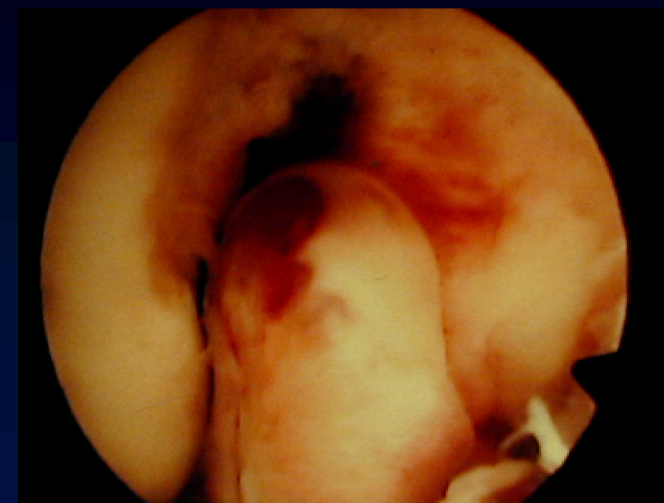




ACL-Reconstuction in Stiff Knee



François Kelberine, Jean Philippe Vivona, Barbara Staelens

Aix-en-Provence, France

Stiffness prevalence > ACL-R

✓ Lack of flexion and/or extension

✓ Flexion > 10° or flexion < 125°

Harner *AJSM* 1992

✓ Main complication after ACL-R (4-35%)

George *AJSM* 2006

✓ Pre operatively causing factors

✓ Inflammation (pain, swelling)

✓ Immobilisation

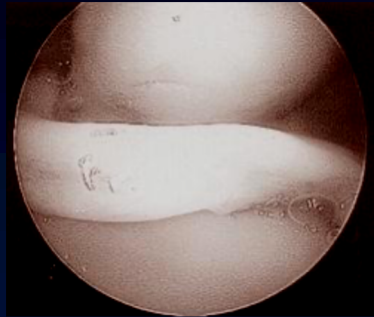
✓ Lack of physio

✓ Stiffness ++

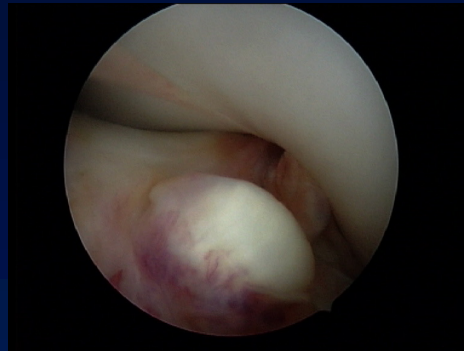
Pre-op causing factors are multiple

✓ Mechanical

- ✓ Meniscal tear
- ✓ Cyclop syndrom
- ✓ Medial scar



✓ Inflammation



✓ Functional

✓ Psychological

Timing / Trauma

✓ Acute

✓ Subacute

✓ Delayed

CRPS

✓ Frequent & unpredictable

✓ Neural input of the medial aspect of the knee

✓ Bone scan

✓ Lack of flexion & extension

✓ NO FAST SURGERY



Decisional factors / ACL-R

- ✓ Acute vs delayed (≠ chronic old lesion)

- ✓ Combined lesions

 - ✓ Meniscal tear

 - ✓ Chondral damages

 - ✓ Collateral ligaments

- ✓ Age, economic situation

- ✓ Type of sport & patient's expectations

Acute or delayed ACL-R?

Second hit theory



✓ Worse results & risk of arthrofibrosis / repair < 3 w (BTB)

Shelbourne *Am J Sport Med* 1991

Harner & al *Am J Sport Med* 1992

Wasilewski *Am J Sport Med* 1993

Shelbourne & Patel *Knee Surg Sports Trauma Arthrosc* 1995

Maygr *Acta Orthop Trauma Surg* 2004

✓ RCT level I Bottoni & al *Am J Sport Med* 2008

✓ Hamstring ACL repair < 2d w vs > 6th w **NS**

✓ Include hemarthrosis or limited rom

✓ No data about the bone bruise or pain

Early?

- ✓ Always stiff due to trauma
- ✓ Hamstring-R (\pm meniscal resection or suture)
- ✓ Immediate rehab
- ✓ ROM, meniscal healing, Proms, hop tests
- ✓ 6,12,24 FU

Ravinaj JBJS 2010
Herbst & Fink KSSTA 2017
Barenius KSSTA 2019

Early is safe

Advantages of early ACL-R

- ✓ Avoid additional injury (menisci, cartilage, ligts)
- ✓ No muscle loss
- ✓ Healthy mindset (ACL« fracture » = repair)
- ✓ Compliance to rehab more effective
- ✓ Economic issue for athletes



Is delayed surgery still relevant?

