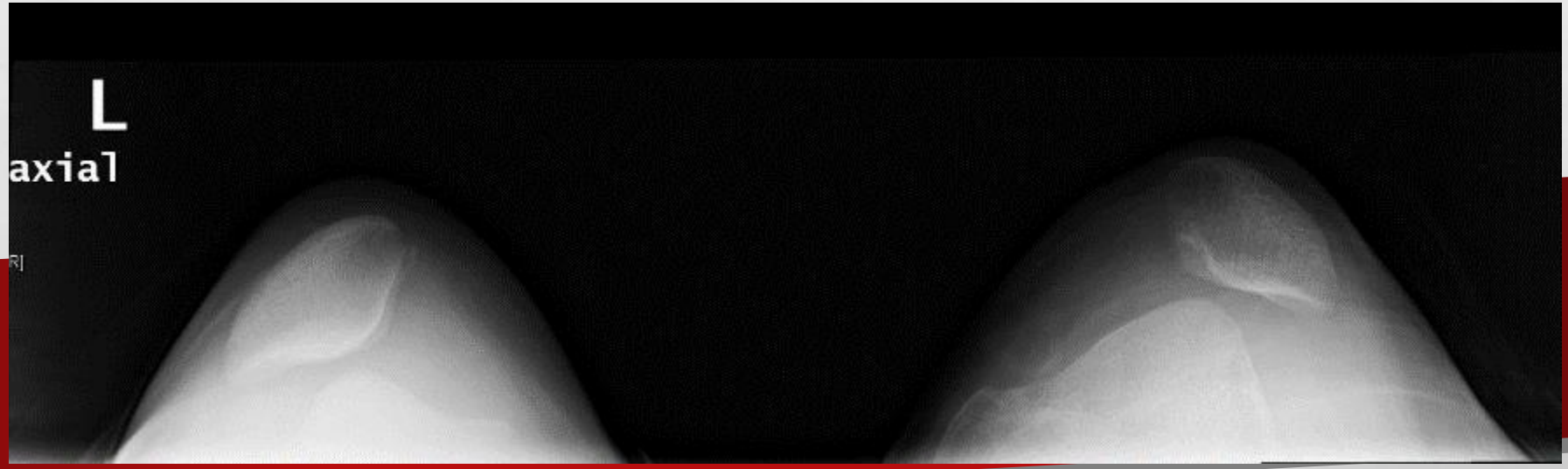
KNEE INJURIES THAT ARE NOT THE ACL

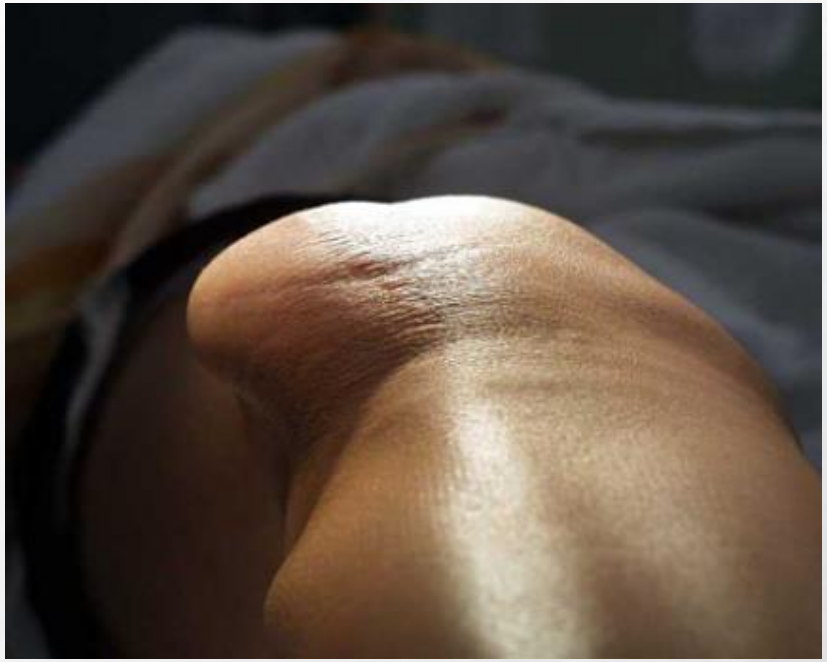
PAT RILEY JR, M.D., FAAOS

PATELLAR INSTABILITY IN THE YOUNG ATHLETE




QBE

PATELLAR DISLOCATION



- AVERAGE AGE 15 YO
  - ACUTE AND RECURRENT, PARTICULARLY HIGH IN FEMALES 10-17
- USUALLY NON CONTACT

WHY DOES THE PATELLA DISLOCATE

- TRAUMATIC
- ATRAUMATIC

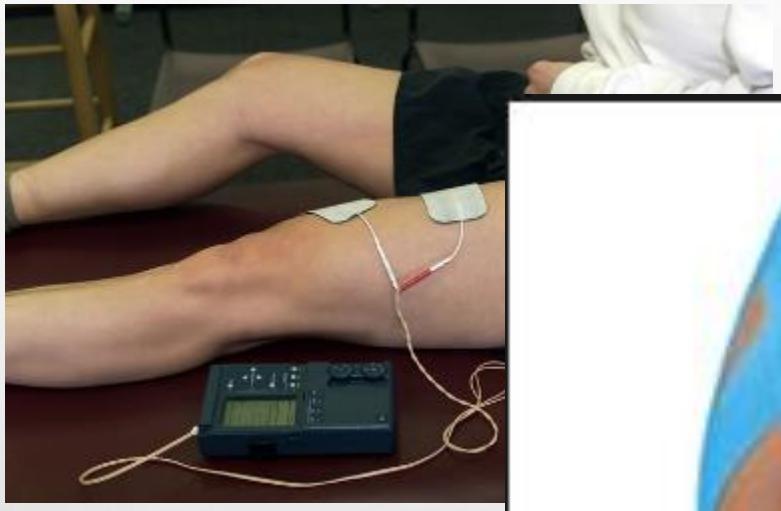
REASONS FOR PATELL

- TROCHLEAR DYSPLASIA
- PATELLA ALTA
- HIGH Q ANGLE OR INCREASE
- DEFICIENT MEDIAL RESTRAI
- MISERABLE MALALIGNMENT

FIRST TIME PATELLAR DISLOCATOR

- NON-OP UNLESS LOOSE BODIES OR ADDITIONAL INTRA-ARTICULAR INJURIES (MENISCUS TEAR)
- KNEE IMMOBILIZER FOR 3 WEEKS, PT, BRACING
- COUNSELING ON REDISLOCATION RATE (~15-70% DEPENDING ON RISK FACTORS)

