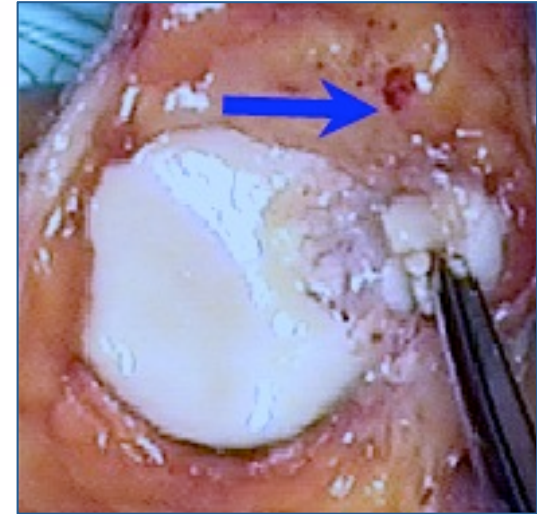




6th Advanced Course on Knee Surgery

January 31st – February 5th, 2016 Val d'Isère - France

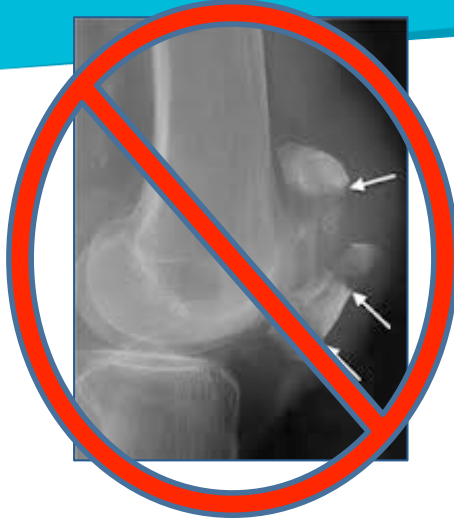
Medial Fractures of the Patella **(= Patellar Dislocation)**



Scott D. Gillogly, MD



3 February 2016
Val d'Isère, France



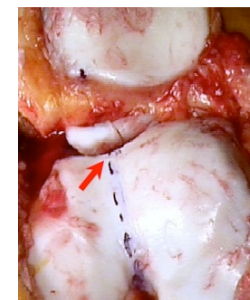
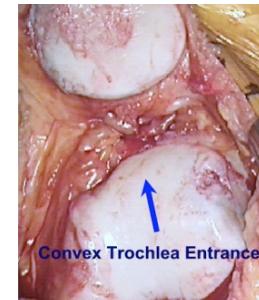
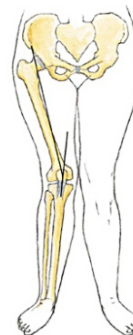
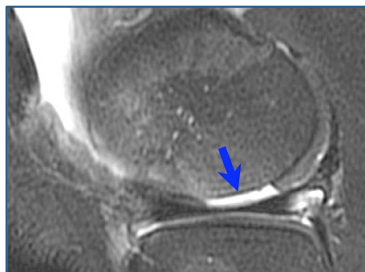
Medial Patella Fractures



- Medial Patella Fractures are typically the “tip of the iceberg”
- Treatment is often determined by underlying pathology and preexisting conditions
- The fracture is seldom the factor that predicts or drives outcomes.

Patella Avulsion Fracture

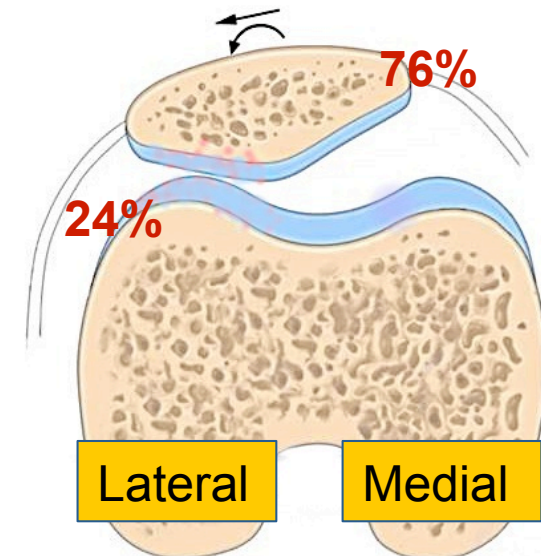
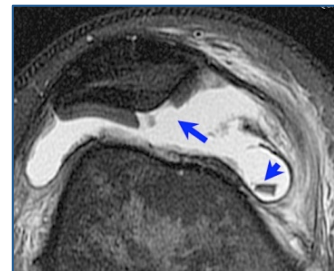
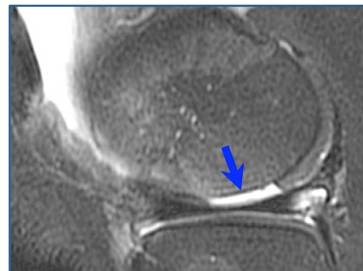
- PF Malalignment
 - Patella Alta
 - MPFL Tear
- Trochlea Dysplasia
- Chondral Damage
- Hyperlaxity



Patella Fracture Associated with Patellar Dislocation

Osteochondral injury after acute patellar dislocation in children and adolescents. Seeley MA; Knesek M; Vanderhave KL: J Pediatr Orthop Jul-Aug 2013, 33(5) p511-8

- 46/122 (38%) acute patellar dislocations (12-20 yrs old) have osteochondral patellar fractures.
- Fractures occurred at the patella in 35 pts.(76%), LFC in 11 pts (24%).
- In 21 patients (44%), MRI confirmed osteochondral injury despite the plain radiograph interpretation as negative for fracture

