



Université Claude Bernard



Lyon 1



ECHEC PAR ERREUR DE POSITIONNEMENT DU MPFL

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Hôpitaux de Lyon



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INTRODUCTION

MPFL & COMPLICATIONS

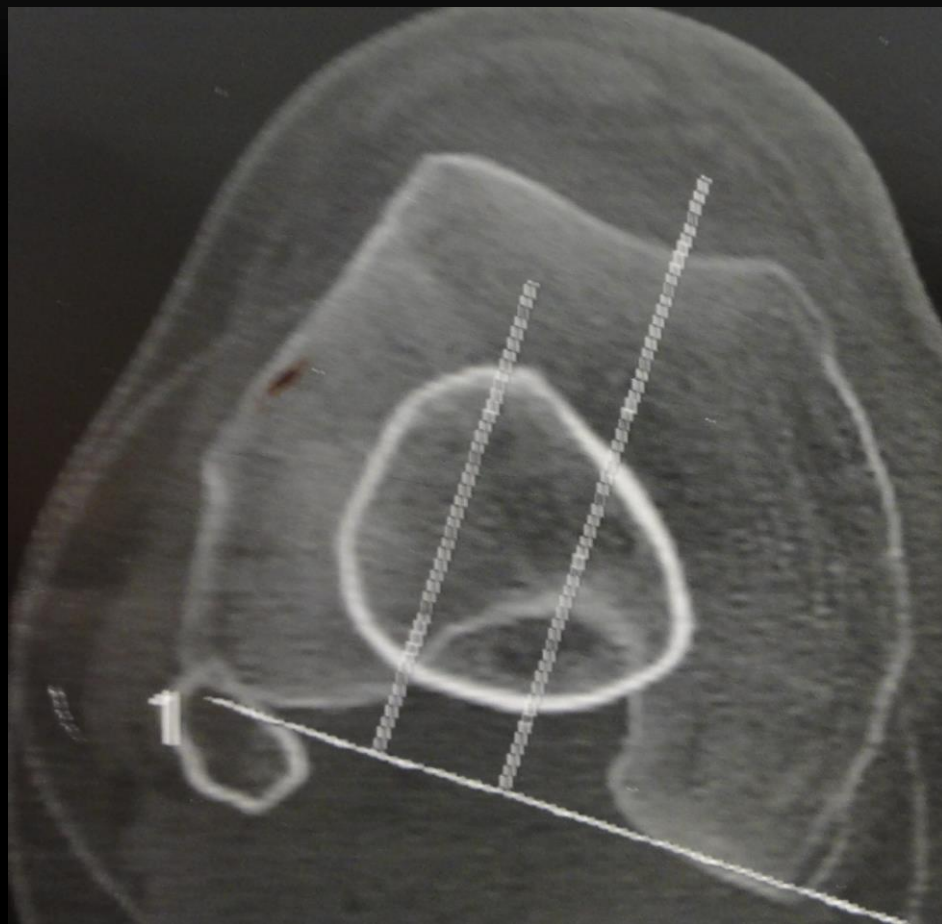
- Failure rates
 - 9.5% in older studies to 4.7% in more recent (Stupay, Arthroscopy, 2015)
- Complications rates
 - 26.1% of complications (n=164/629 knees) (Shah, A J Sports Med, 2012)
 - 30.4% of complications (n=155/510 knees) (Fisher, Nyland et al. 2010).

CLINICAL CASE

HISTORY

- 18 year old male
- History of numerous patellar dislocations (15 per year) over last 5 years on the right
- Initial exam
 - Range of motion: 10 / 0 / 150
 - Apprehension (Smillie) test +
 - Jsign -
 - Normal patellar tracking

INITIAL IMAGING



TT-TG = 15mm



C-D = 1.8

HISTORY

- Underwent distalization tibial tubercle osteotomy and MPFL reconstruction
- 6 months post-operative
 - No recurrent dislocations
 - Complains of stiffness
 - Physical exam
 - No apprehension
 - No effusion
 - Range of motion: 10 / 0 / 100