PHYSICAL THERAPY



SURGERY

>100 PROCEDURES DESCRIBED

SOFT TISSUE PROCEDURES

- LATERAL RELEASE
- MEDIAL REEFING
- SEMITENDINOSUS
- ROUX-GOLDTHWAIT
- MPFL REPAIR
- MPFL RECONSTRUCTION

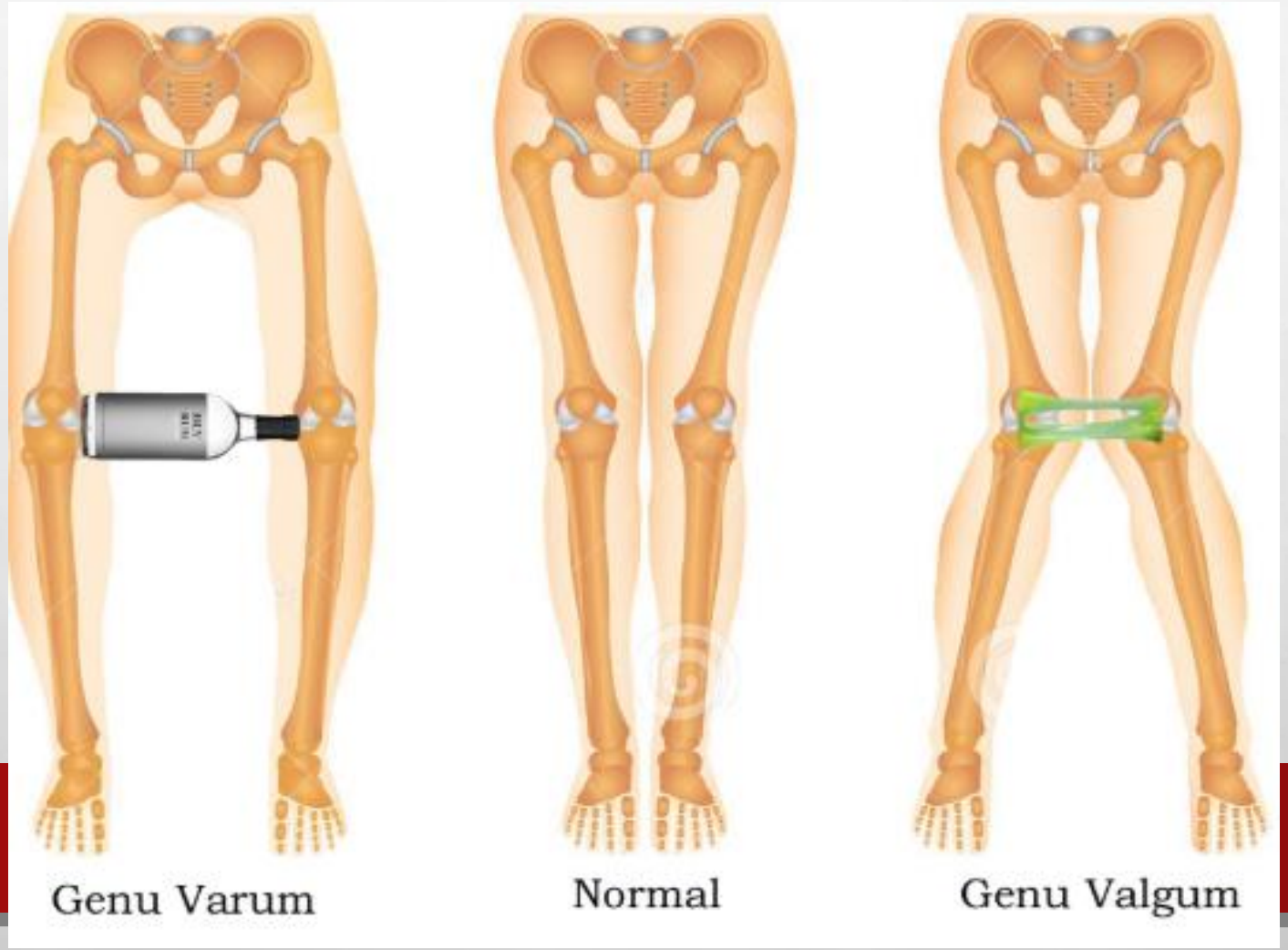
BONY PROCEDURES

- MAQUET
- HAUSER
- FULKERSON
- HUGHSTON
- ELMSLIE-TRILLAT

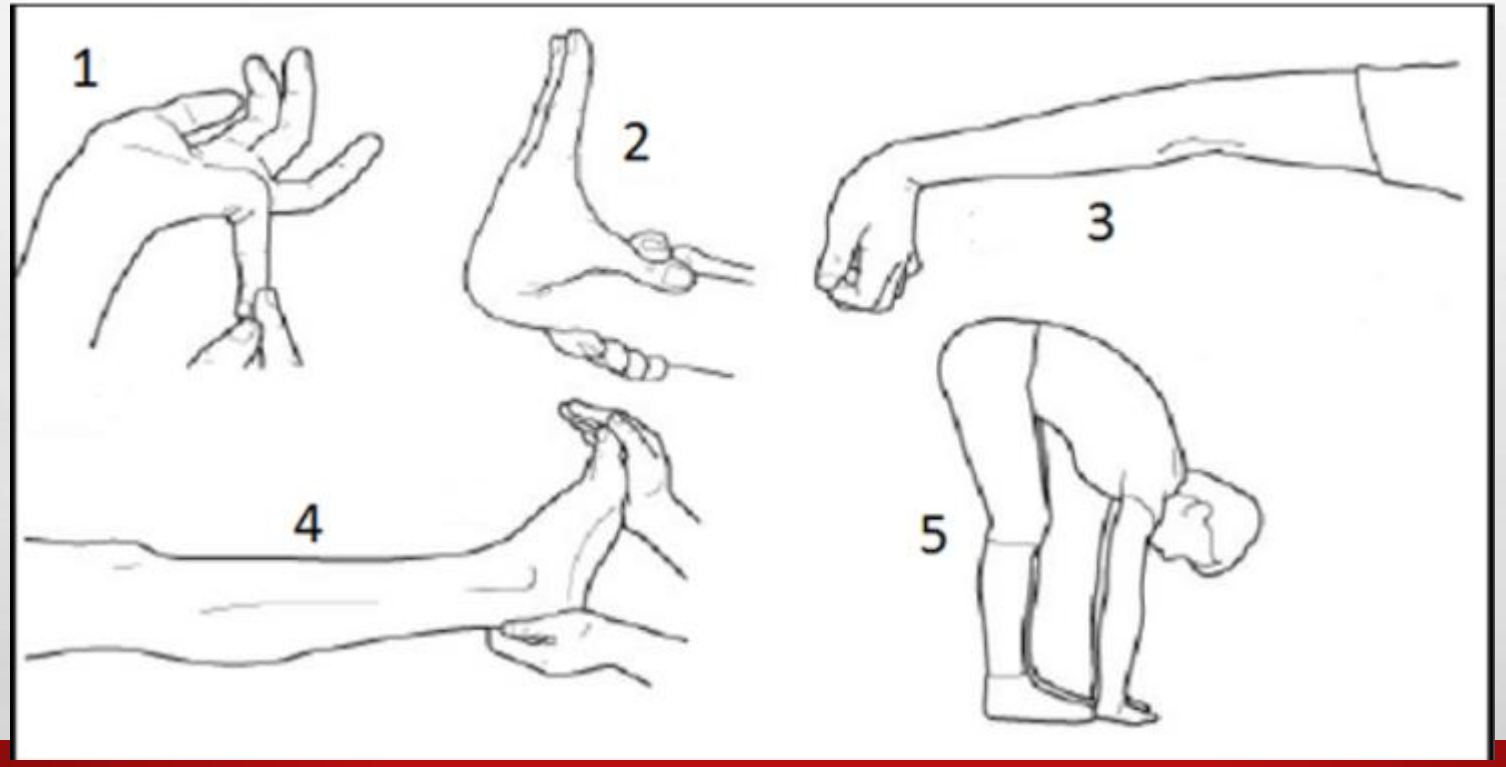
HOW DO WE DECIDE PROCEDURE?

ANATOMY AND PHYSICAL EXAM!!!!!

CORONAL ALIGNMENT

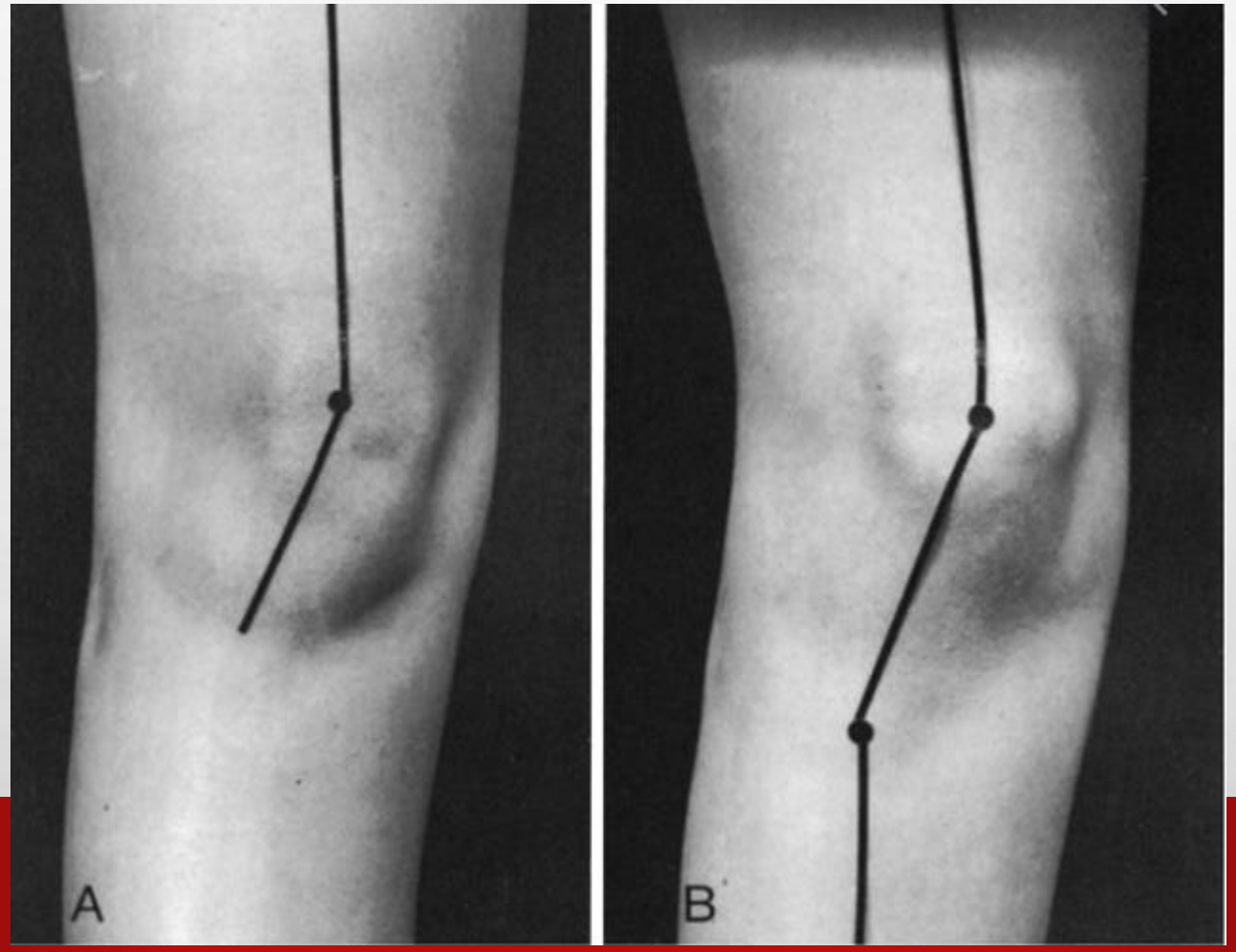


LIGAMENTOUS LAXITY



PRONE EXAM

TIBIAL TUBERCLE

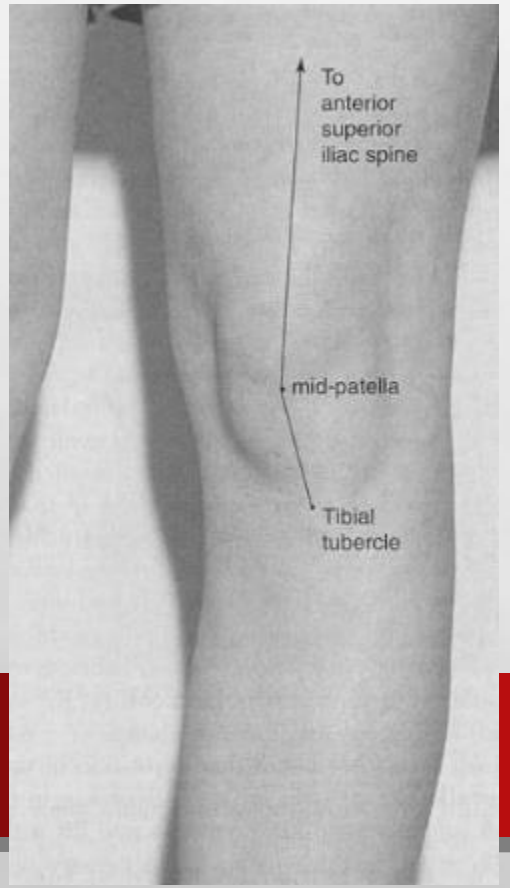


Knee Surg Sports Traumatol Arthrosc (2008) 16:1068–1079
DOI 10.1007/s00167-008-0643-6

