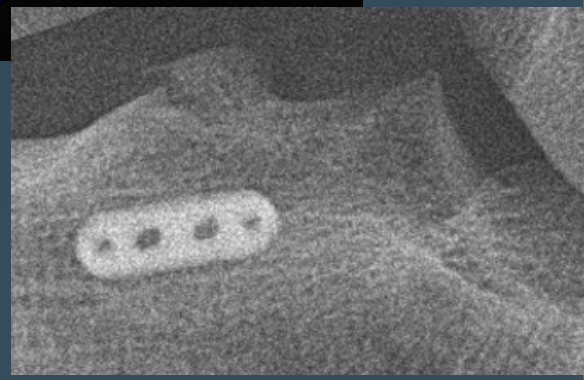

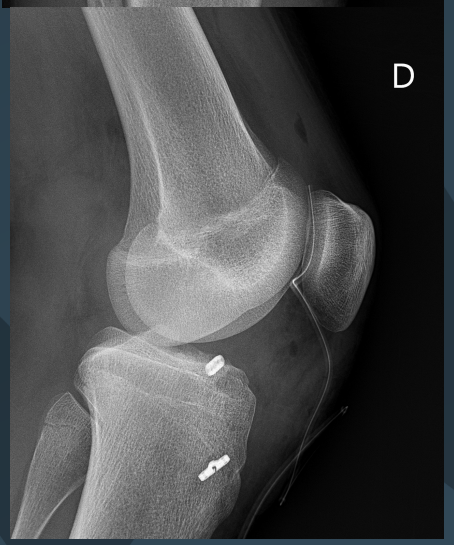
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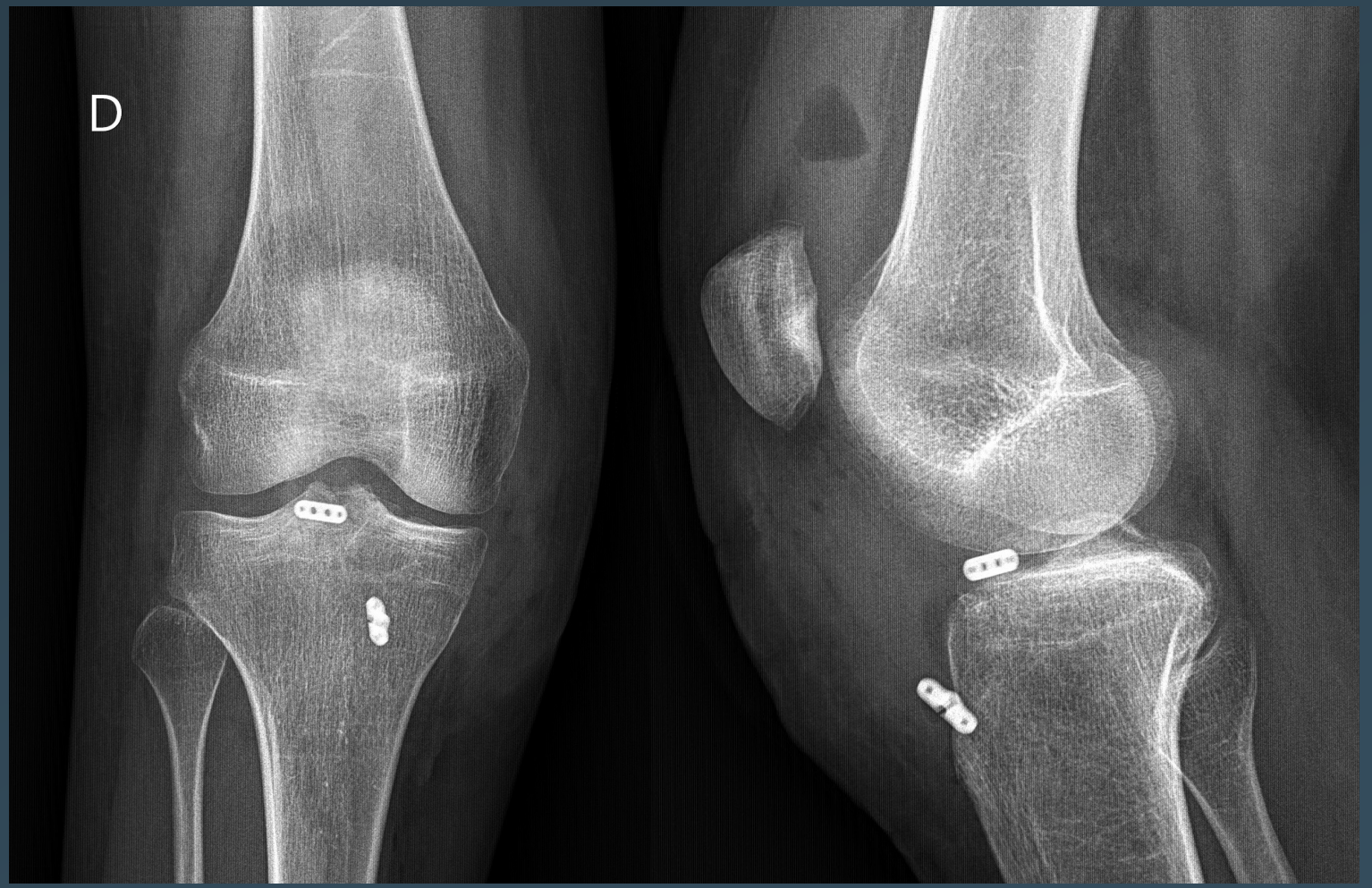
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02