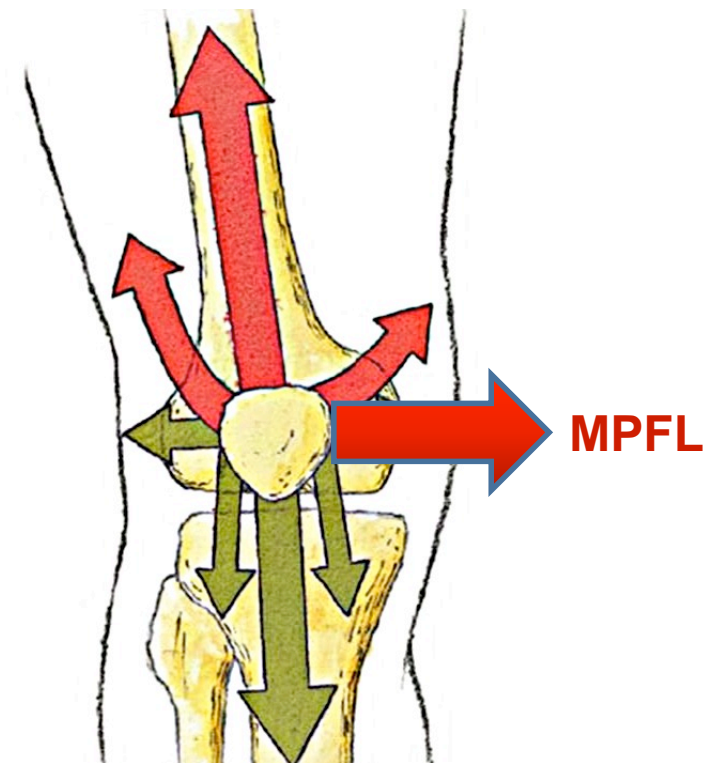
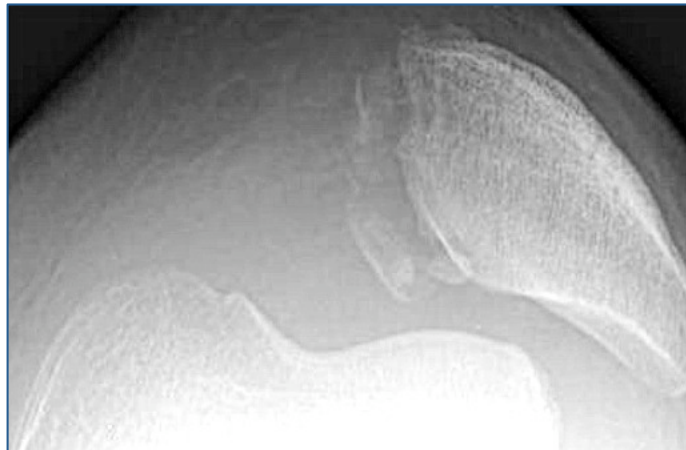


Medial Patellar Fracture and MPFL

Medial marginal fracture of the patella following patellar dislocation..

Toritsuka Y; Horibe S; Hiro-Oka A; Mitsuoka T; Nakamura N *Knee*, Dec 2007, 14(6) p429-33

- Medial marginal fracture of the patella was an avulsion fracture of the MPFL that occurred at the middle one-third of the patella
- The bony fragments were continuous with the thick and taut MPFL in all cases



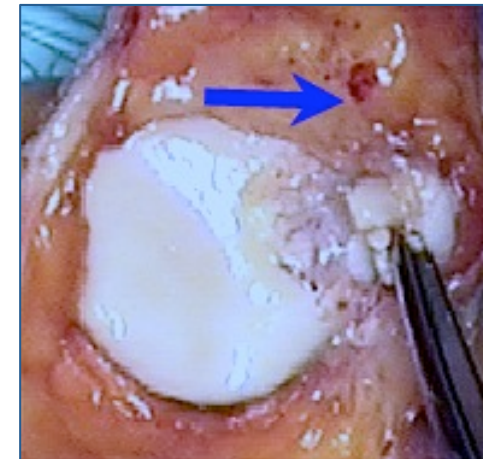
Operative Treatment for Patella Avulsion Fracture and MPFL Repair Associated with Patellar Dislocation

Medial patellofemoral ligament avulsion injury at the patella: classification and clinical outcome. Sillanpaa PJ; Salonen E; Pihlajamaki H; Maenpaa HM:. Knee Surg Sports Traumatol Arthrosc, Oct 2014, 22(10) p2414-8

Three Patterns of Injury medially with patellar dislocation:

- P₀** 1. Avulsion of MPFL, all soft tissue
- P₁** 2. Avulsion of MPFL with non-articular bone fracture
- P₂** 3. Avulsion of MPFL with bone fracture involving articular surface

P₁

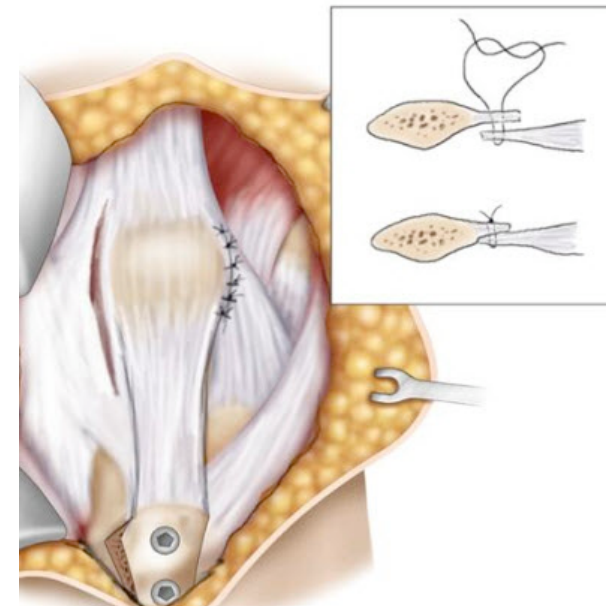


P₂

Operative Treatment for Patella Avulsion Fracture and MPFL Repair Associated with Patellar Dislocation