KNEE

The reliability and validity of the Q-angle: a systematic review

Toby O. Smith · Nathan J. Hunt · Simon T. Donell



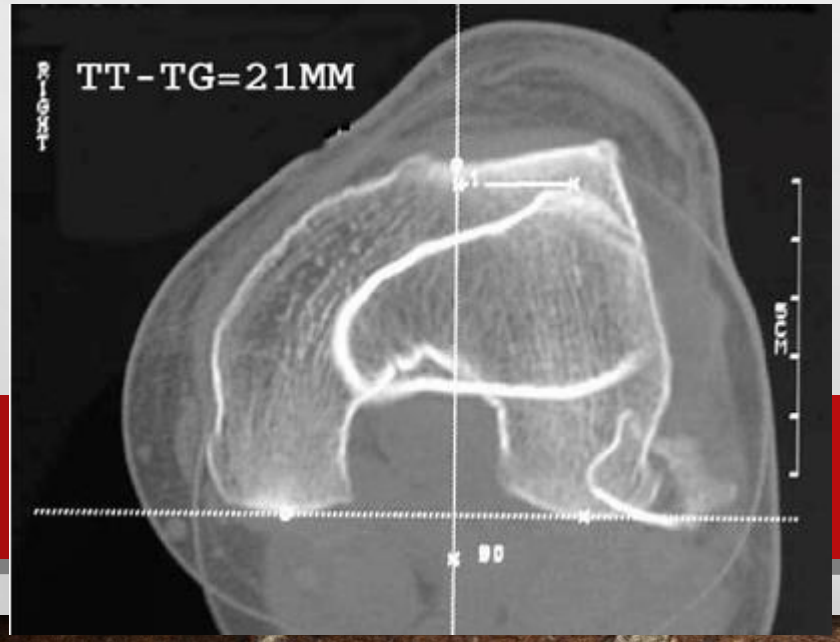
- DISAGREEMENT OF THE RELIABILITY AND VALIDITY OF THE CLINICAL Q-ANGLE MEASUREMENT
  - INTER-TESTER RELIABILITY ICC: 0.20-0.70
  - INTRA-TESTER RELIABILITY ICC: 0.22-0.75
- LACK OF STANDARDIZATION IN Q-ANGLE METHOD

Some debate of assessment in terminal extension or in 20°, 30°, or 90° knee flexion

TT-TG DISTANCE

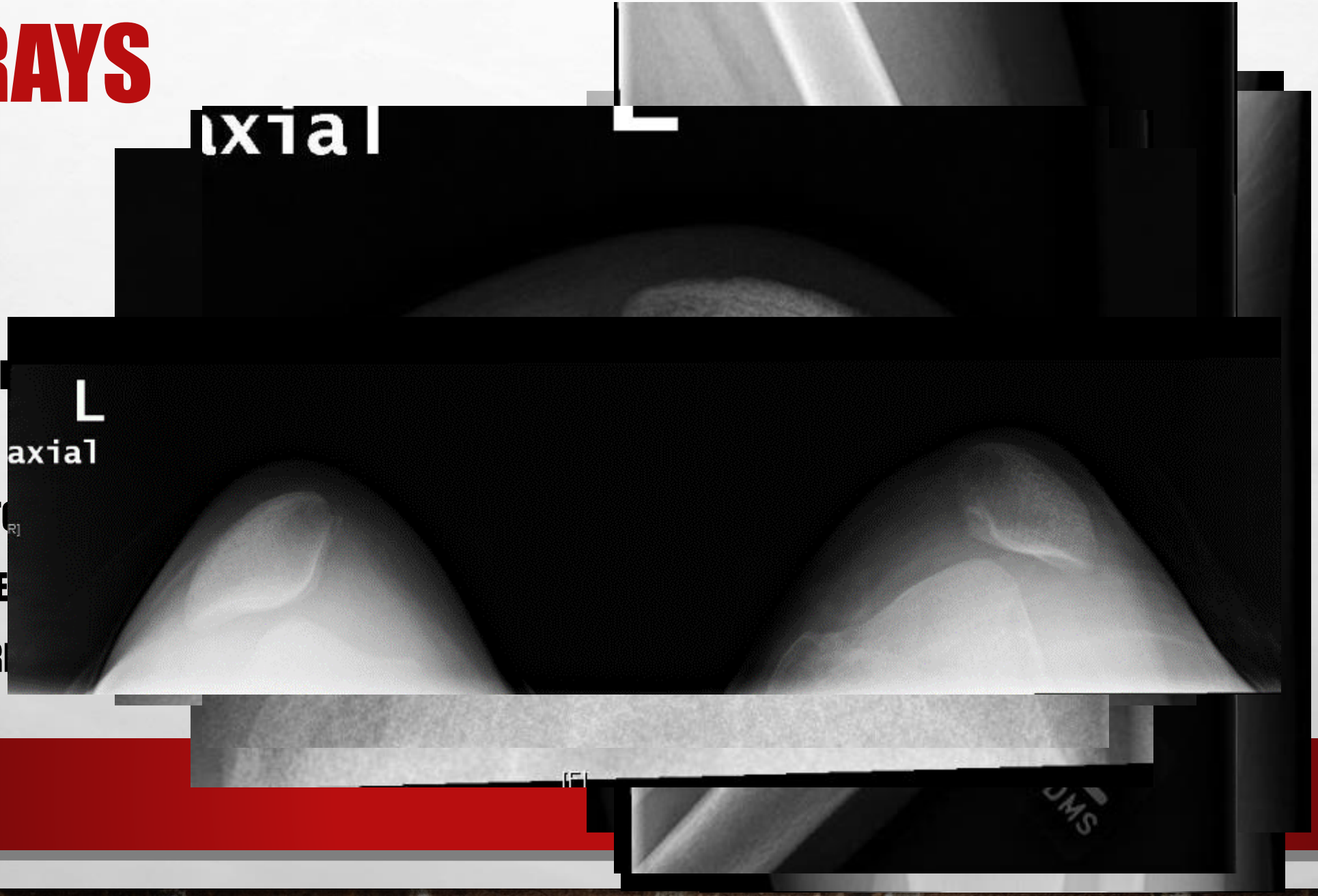
- TIBIAL TUBERCLE - TROCHLEAR GROOVE
- > 20 MM IS NEARLY ALWAYS ASSOCIATED WITH PATELLAR INSTABILITY

Normal range from 10-15 mm



XRAYS

- 4 VI
- AP
- NOT
- LATE
- SUR



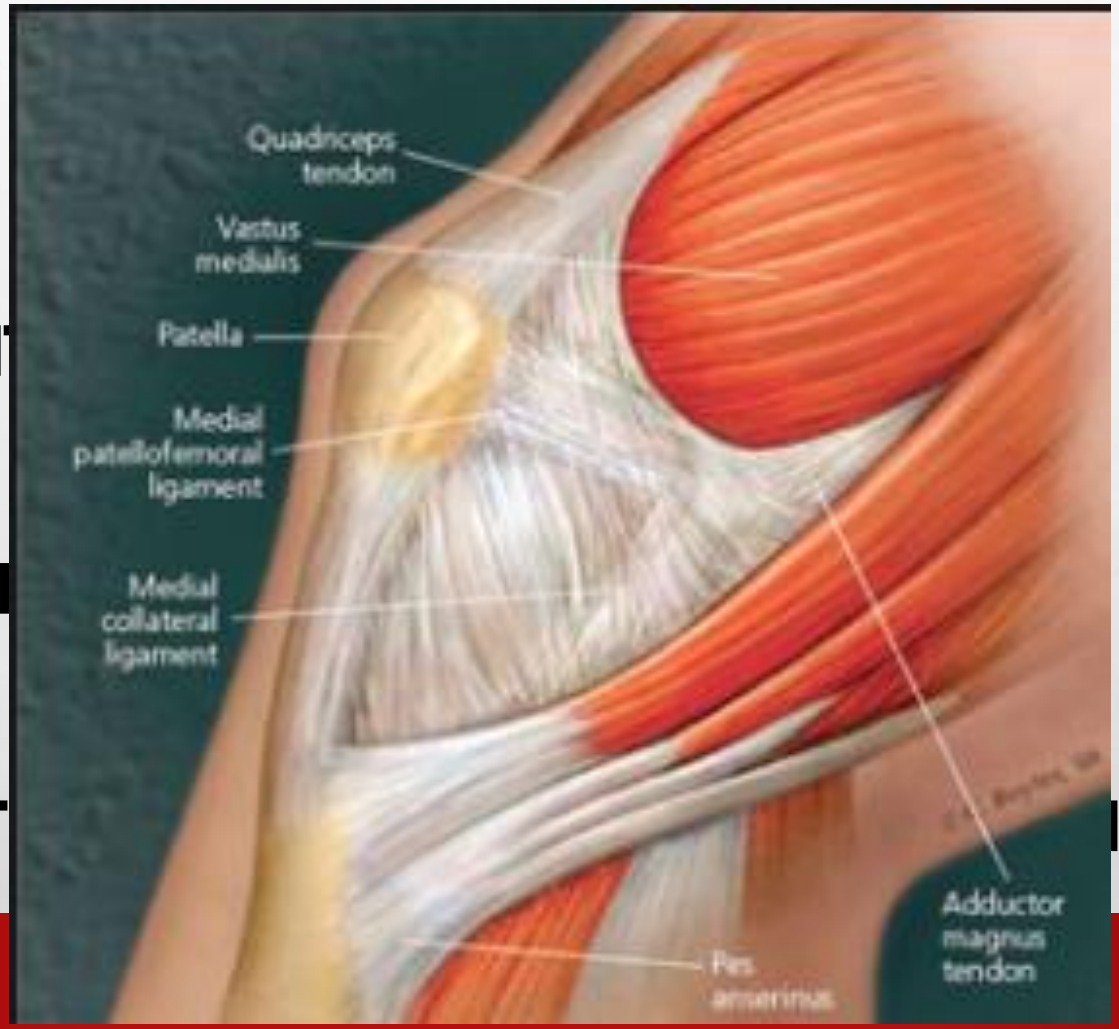
MRI CAN

PROCEDURES

- MPFL RECONSTRUCTION
- TIBIAL TUBERCLE OSTEOTOMY
- PATELLAR TENDON TRANSFER
- GUIDED GROWTH
- FEMORAL/TIBIAL OSTEOTOMY
- TROCHLEOPLASTY
- MEDIAL IMBRICATION?