PLAIN RADIO



Caton-Deschamps = 0.9

PLAIN RADIOGRAPH



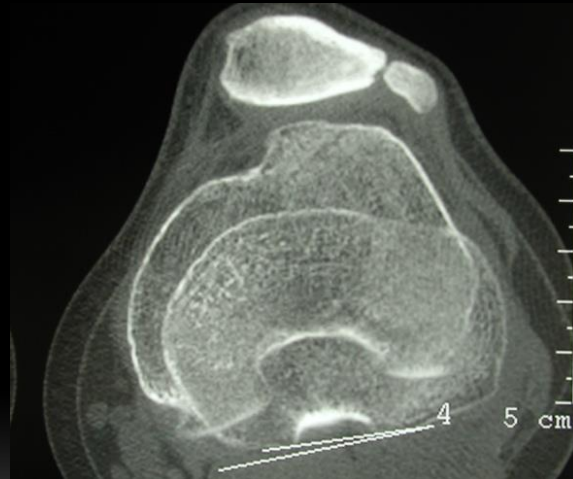
COMPLICATIONS OF MPFL RECONSTRUCTION

- Patellar fracture
 - Recurrence of lateral patellar instability (failure)
 - Over-tightened MPFL graft
 - Stiffness with restricted range of motion
 - Medial patellar instability
 - General complications
-

MPFL R

REASONS FOR FAILURE

- Consider additional risk factor
 - High grade of trochlear dysplasia (patellar maltracking)
 - Patella alta



Berard JB, Magnussen RA, Bonjean G, Ozcan S., Lustig S, Neyret P., Servien E,
Femoral tunnel enlargement after medial patellofemoral ligament reconstruction: prevalence, risk factors, and clinical effect. Am J Sports Med. 2014

Recurrence of patellar instability

- Recurrent apprehension or dislocation?
 - Incidence ?
 - 4% (Smith, Walker et al. 2007 ; Singhal, Rogers et al. 2013 ; Shah, Howard et al. 2012) to 9% (Fisher, Nyland et al. 2010)
 - Aetiology
-

Stiffness

- Incidence

3.5% (Shah, Howard et al. 2012 ; Singhal, Rogers et al. 2013) to 18.1% (Fisher, Nyland et al. 2010)

- Risk factors

- Improper graft tensioning
 - Femoral tunnel mal-positioning,
 - Excessive pain, post-op hemarthrosis,
-

MPFL R

REASONS FOR FAILURE

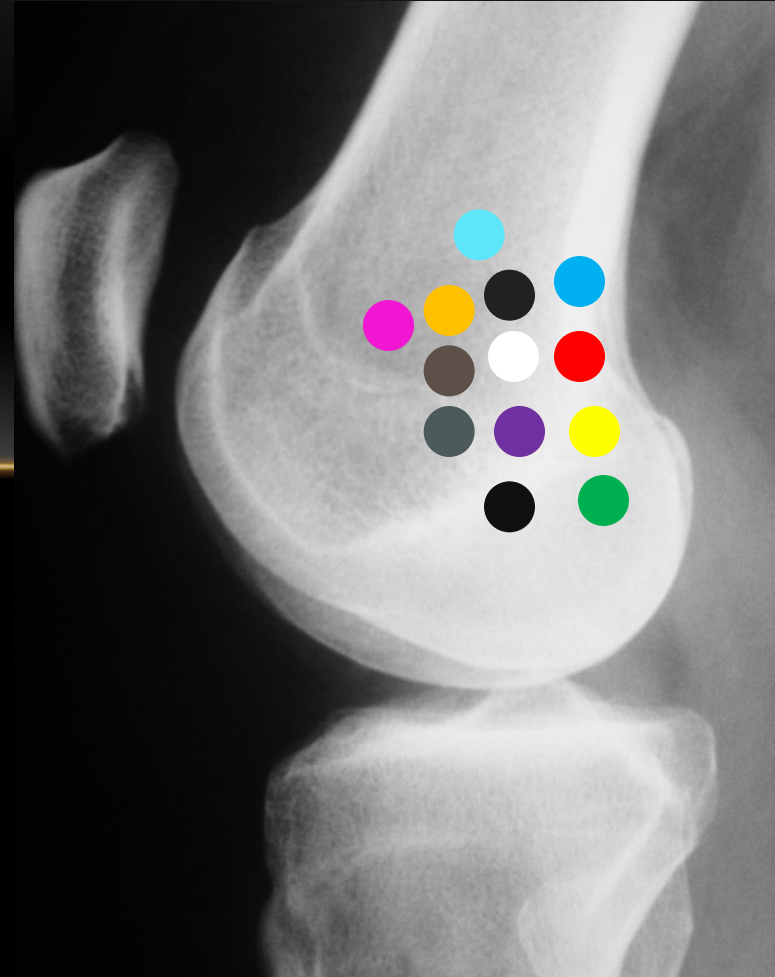
- Failure to consider additional risk factor
- Intra-operative technical errors