Medial patellofemoral ligament avulsion injury at the patella: classification and clinical outcome. Sillanpaa PJ; Salonen E; Pihlajamaki H; Maenpaa HM:. Knee Surg Sports Traumatol Arthrosc, Oct 2014, 22(10) p2414-8

- 44/56 patients with patellar detachment injury to the MPFL followed at average 4 yrs.
- 13 pts had undergone MPFL repair and osteochondral medial patellar fixation.
- 31 pts. with patellar MPFL injuries had non-operative TX.
- 2/13 (15%) surgery pts had patellar instability and 17/31 (55%) of non-operative TX had patellar instability

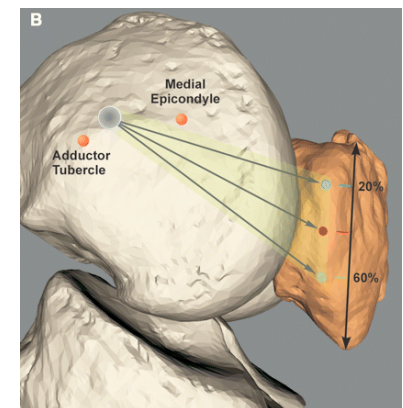
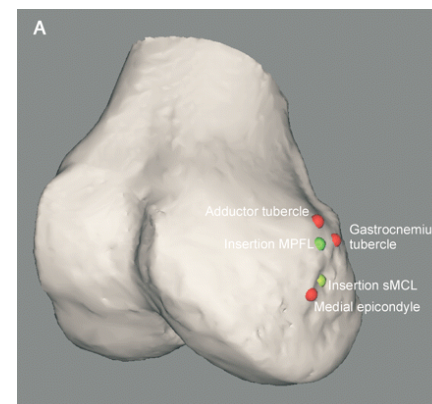
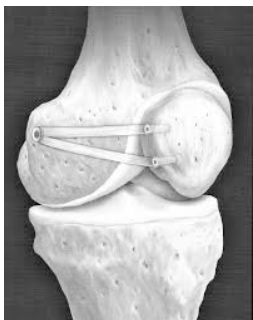
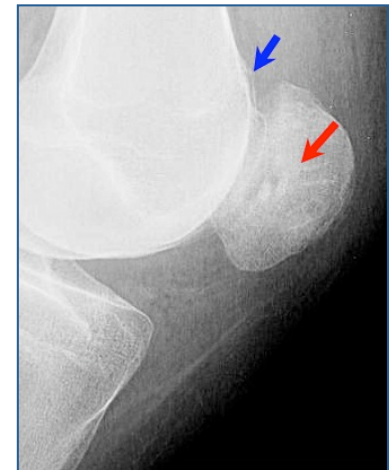


Complications with MPFL Reconstruction

Complications of medial patellofemoral ligament reconstruction in young patients.

Parikh SN; Nathan ST; Wall EJ; Eismann EA et al: Am J Sports Med, May 2013, 41(5) p1030-8

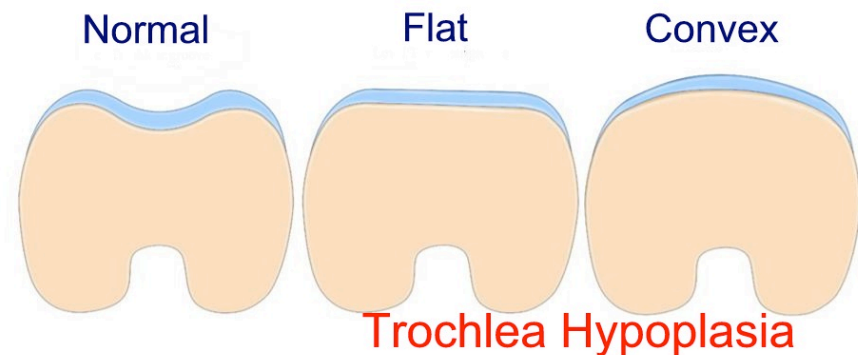
- 38 complications in 29 knees (16.2%) from 179 MPFL reconstruction, 34 major and 4 minor.
 - Recurrent lateral patellar instability (8 patients, 4.5%)
 - Motion stiffness with flexion deficits (8 patients, 4.5%)
 - Patellar fractures (6 patients, 3.4%)
 - Patellofemoral arthrosis /pain (5 patients, 3%)
- 18/38 (47%) complications were considered technical errors. Female gender and bilateral MPFL reconstructions were risk factors



Effect of Trochlea Dysplasia and Tunnel Position on MPFL Reconstruction

Does degree of trochlear dysplasia and position of femoral tunnel influence outcome after medial patellofemoral ligament reconstruction? Hopper GP; Leach WJ; Rooney BP; Walker CR; Blyth M: Am J Sports Med, Mar 2014, 42(3) p716-22

- Distance of the femoral tunnel from the anatomic position predicted clinical outcome (Kujala score, $P = .043$; Lysholm score, $P = .028$).
- ≤ 10 mm of the anatomic position defined by Schottle
- 4/68 pts (6%) had patella fractures postoperatively
- All pts with severe trochlear dysplasia ($n = 7$) failed with recurrent dislocations (57% satisfied) vs. only 9.3% of pts ($n = 5$) with mild trochlear dysplasia (83% satisfied) ($P = .05$)



Patellar Tendon Shortening for Patellar Dislocation

Patellar tendon tenodesis in association with tibial tubercle distalization for the treatment of episodic patellar dislocation with patella alta. Mayer C; Magnussen RA; Servien E; Demey G; Jacobi M; Neyret P; Lustig S: Am J Sports Med (United States), Feb 2012, 40(2) p346-51