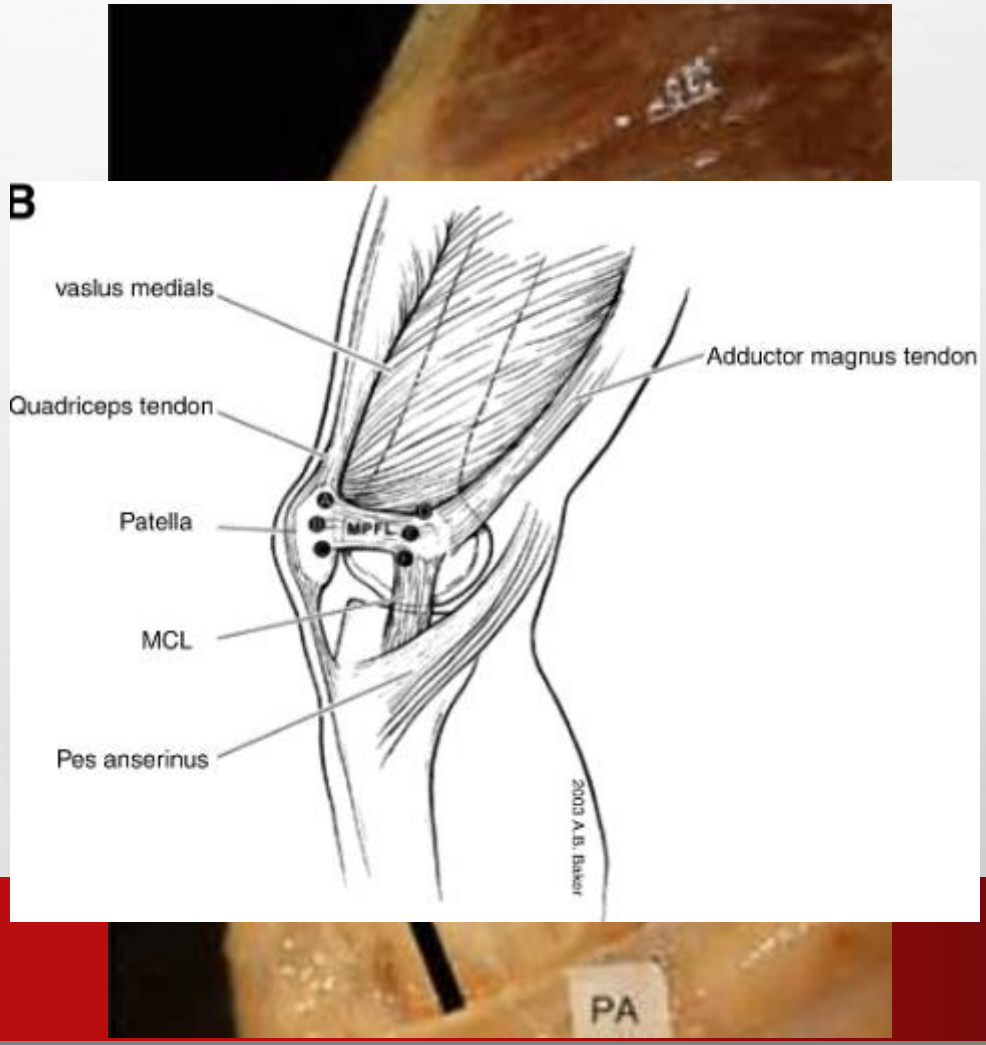
MPFL ANATOMY

- PRIMARY RESTRAIN
- MOST TAUT IN FULL
- GUIDES PATELLA INT

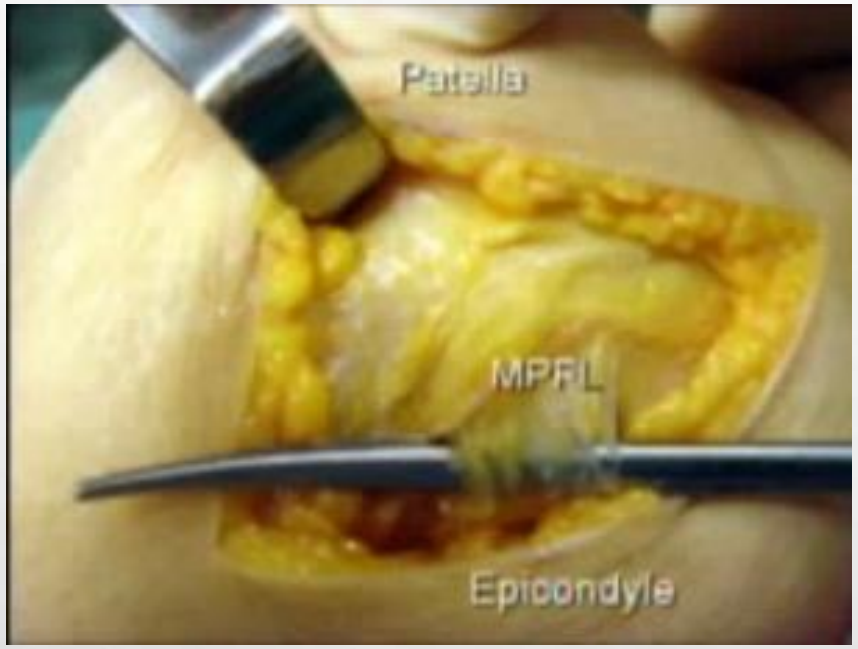


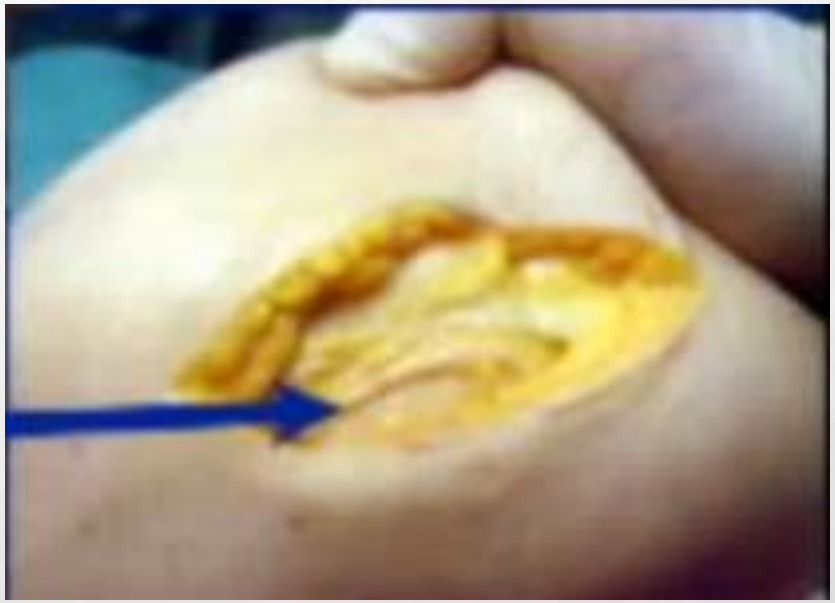
MPFL ANATOMY

- UPPER 1/3 OF PATELLA
- FEMORAL INSERTION CONTROVERSIAL
  - BETWEEN ADDUCTOR TUBERCLE AND MEDIAL EPICONDYLE
- OPEN GROWTH PLATES
  - PROXIMAL?DISTAL?
  - ALL AGREE VERY NEAR THE PHYSIS (CAUTION)



MPFL





- SEVERED MPFL ALLOWS PATELLA TO DISLOCATE IN NORMAL CADAVER KNEE

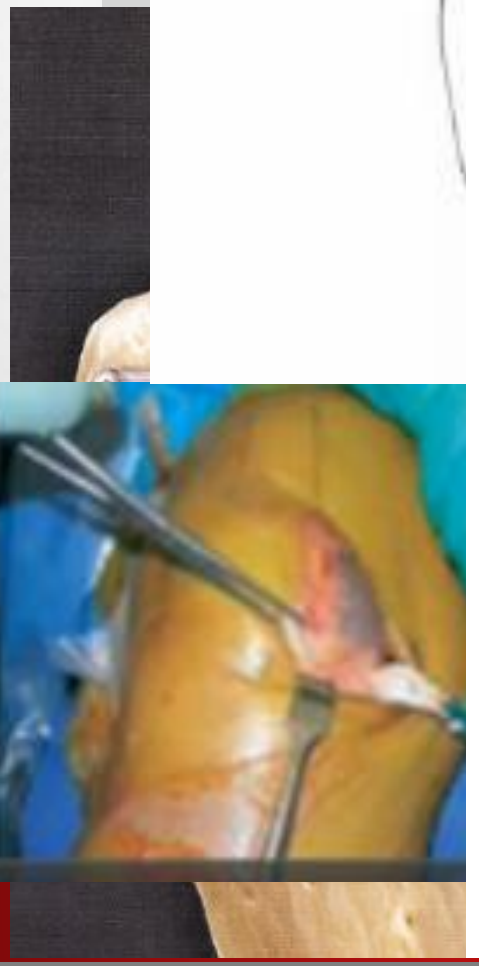
- *DONALD FITHIAN MD, METCALF MEMORIAL CONFERENCE 2009