Nelitz et al., Int Orthop, 2014

MPFL R

REASONS FOR FAILURE

- Intra-operative technical errors
- Femoral tunnel malpositioning
- Overtensioning of the graft



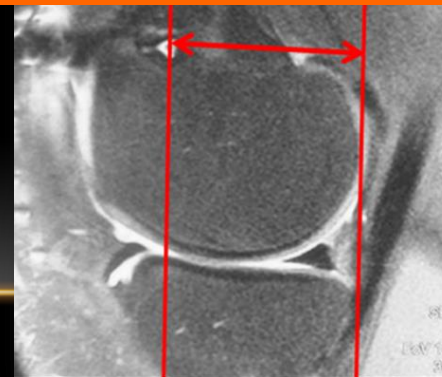
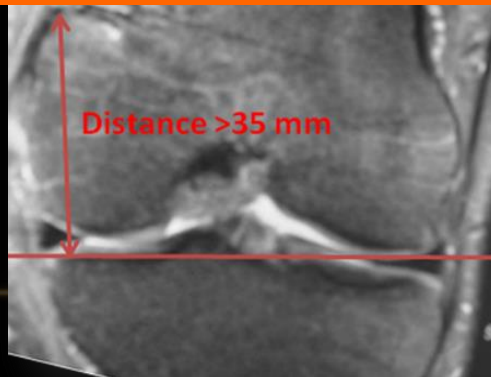
Nelitz et al., Int Orthop, 2014

Our experience

Tunnel	<i>MRI</i>	« <i>Squares</i> » <i>Method</i>	<i>Schöttle's</i> <i>Method</i>
Correct positioning	65% (n=19)	69% (n=21)	69% (n=21)
proximal	17% (n=5)	17% (n=5)	17% (n=5)
anterior	11% (n=3)	11% (n=3)	11% (n=3)
anterior & proximal	7% (n=2)	3% (n=1)	3% (n=1)
distal	0% (n=0)	0% (n=0)	0% (n=0)
posterior	0% (n=0)	0% (n=0)	0% (n=0)

In vivo positioning analysis of Medial patellofemoral ligament reconstruction.
 Servien et al., *Am J Sport Med*, 2010 , Jan (1) : 134-9

30 ±6 mm
(25-51)