- Combination of Tibial Tubercle distalization and tenodesis of tendon to original tubercle site with anchors, 22 pts.
- No recurrent dislocation at 9.6 yr follow-up, IKDC score was 75.6
 - Patellar tendon length decreased from **56.3** mm to **44.3** mm ($P < .0001$).
 - Caton-Deschamps index decreased from **1.22** to **0.95** ($P < .0001$)
 - Insall-Salvati ratio decreased from **1.42** to **0.91** ($P < .0001$)
- Patellar tendon tenodesis and tibial tubercle distalization result in normalization of patellar tendon length and a stable patellofemoral joint

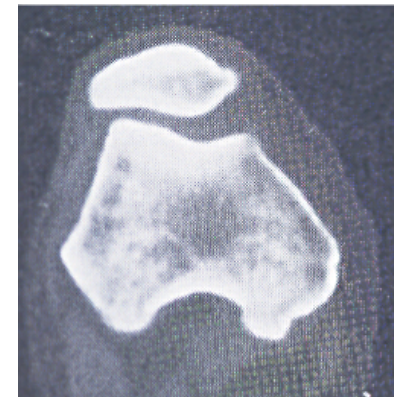


1st Episode Patellar Dislocation

Systematic Review Recommendations

First-time traumatic patellar dislocation: a systematic review. Stefancin JJ; Parker RD, Clin Orthop Relat Res, Feb 2007, 455 p93-101

- Recommend initial non-operative management of a first-time traumatic patellar dislocation **except:**
 - Osteochondral fracture
 - Significant disruption of the medial patellar stabilizers
 - Persistent laterally subluxed patella with normal alignment of the contralateral knee
 - Second dislocation
 - No improvement with appropriate rehabilitation



Knee Osteochondral Fractures

“French Arthroscopy Society Study”

Knee osteochondral fractures in skeletally immature patients: French multicenter study. Chotel F; Knorr G; Simian E; Dubrana F; Versier G: Orthop Traumatol Surg Res (France), Dec 2011, 97(8 Suppl) pS154-9

- 14 adolescent pts with OCF followed ave. 30 months
- Lateral condyle:9, Patella:5; injury mechanism was patellar dislocation (n=9) or a direct impact (n=4)
- All detached fragments were fixed: screw fixation (n=5), resorbable pins (n=5), or pull-out suture (n=4). Biological glue was added (6); Patellar stabilization performed in 2 cases
- All fractures united; IKDC 88.6, All satisfied
- 3 (21%) pts underwent secondary patellar stabilization

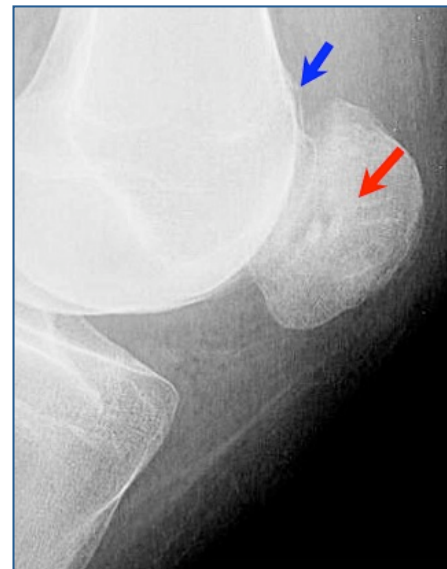
Case Based Discussion

Secondary Issues of Patellar Avulsion Fracture and Patellar Dislocation

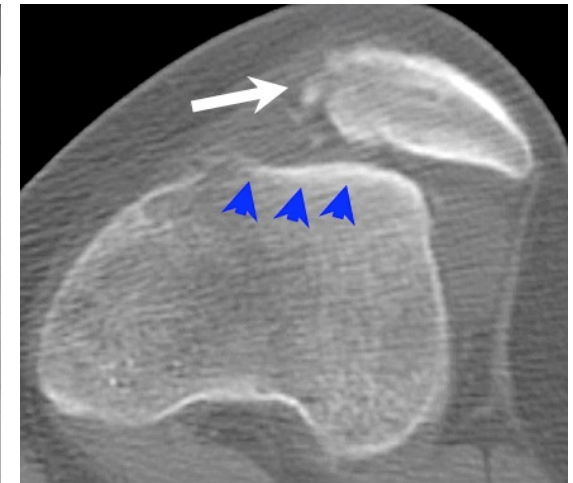
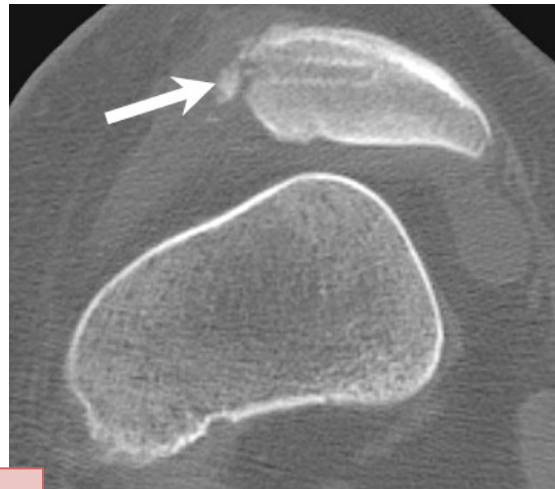
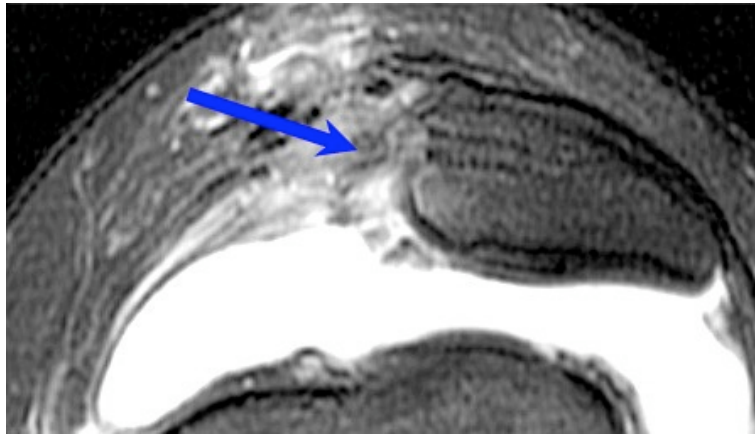
- 16 year old American Football with recurrent Patellar Dislocation, Medial Fracture
- 6 months after (Outside Clinic) MPFL Reconstruction, Lateral Release, Removal of Loose bodies and Chondral Biopsy (concomitant articular cartilage injury)