Secondary lesions

✓ Occurrence of new cartilage or meniscal damages

✓ Odds = 1% / month in general population

Wasilewski *Am J Sport Med* 1993

Foster *The Knee* 2003

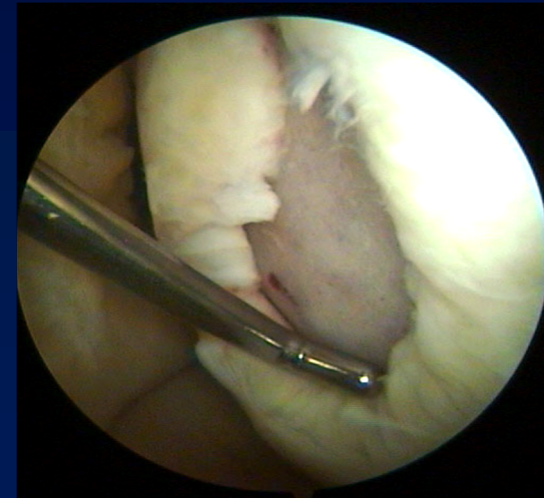
Granan & al *Am J Sport Med* 2009

✓ 100% DJD in hight athletes @ 35y

Nebelung *Arthroscopy* 2005

✓ Young athletes needs ACLR even if stiff

✓ Rehabilitation



Delayed ?

✓ Remaining literature : ROM will be better

✓ Cooled down knee

✓ Prehabilitation

✓ Trust in surgeon

✓ Mental preparedness

✓ Initiation of optimized recovery timeline

Quelard AJSM 2010
Shaarani AJSM 2013
Moon Group AJSM 2016
Macalena ISAKOS 2021

Delayed regularly better

Delayed? Early?

✓ Very early < 48h

✓ Early < 2 weeks

✓ Delayed > 6 weeks

✓ Subacute = GAP

Delayed regularly better

But

Early is safe

Patient's expectations

Usual pathway

Referred to surgeon = min 2 weeks

Surgery min 4 weeks

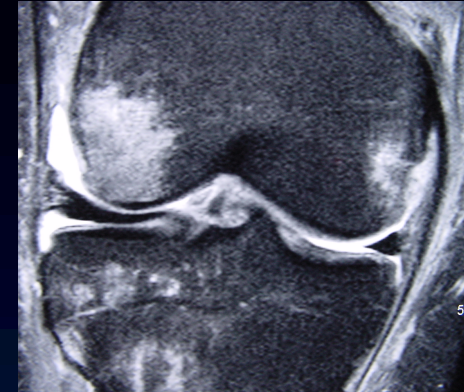
Logistic issue !! Structure & MRI

Type of trauma

- ✓ Hight grade energy trauma
 - ✓ Frequent MCL combined sprain



- ✓ Low grade energy trauma



Knee status at time of surgery

rather than time elapsed between tear and surgery

Maygr Acta Orthop Trauma Surg 2004
Beynon & al Am J Sport Med 2005
Howell Op Techn Sports Med 2009
Drakos & Warren Op Techn Sports Med 2009
Meisterling Op Techn Sports Med 2009

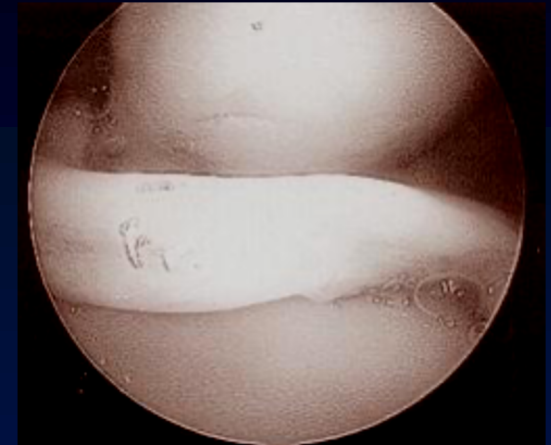


Combined lesions @ time of injury

- ✓ Delay could account for the inability to repair some meniscal tears

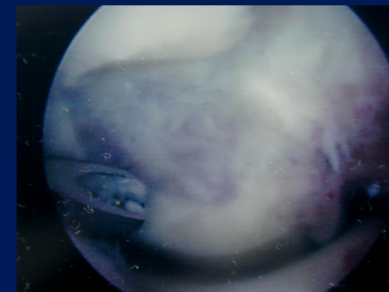
Botoni & al *Am J Sport Med* 2008 YES
Shelbourne & Patel *The knee* 1996 NO

- ✓ Meniscus (Locked bucket-handle)
- ✓ Treatment of MM first?



Shelbourne & Urch *Op Techn Sports Med* 2009

- ✓ Reversible bone bruise ≠ chondral damage
- ✓ Reduced time to surgery



Combined lesions @ time of injury

✓ Collateral ligament tears (MLI)

✓ MCL particularly cause of stiffness

Hugston *JBJS* 1983

Froke *KSSTA* 1998

Petersen *Acta Orthop Trauma Surg* 1999

✓ Early surgery

✓ Grade 3 bone avulsion

✓ Incarcerated within joint line

✓ MM tear associated

✓ LCL subacute repair (3 w)

✓ Better results with MCL repair : ROM, PROMs



Haliner *JBJS* 2009

Grant *Arthroscopy* 2012

Hanaer *ISAKOS* 2021

Conclusions

- ✓ ACL-R in stiff knee
 - ✓ Mechanical locking
 - ✓ Acute cases in special patients
 - ✓ MLI
- ✓ Better to prepare the knee
 - ✓ Painfree
 - ✓ Good mobility
 - ✓ Good muscle