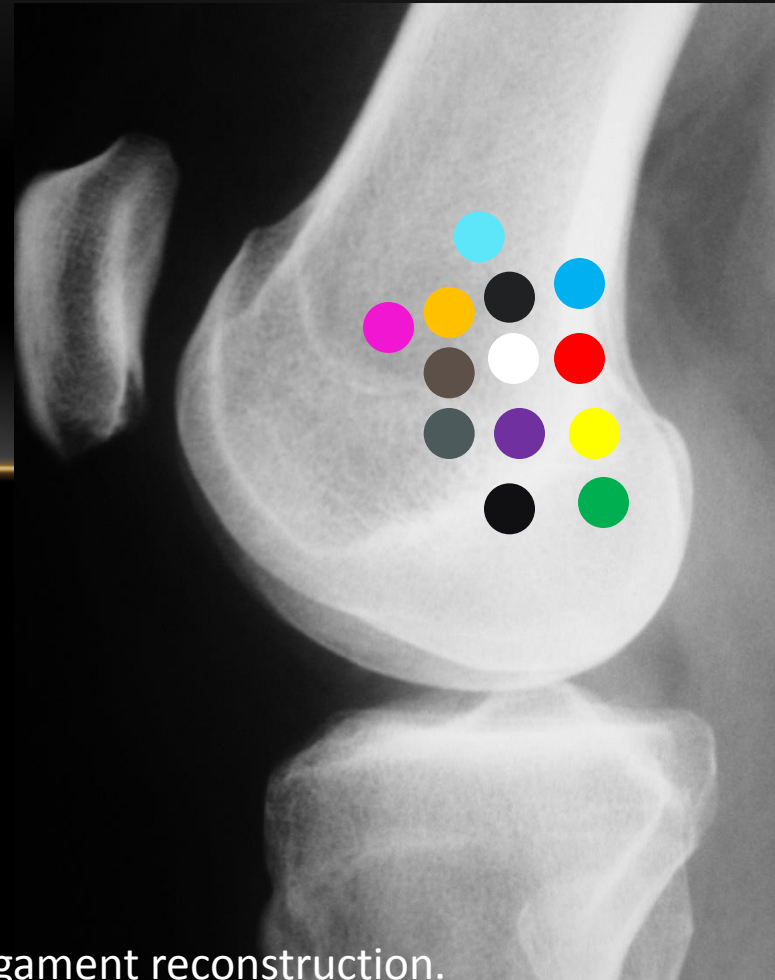


27 ±3.6 mm
(20-38)

MPFL R

REASONS FOR FAILURE

- Intra-operative technical errors
 - Femoral tunnel malpositioning
- Anterior / proximal



In vivo positioning analysis of Medial patellofemoral ligament reconstruction.
Servien et al., *Am J Sport Med*, 2010 , Jan (1) : 134-9

How to manage these ?

- Assess femoral tunnel placement with fluoroscopy +++
- Check isometry of graft in extension and flexion, before graft fixation.
- Check correction of patellar tracking during knee mobilization.
- Graft fixation within 10-30° of flexion, when patella should engage in the trochlea.



Restricted range of motion / Stiffness

- Treatment

- Manipulation under anesthesia ? No!

Arthrolysis under arthroscopy then MUA

- Percutaneous release of the MPFL graft (Thaunat and Erasmus 2009).
- Graft section and MPFL Revision (reconstruction)