Complications

Arthrofibrosis 10 %

Lack of extension > 10° of asymetry
Knee flexion < 90°

- Hardwire impingment
- AMI
- Agressive rehabilitation

Treatment : arthroscopic arthrolysis with selective cut of adhesions

Vander Have AJSM 2010

Growth disturbance & modifications

Type A : growth ARREST

- Avoid multiple perforation of the growth plate
- Early removing / NO transphyseal fixation devices

Type B : overgrowth

- Up to 1 cm longer

Arrest tibial tuberosity: recurvatum

NO transphyseal hardware or synthetic graft

Arrest distal lateral femur physis: valgus knee

Arrest medial proximal tibial physis: Varus knee

Chotel KSSTA 2010
Mylle Arch Orthop Trauma Surg 1993
Ahn KSSTA 2005

Non-union and mal-union

Managment under debate ?

Pain / flexion / instability

Retraction of ACL

Luger Arthroscopy 1994

Displacment > 2 mm (mal-union)

N-U : Bone grafting of the fracture « bed »

M-U :

- Stable + Flexum = **Notchplasty**
- Unstable = **ACL rec.**

Residual laxity / instability

F.U. 4 years :

- up to 20 % pivot test +
- UP to 75 % of residual laxité ATT

FU 7 years :

- 50 % symptomes
- 100 % residual laxity

- Better results in recent study

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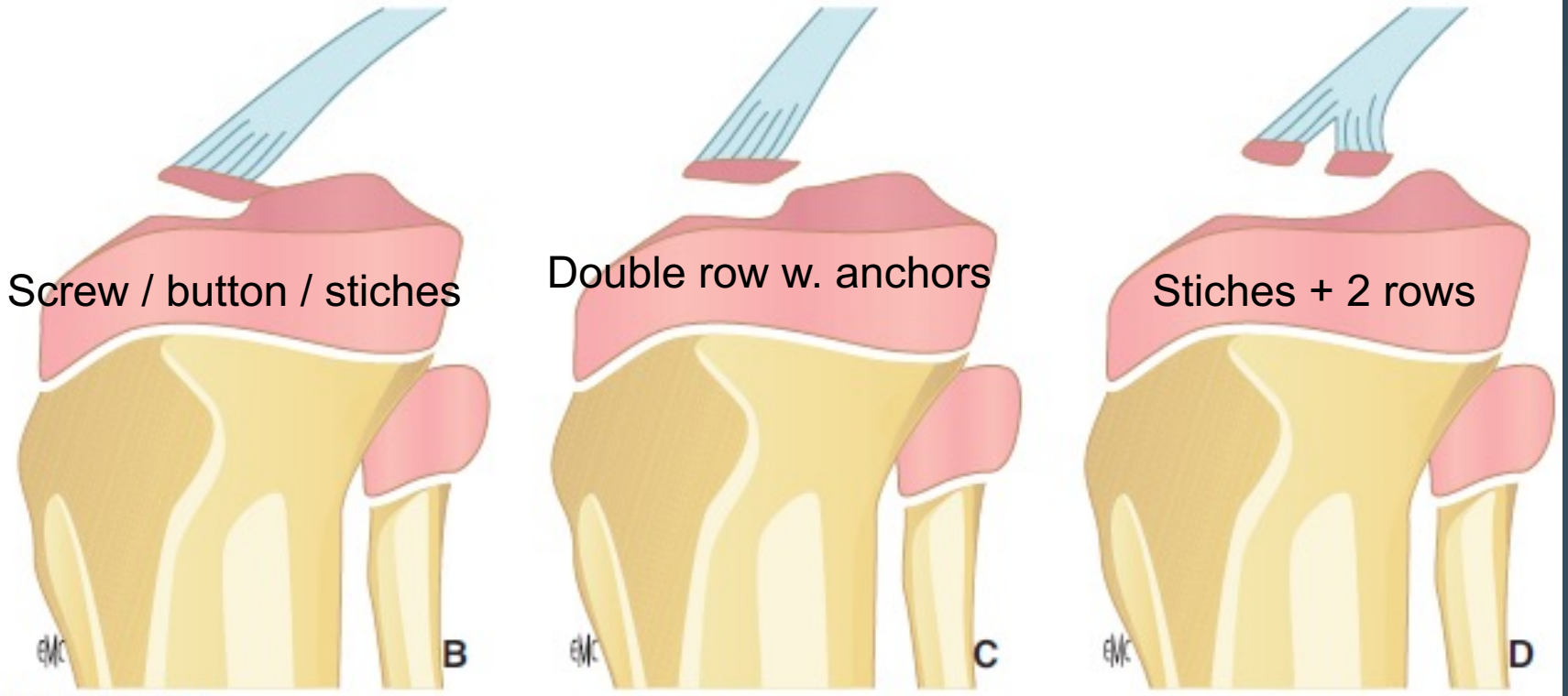
03
Conclusions

Conclusions

Wait up to 5 – 15 days
Arthroscpic technique
Treat all lesion
Early ROM



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Take Home Message

< 9 yo : cartilaginous avulsion = **MRI**

MRI : **associated lesions**

Displaced fracture > II : reduction & fixation under arthroscopic control

ACL treatment … not « only » a tibia fracture

!!! Arthrofibrosis

Potential evolution to INSTABILITY and the to meniscal repair