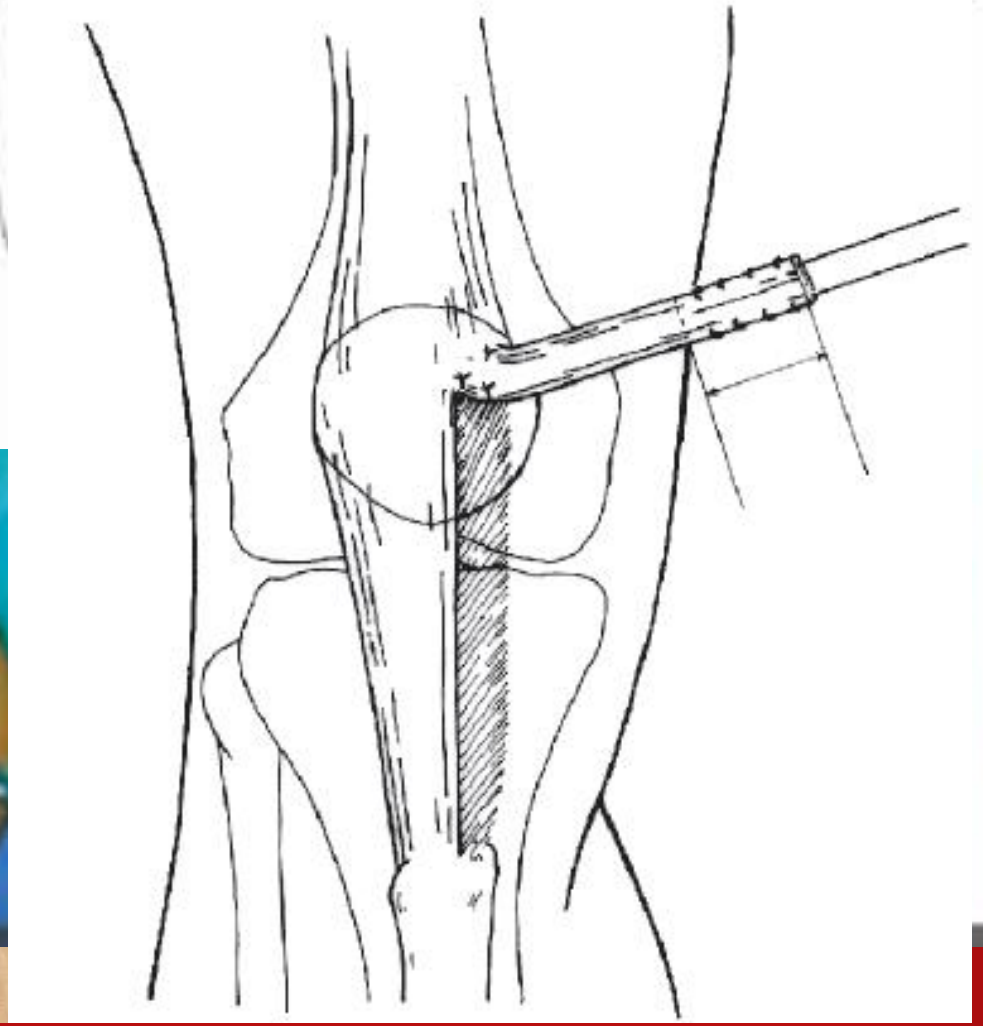
MPFL RECONSTRUCTION

- INDICATIONS: RECUF UE TO MEDIAL LAXITY (NO CHECKREIN, NO ENDI

DO MPFL REPAIR (F ETC.) IF I'M TAKING A FIRST TIME DISLOCATOR TO LOOSE BODY) AND THEY HAVE OTHER SIGNIFICA

Nonoperative Treatment Compared With MPFL Reconstruction Using Patellar Tendon

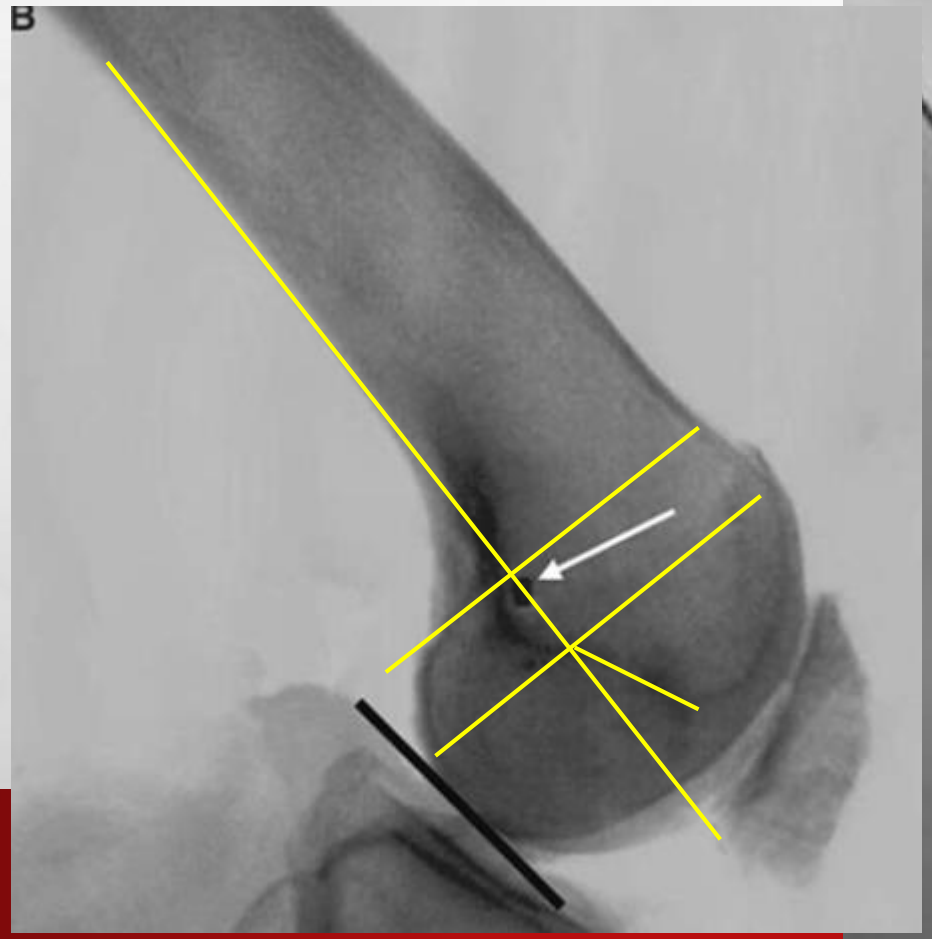


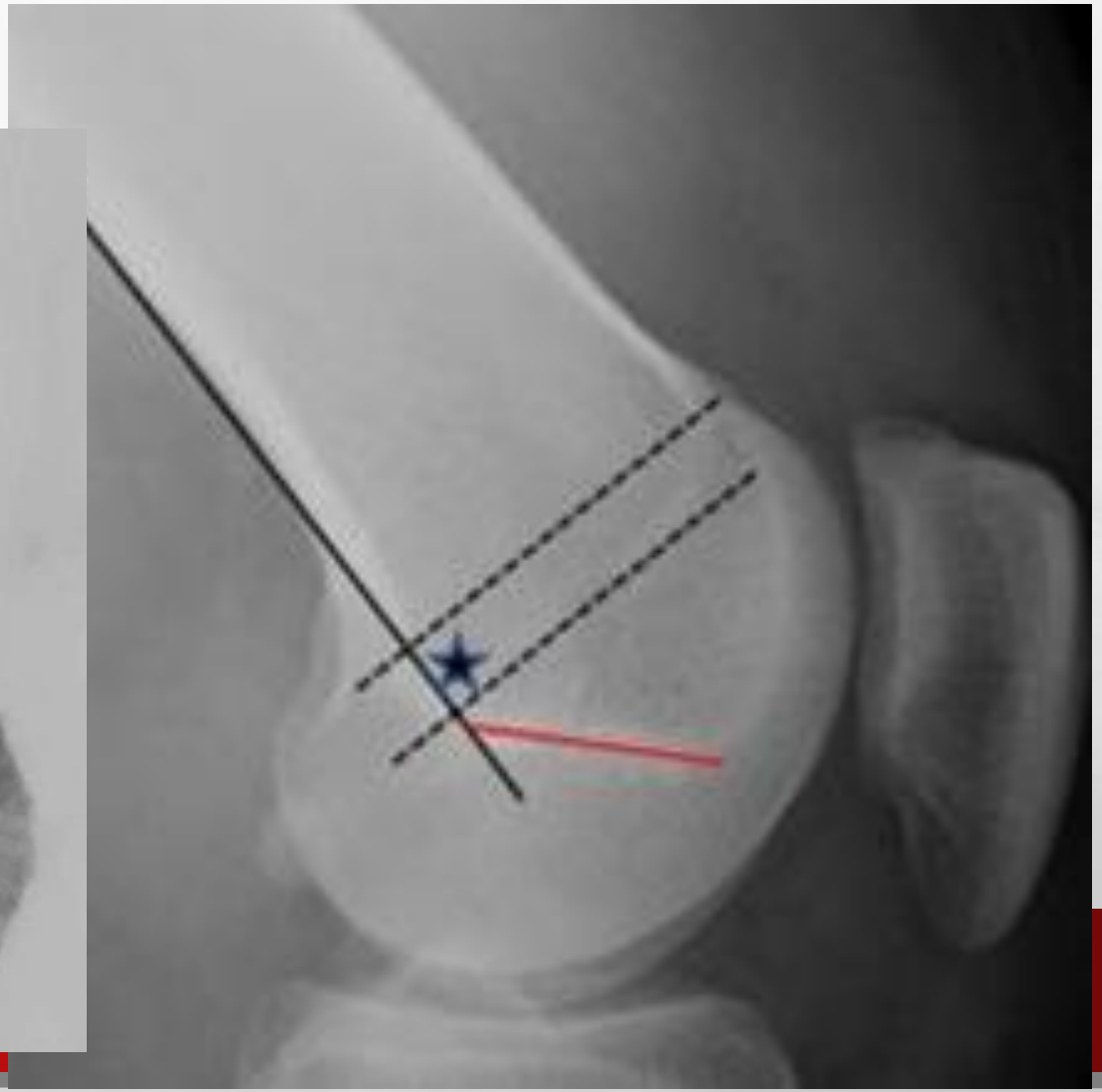


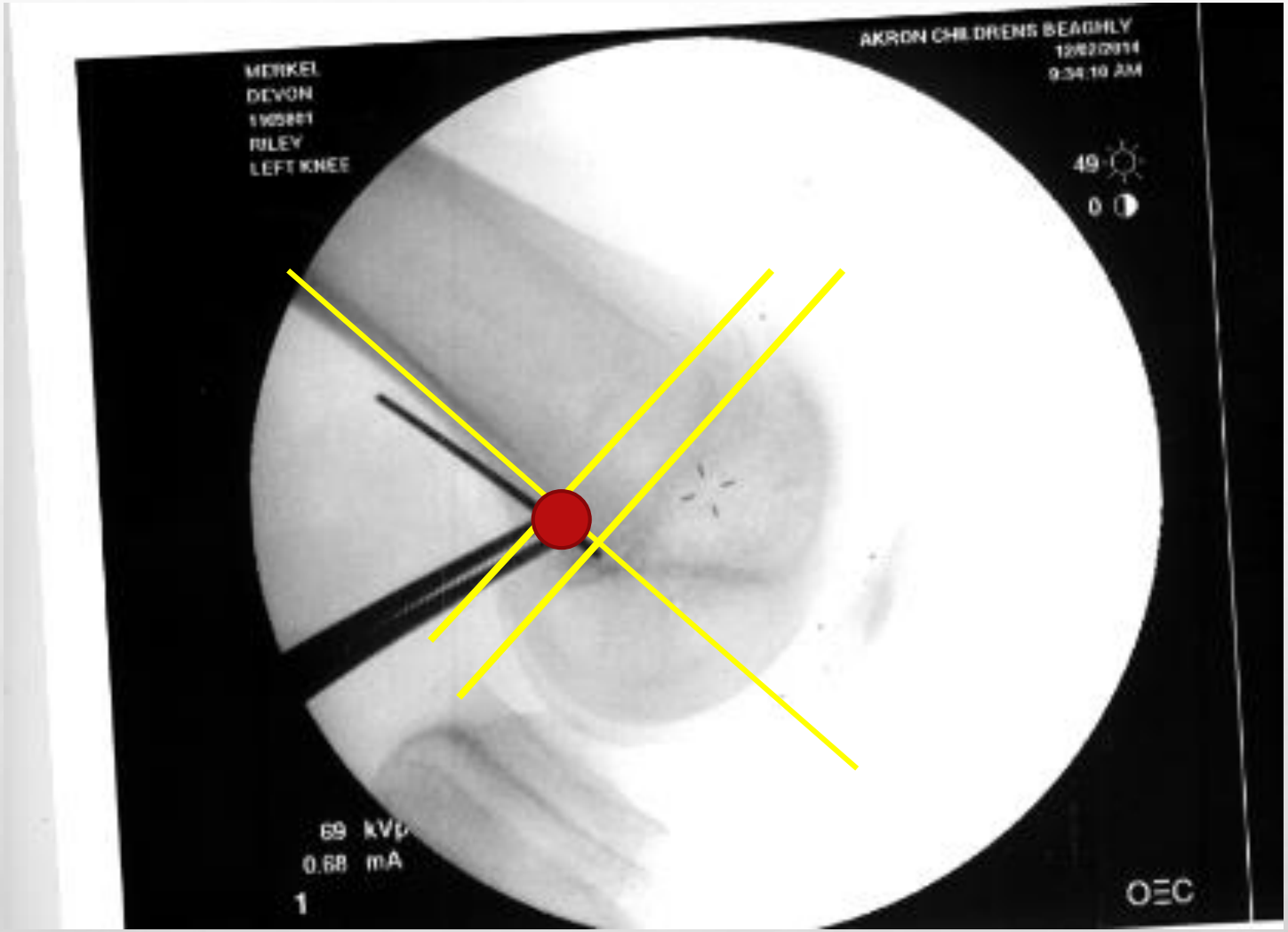
MPFL

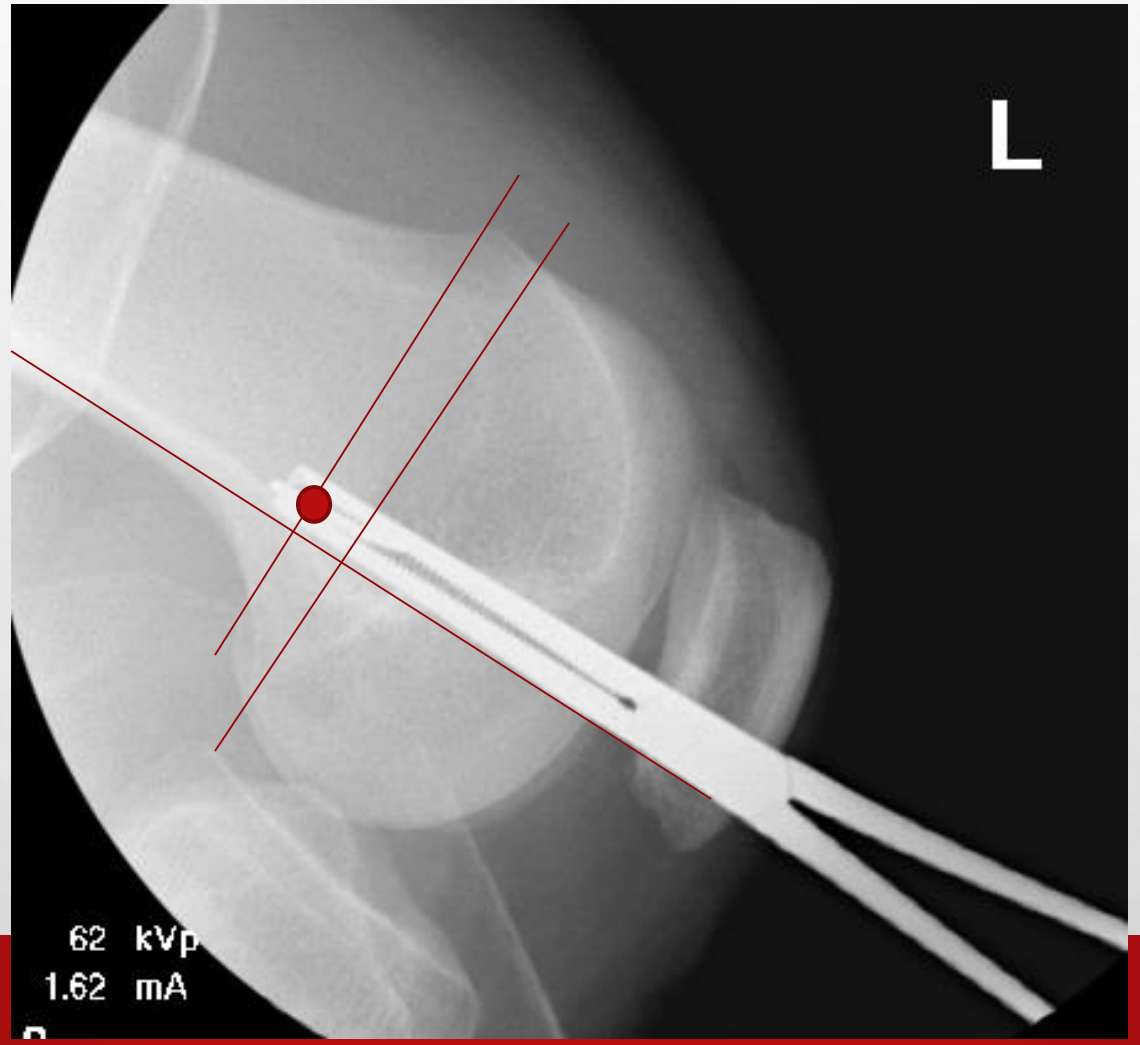

3

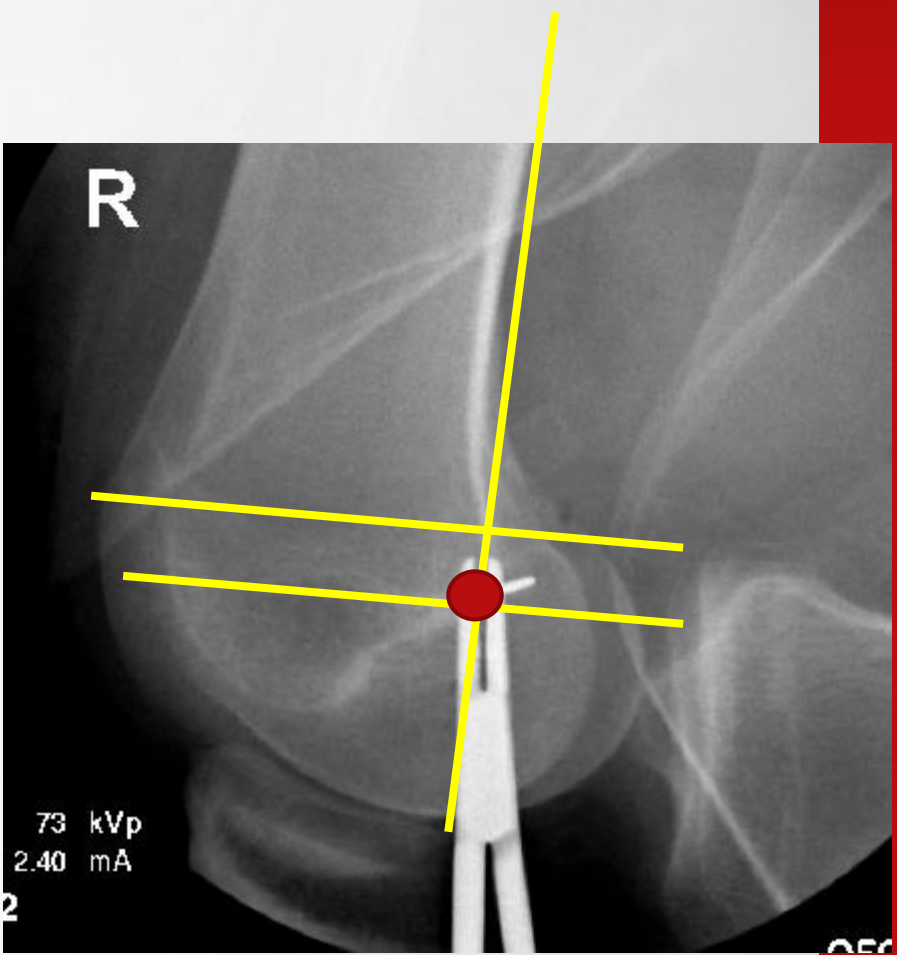
SCHOTTLES POINT