- TT-TG 23.9 mm
- IS pre op 1.45 - post op 1.2
- CD pre op 1.51 – post op 1.18
- Q angle 18



Recurrent Injury Imaging



Temporary Treatment:

- Aspiration
- Pre-habilitation program
- Bracing while awaiting definitive surgery

•Risk Factors on evaluation:

- FT Chondral Defect
- Valgus alignment
- Increased Q-angle
- Increased TT-TG
- Patella alta
- Hypermobility/Hyperlaxity

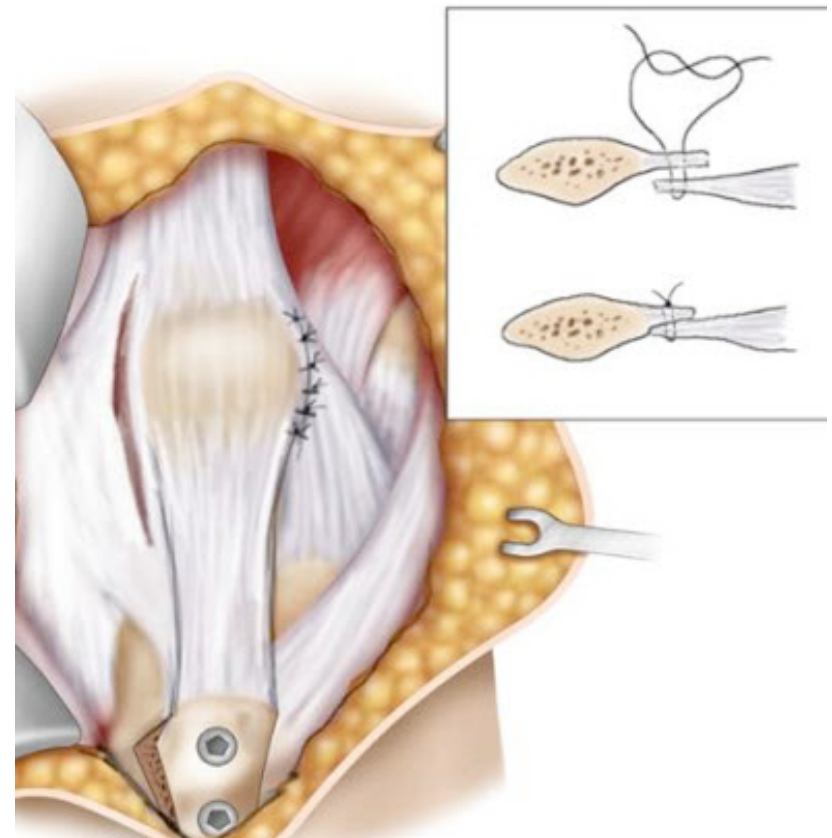


**Now
What ?**

Case Based Discussion

Secondary Issues of Patellar Avulsion Fracture and Patellar Dislocation

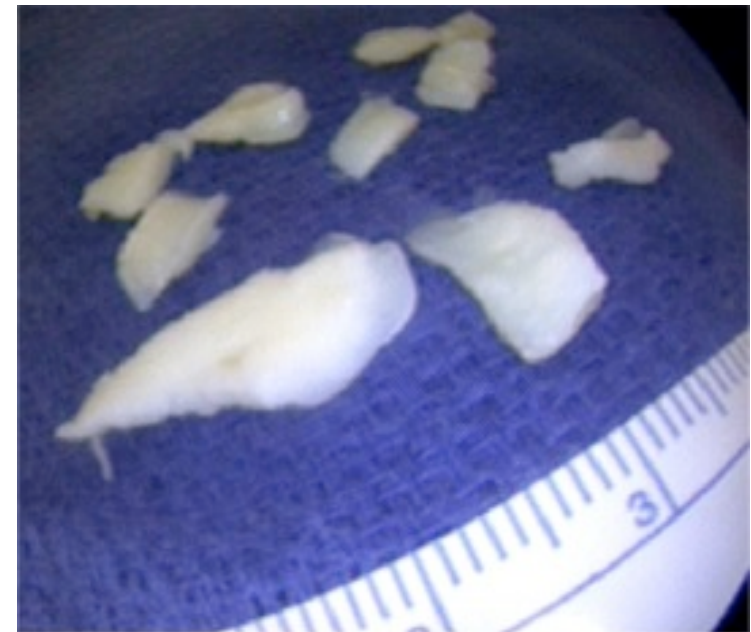
- Biopsy already done so definitive surgery in 4 wks. (cells available quickly)
- Recommended Treatment:
 - Scope Loose Bodies
 - Open ACI Patellar defect
 - Trochleoplasty (grooveplasty)
 - AMTT (Fulkerson) with distalization
 - Medial Imbrication/Reefing
 - Lateral lengthening