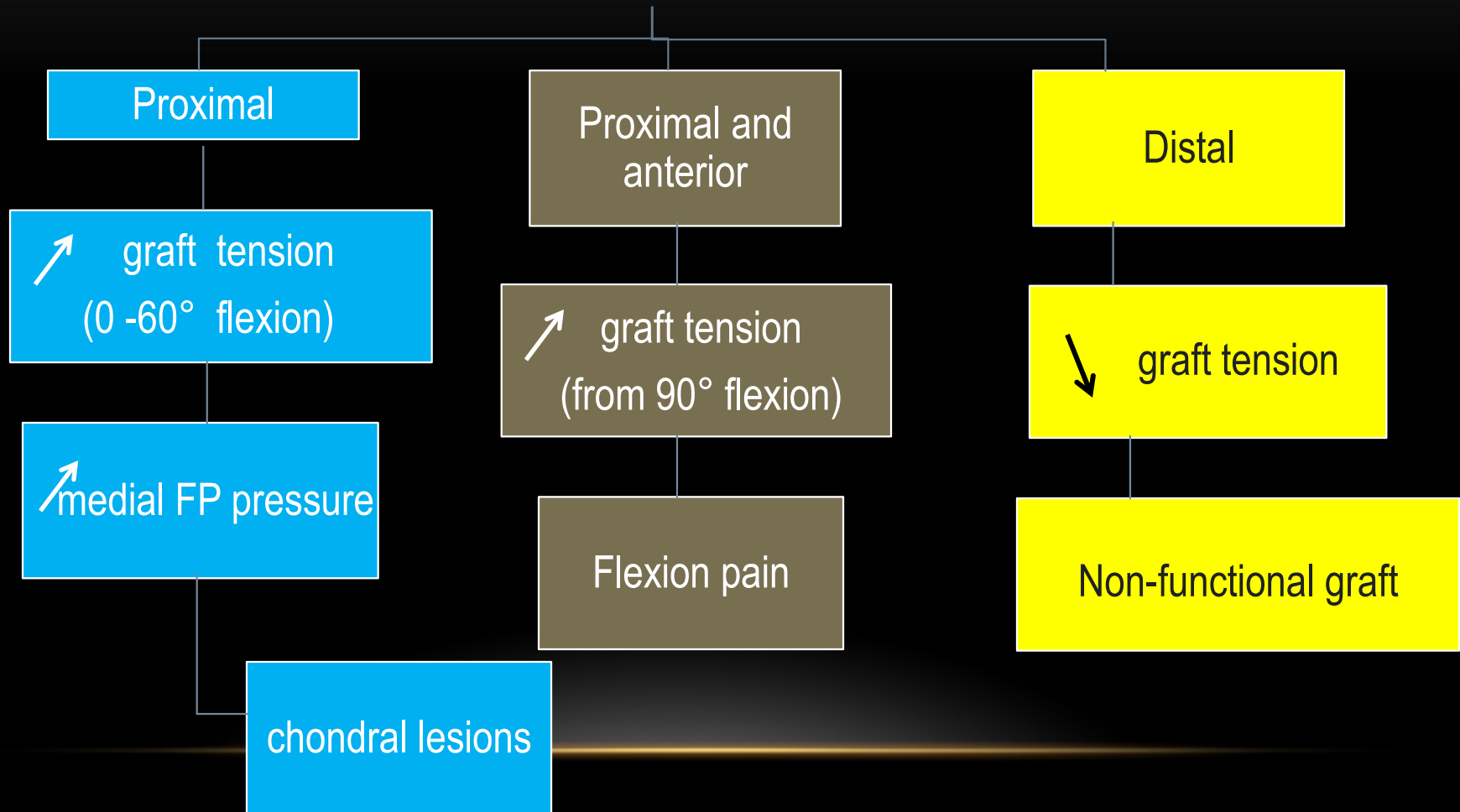
Medial patellar instability

- Incidence.
 - uncommon 3 cases in literature (Bollier and al.)
 - Risk factors
 - Concurrent lateral retinacular release ++
 - Over-tightening of the graft.
 - Mal-position of femoral tunnel (too proximal and/or anterior).
-

Medial patellar instability

- Management ?
 - MPFL Revision/release
 - LPFL reconstruction

Graft positioning / overtensioning



CONCLUSION

- Patient selection and indication: Instability !
- Choice of graft types and fixation methods
- Accurate positioning of tunnels
- Restore “anisometry” : tensioning of MPFL graft
- Assess / address concomittant risk factors



MERCI



MERCI





CONSEQUENCES?

FEMORAL TUNNEL WIDENING ?

- 2005 - 2010 : 55 patients (n=59)
- 37 Female, 14 Male (Sex ratio : 2.6/1)
- 39 isolated MPFL (+ 16 with ATT transfer)
- Exclusion criteria :
 - Revision surgery
 - Neuro
 - Associated procedure (except ATT)

POST OPERATIVE ANALYSIS

- Minimum follow-up :2y
- IKDC subjective score
- Lateral X-ray : vertical et horizontal tunnel measurement



POST OPERATIVE ANALYSIS

- Measures : 2 independent observers, compared
- Tunnel area calculation → 2 groups :
 - Area < 2 X theoretical area = Normal group
 - Area > 2 X theoretical area = Widened group
- Student Test between the 2 groups

RESULTS

N=55

- Mean IKDC :
 - Pre operative 56
 - Post operative 76
- Patellar dislocation : 0
- Normal tunnels : n=32 (58 %)
- Widened tunnels : n=23 (42%)



RESULTS

N=55

- Caton-Deschamps Index :

Normal Group	Widened Group
<1.2 : 72 %	<1.2 : 48 %
<u>28 %</u>	<u>52 %</u>

→ More patella alta in widened group



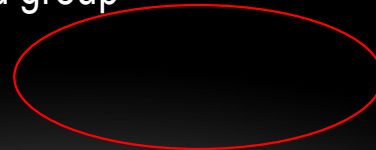
RESULTS

N=55

- Femoral Tunnel Positioning

Normal Group	Widened Group
optimal : 66 %	optimal : 56 %
<u>34 %</u>	<u>44 %</u>

→ More malpositioned tunnel in widened group



RESULTS

N=55

- Subjective IKDC score :

76 in BOTH groups

(p=0.43)



RESULTS

N=55

- **Subgroup analysis :**
 - Isolated MPFL vs MPFL + ATT
 - Trochlear Dysplasia

(p=0.87)



DISCUSSION

TUNNEL WIDENING IN MPFL-R :

- Patella alta §/or femoral tunnel malpositioning are two statistically significant factors
- Mechanical reason :
- overtight graft ? (*Thaunat & Erasmus, Knee 2007, KSSTA 2009*)
- excessive anisometry ?