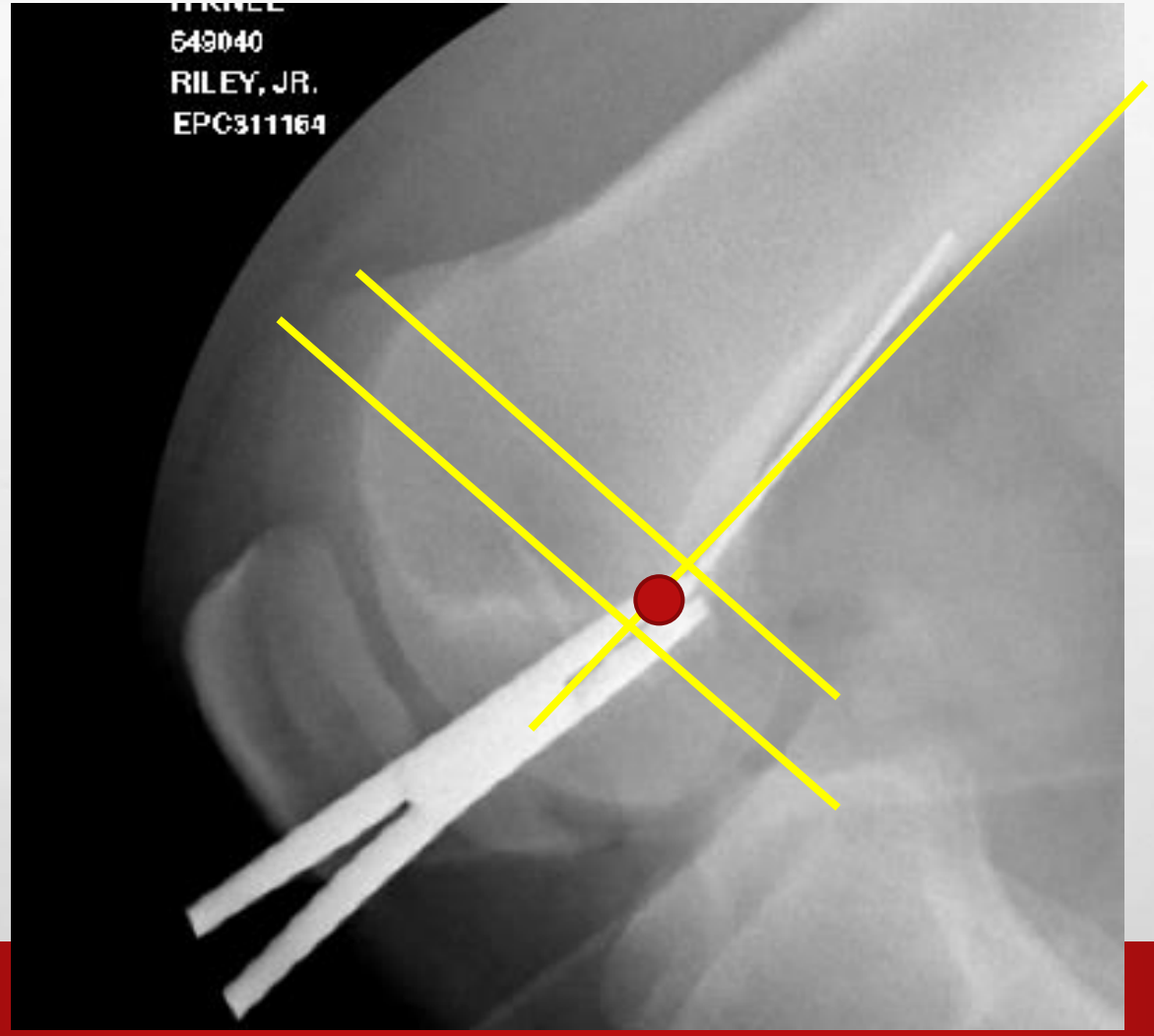


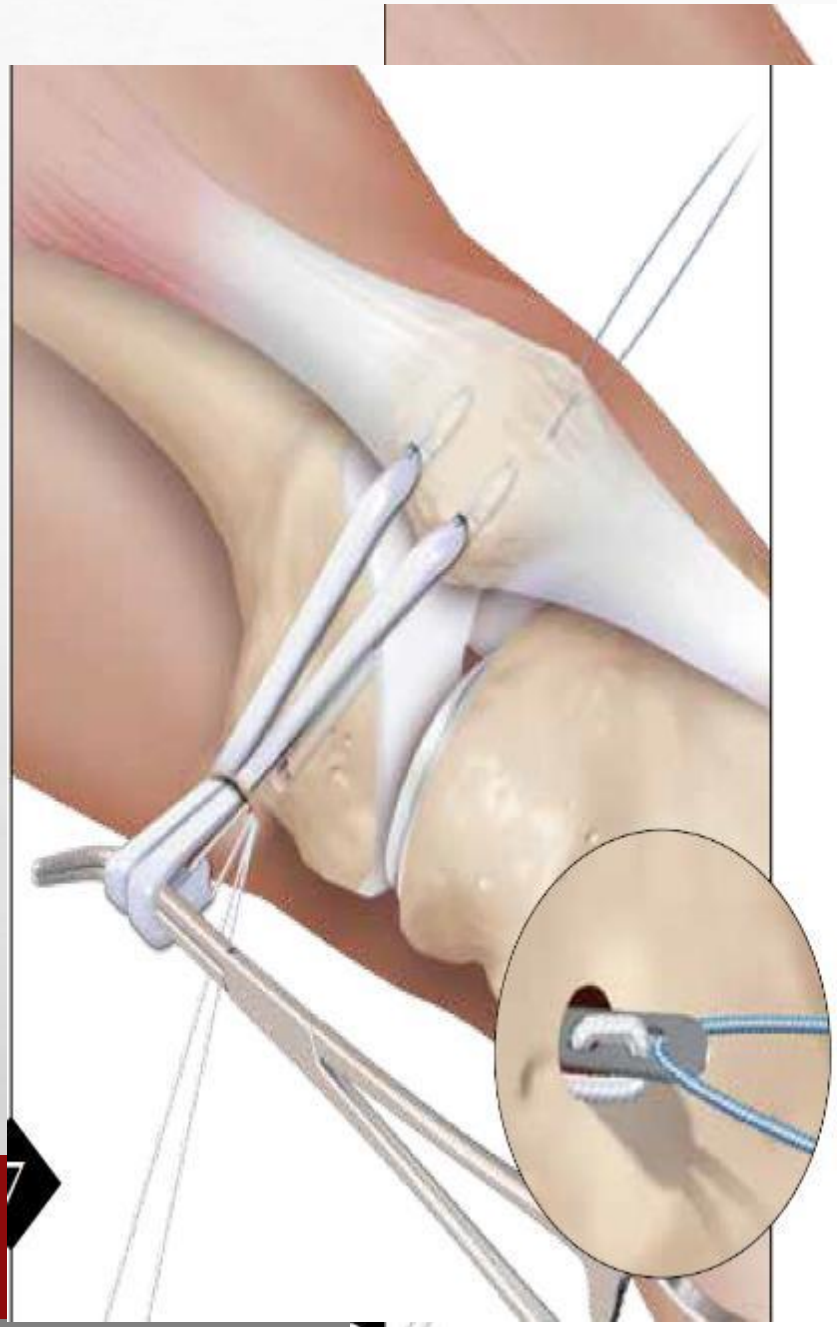



MERIKEL
DEVON
RILEY
LEFT KNEE
AKRON CHILDRENS BEAGHLY
49
0
69 kVp
0.68 mA
1
OEC


L
62 kVp
1.62 mA

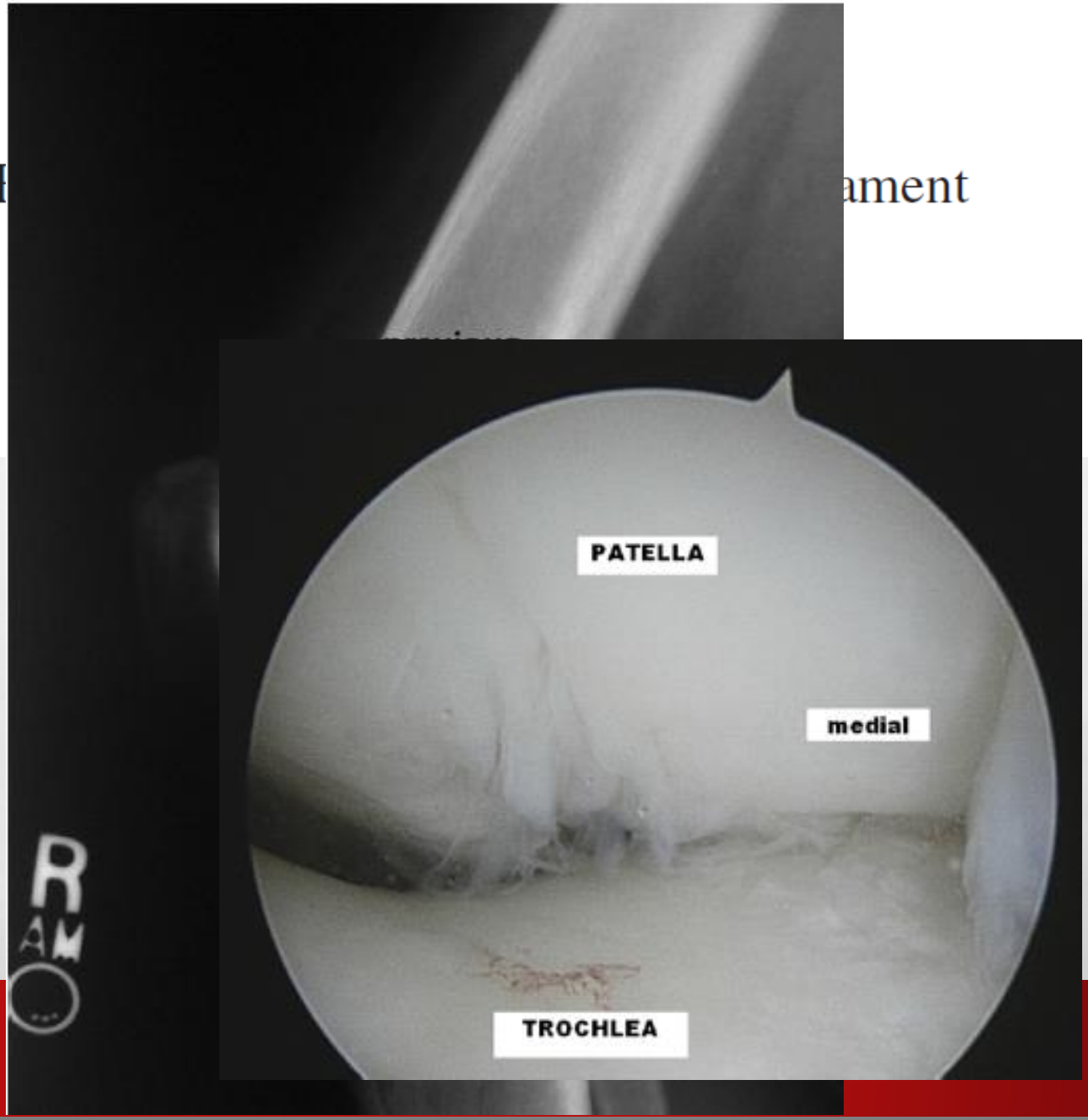

R
73 kVp
2.40 mA


649040
RILEY, JR.
EPC311164

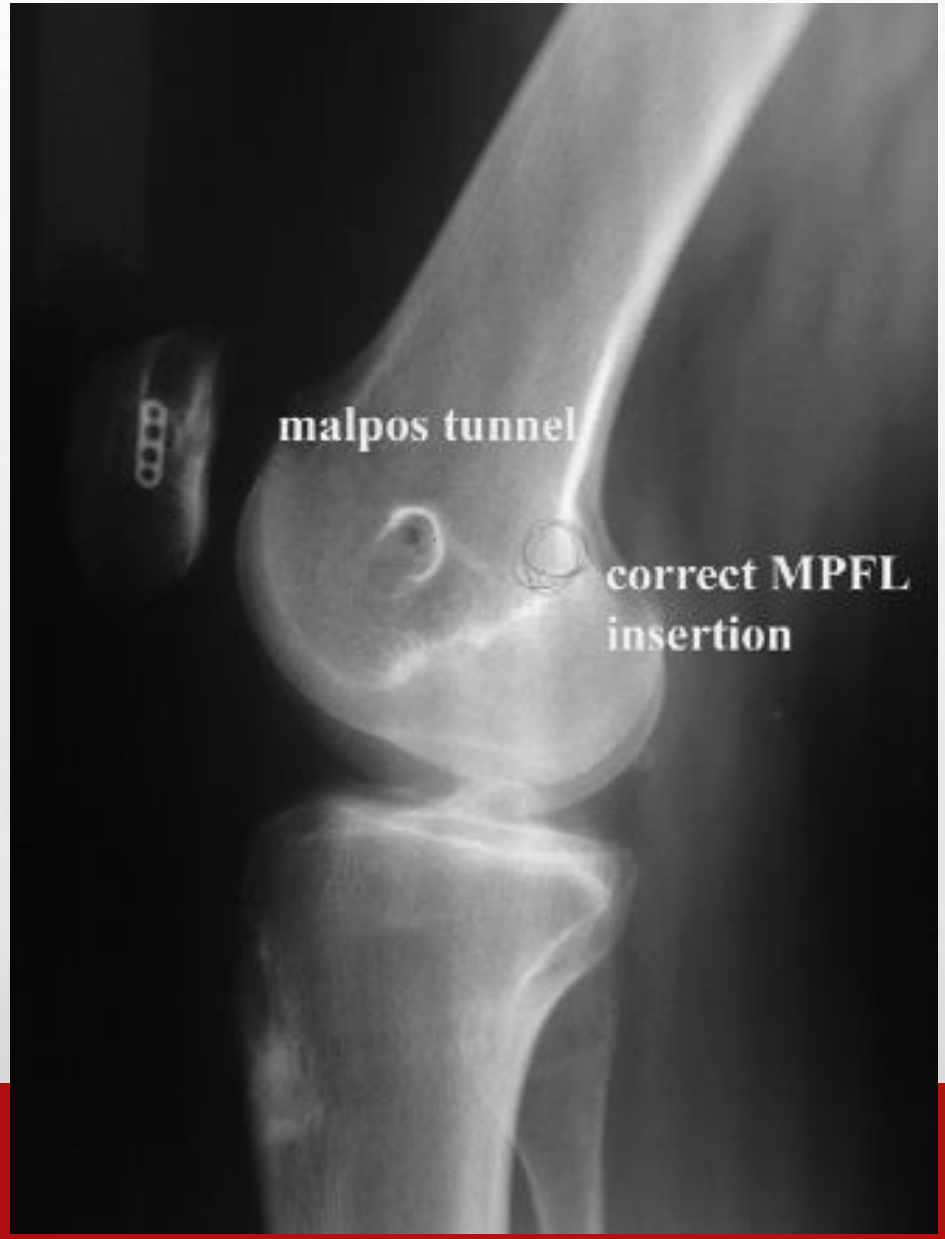


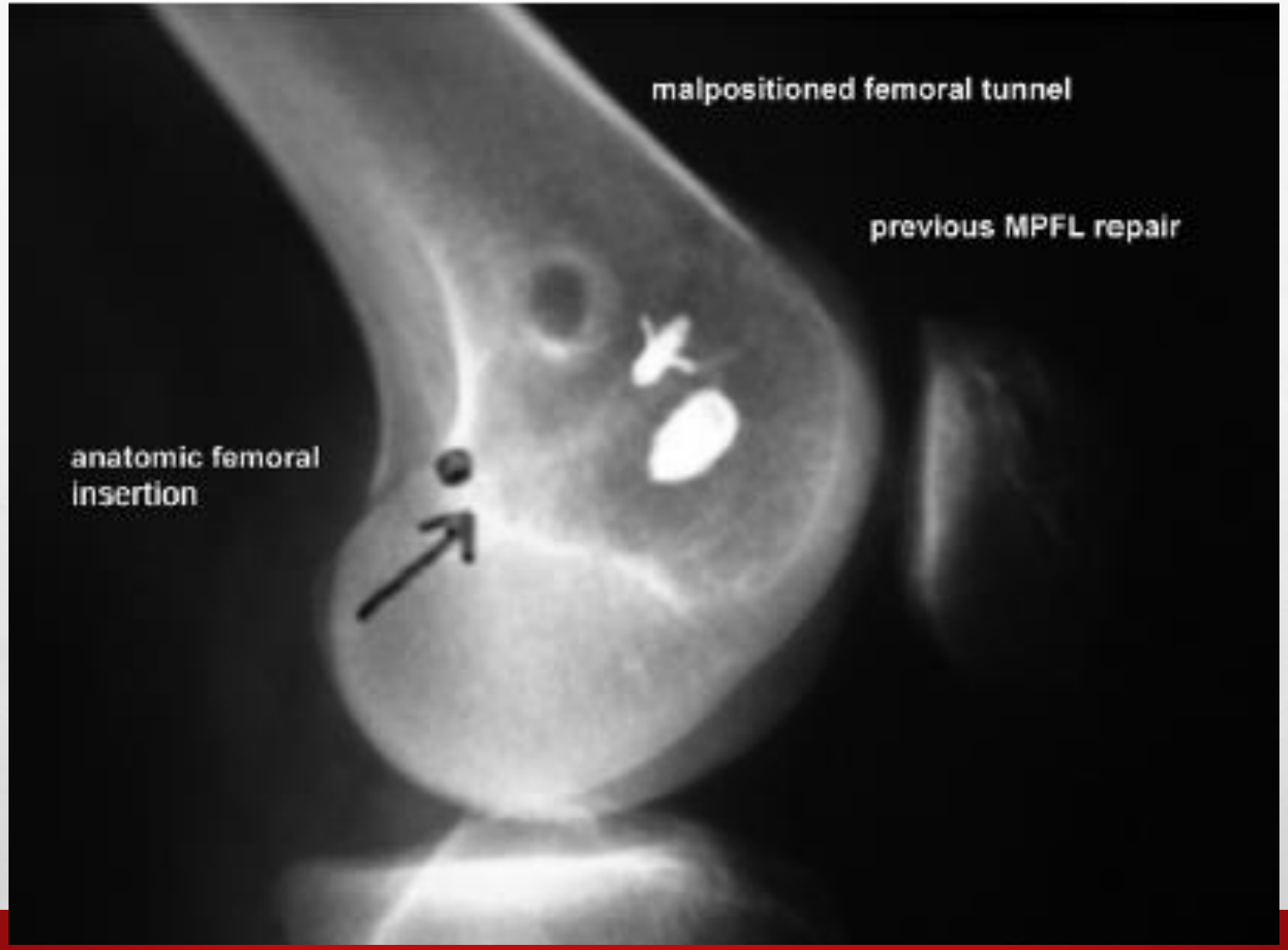
Technical H ament

Matthew Bollier, M.D.,



- *ARTHROSCOPY 2011


malpos tunnel
correct MPFL
insertion


malpositioned femoral tunnel
previous MPFL repair
anatomic femoral insertion


anteriorly
malpositioned