Case Based Discussion

Definitive Treatment (Single Stage)

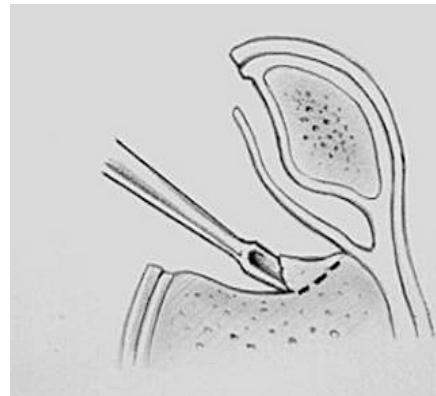
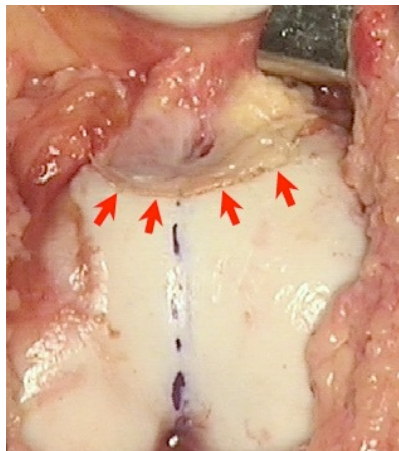
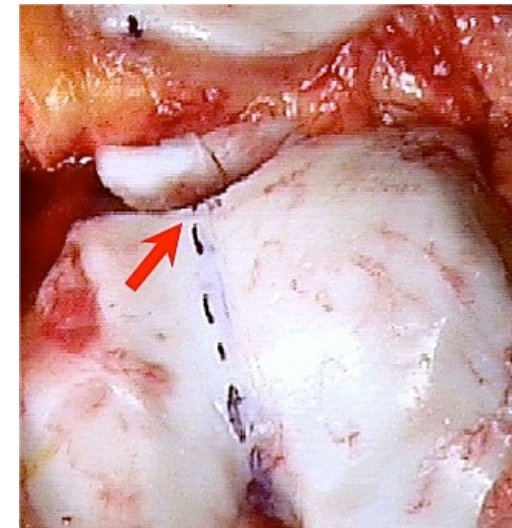
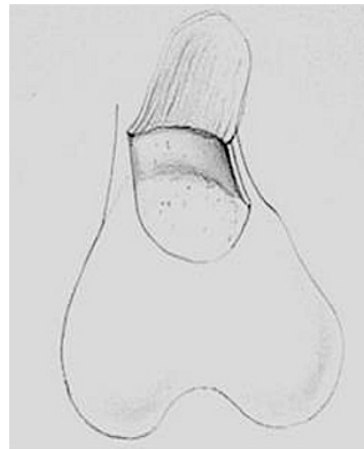
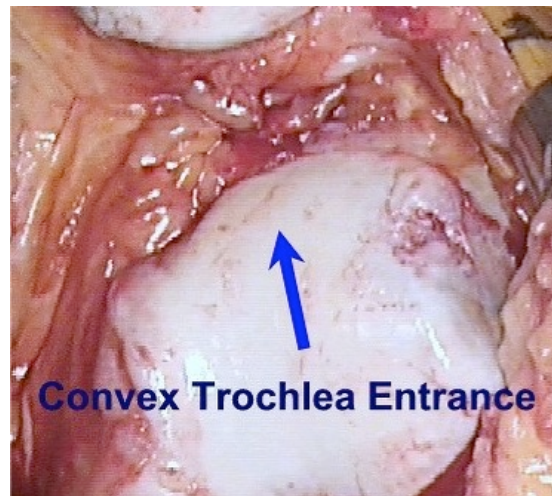
1. Arthroscopy: Removal of loose bodies,



Case Based Discussion

Definitive Treatment (Single Stage)

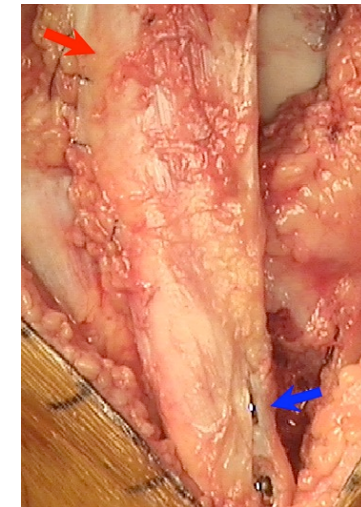
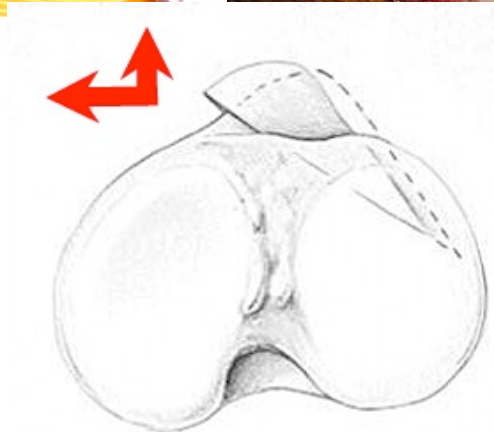
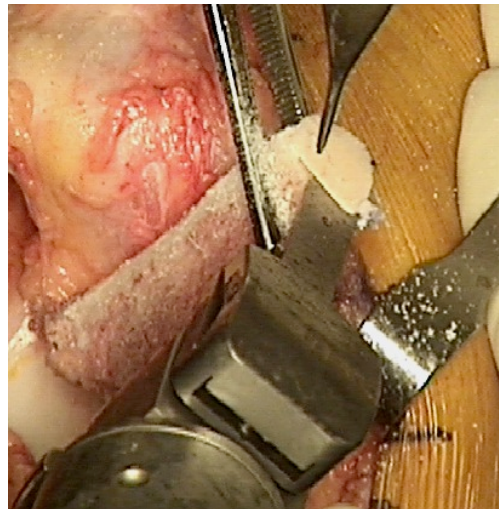
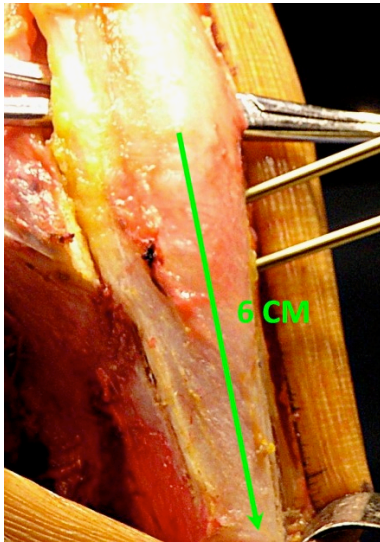
2. Trochleoplasty (grooveplasty): create concave entrance to trochlear groove