DISCUSSION

TUNNEL WIDENING IN ACL-R :

- Biological theory :
 - PLLA-screw reducing bone tunnel widening (*Robinson, Knee 2006*)
 - Hypertrophy and high stiffness of the graft in tunnel widening (*Neddermann, AJSM 2009*)

DISCUSSION

- Mechanical theory (ACL-R):
 - Early motion increasing the amount of tibial tunnel widening (*Hantes, Arthroscopy 2004*)
 - Acute femoral tunnel angle and malpositioning increasing tunnel widening (*Segawa, KSSTA 2001; XU, Arthroscopy 2011*)

DISCUSSION

- Weakness of the study
 - 2 y minimal FU
 - No consensus for tunnel widening sizing
 - X-Ray vs CT-scan / MRI
- (Webster, AJSM 2005 et Fules, Knee 2003)



CONCLUSION

- Preventing widening by
 - Optimal femoral tunnel positioning : fluoroscopy
 - ATT distalization when needed

- No role of trochlea dysplasia ?



Femoral tunnel enlargement after medial patellofemoral ligament reconstruction: prevalence, risk factors, and clinical effect.
Am J Sports Med. 2014 Feb;42(2):297-301.

ONGOING STUDY

MPFL-R with or without lateral retinaculum release

- Randomized control trial
- [Clinicaltrials.gov : NCT01719666](https://clinicaltrials.gov/ct2/show/study/NCT01719666)

?



Patella fracture

- **Without extensor mechanism disruption.**

Avulsion fracture of the patella at the fixation site of graft.

⇒ medial facet fracture

cases reported in literature (Thaunat and Erasmus 2008)



Patella medial facet's fracture

- **Management**
 - Use fixation methods without tunnels: anchors / quadricipital tendon.
 - Preserve bone bridge at least 10mm between patellar tunnels.
 - Avoid large diameter tunnel, using gracilis autograft.
 - Avoid transpatellar tunnels



General complications

- **Wound complications**

- *Subcutaneous hematoma*

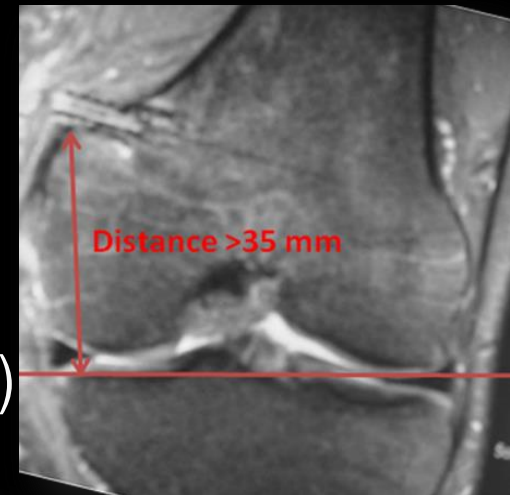
Rate of 0.5% (Shah, Howard et al. 2012)

- *Wound infections*

Rate < 1% (Fisher, Nyland et al. 2010; Smith, Walker et al. 2007; Shah, Howard et al. 2012).

- **Implants pain +++**

- To 10% (Steiner and al) at 57% (Nomura and al) according to fixation methods.



Pediatric Complications

- In pediatric population : **16 %** of complications. (Parikh, Nathan et al. 2013)
- Specific complications for skeletally immature patients ?

GROWTH DISTURBANCE

⇒ Avoid iatrogenic physeal injuries

⇒ Femoral tunnel placement should be distal to femoral physis

⇒ Fluoroscopic guidance is mandatory

(Parikh, Nathan et al. 2013)

OUR EXPERIENCE

- Redislocation : 1 case (femoral malpositioning)
- Distal patellar tunnel breakage : 11% (4/30)
- Post op stiffness : 10% (3/30) -> arthrolysis (n=1)

Patella fracture

- **With extensor mechanism disruption.**

- Patellar transversal fracture .
- Avulsion of patellar superior pole.

(Parikh and Wall 2011).

⇒ transpatellar tunnel

Usually within 3 months after surgery

Incidence: **0.6%** (Fisher, Nyland et al. 2010 ; Shah, Howard et al. 2012) to **0.9%** (Singhal, Rogers et al. 2013).