Case Based Discussion

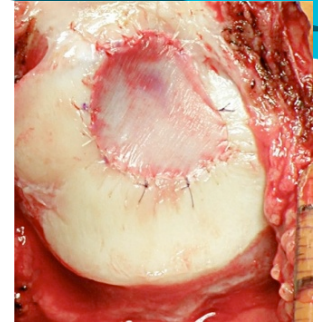
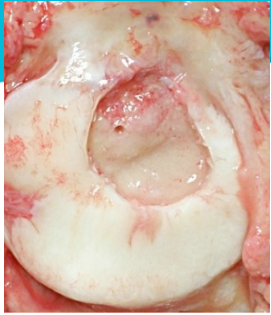
Definitive Treatment (Single Stage)

3. AMTT (Fulkerson) with distalization
4. Medial Imbrication/Reefing of MPFL

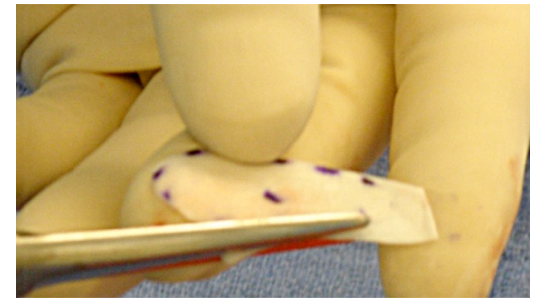
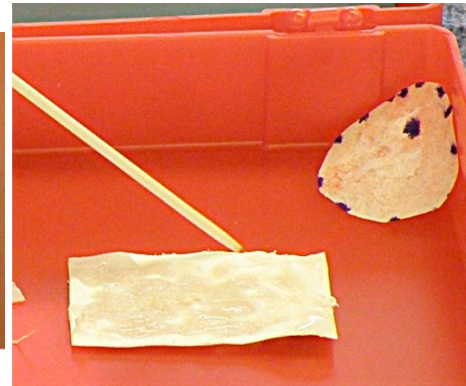
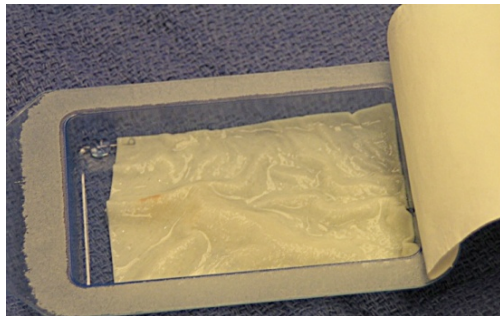


Case Based Discussion

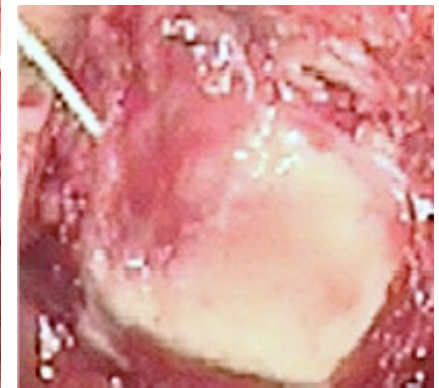
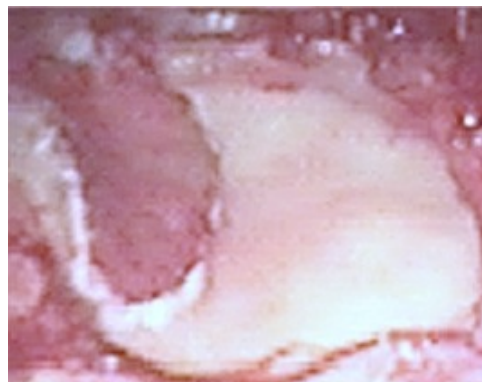
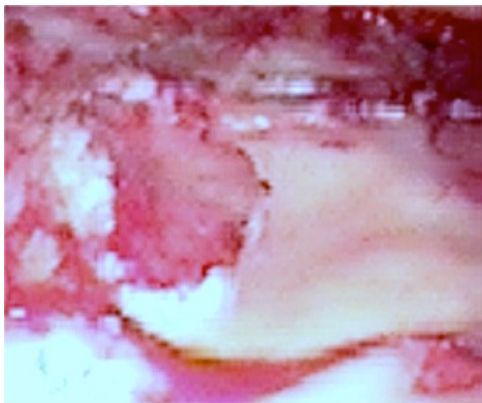
Definitive Treatment (Single Stage)



5. Autologous Chondrocyte Implantation Patella FTCD with Absorbable Collagen Membrane



Type I/III Collagen Membrane



Case Based Discussion

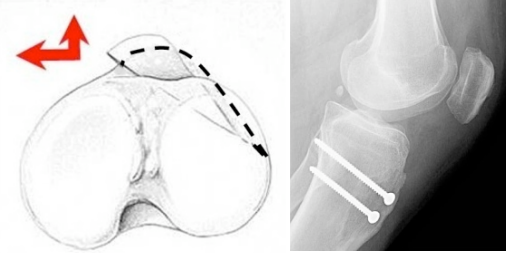
Definitive Treatment (Single Stage)

- Post-Operative Imaging

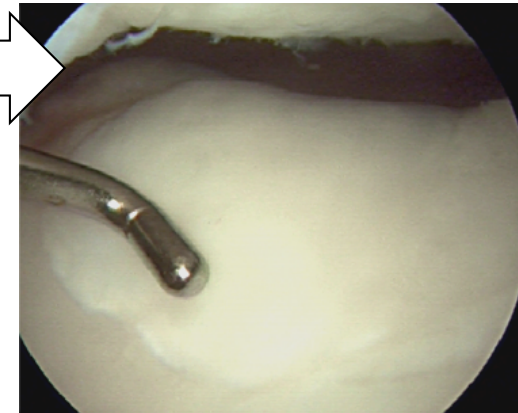
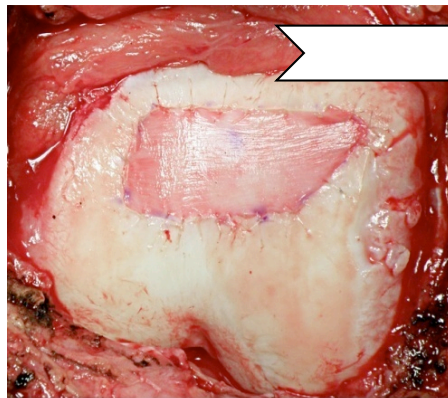
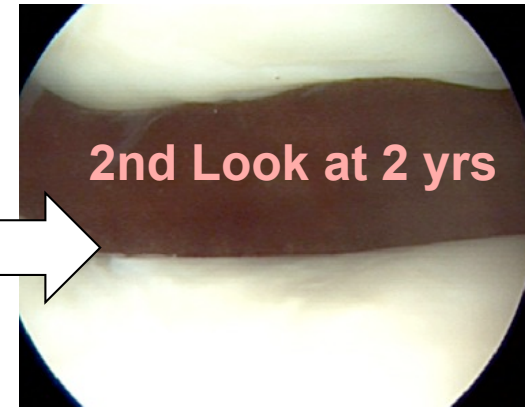
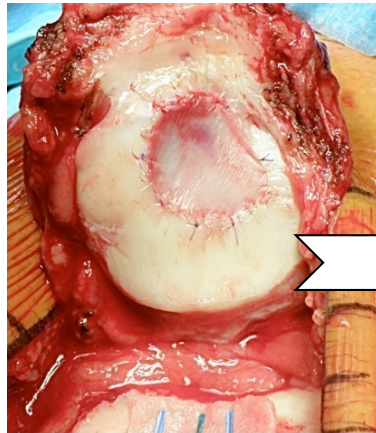


Autologous Chondrocyte Implantation (ACI)

Articular Cartilage Defects of the Patellofemoral Joint



Treatment of both the articular cartilage defect and abnormal biomechanical loading and malalignment



Autologous Chondrocyte Implantation for Patellar Chondral Defects: Results

Patella ACI Studies	# Pts	Follow-up	Defect size cm ²	Clinical Outcome	Comments
Brittberg, Peterson, NEJM 94	7 Isolated	36.4 mos.	3.5	Only 28% G/Exc (2) 3 Fair 2 Poor	No TTO
Henderson Knee 2006	22 isolated 22 w/TTO	29 mos. 26.2 mos.	3.2 2.92	55% G/Exc w/out TTO 86% G/Exc w/TTO, 36.2 IKDC increase	Periosteal patch hypertrophy (9)
Macmull Int Orthop 2012	25 isolated	45 mos.	4.73	40% Good to Exc	No TTO
Pascual-Garrido AJSM 2009	11 Isolated 12 AMZ	30 mos. 51.6 mos.	4.3 3.9	54% Good to Exc 83% Good to Exc	7.7% clinical Failures
Farr CORR 2007	21 Isolated 7 Bipolar 73% AMZ	37 mos.	5.4	80% Good to Exc	ICRS Arthroscopic assessment 1.2 yrs 11/12
Minas ICRS 2013	30 73% w/TTO	2-10 years	5.5	83%- Good to Exc. 13%- Fair 4%- Poor	Best results seen with good fill rate and surface integrity
Gillogly AJSM 2014	27 Isolated All had AMTT	5-11 years, Mean 7 years	6.4	83% Good to Exc.; IKDC 42 pre op improved to 75 post op (p<.0001)	Results for diffuse lesions no different than facet lesions; 91% satisfaction
Gomoll Multi-Center AJSM 2014	110 69% AMZ 27% Both	2-4 yrs	5.26 4.5cm Trochlea Def.	86 % Improved 74% (20 point inc. on IKDC); 9% Failure	High Patient Satisfaction 92%

Medial Patella Fractures

Summary

- Suspect OCF in 1st time patellar dislocations; Radiographs unreliable so get MRI in acute setting
- Evaluate patient for risk factors of recurrent dislocation
 - Osteochondral fracture (“tip of the iceberg”)
 - Significant disruption of the medial patellar stabilizers
 - Persistent laterally subluxed patella with normal alignment of the uninvolved knee
 - Recurrence
- Incorporate patellar stabilization into OCF repair
- Address Predisposing Factors upfront, Counsel patient and family

Merci
Molte Grazie
Danke Schön
Thank You



6th Advanced Course on Knee Surgery

January 31st – February 5th, 2016 Val d'Isère - France