tunnel

J

Outcomes After Isolated Medial Patellofemoral Ligament Reconstruction for the Treatment of Recurrent Lateral Patellar Dislocations:

A Systematic Review and Meta-analysis

- **HIGH RATE OF RETURN TO SPORTS (86%)**
- **RATE OF REDISLOCTATION (1.2%)**

AJSM 2016

Factors Affecting the Outcomes of Double-Bundle Medial Patellofemoral Ligament Reconstruction for Recurrent Patellar Dislocations Evaluated by Multivariate Analysis

Keisuke Kita, MD, PhD*, Yoshinari Tanaka, MD, PhD, Yukiyoshi Toritsuka, MD, PhD, more... Show all authors

- **AJSM 2015**
- **3.2 YEAR F/U**
- **4.5% REDISLOCATION RATE**

Am J Sports Med. 2019 May;47(6):1331-1337. doi: 10.1177/0363546519835800. Epub 2019 Apr 15.

Isolated Medial Patellofemoral Ligament Reconstruction for Patellar Instability Regardless of Tibial Tubercle-Trochlear Groove Distance and Patellar Height: Outcomes at 1 and 2 Years.

Erickson BJ[1], Nguyen J[2], Gasik K[2], Gruber S[2], Brady J[3], Shubin Stein BE[2].

- 90 PTS
- TT-TG AVG 15 +/- 5 MM (-2 – 26)
- 1 REDISLOCATION AT 1 YEAR AND NONE AT 2 YEAR
- ANOTHER ONE AT 3.5 YEARS

Am J Sports Med. 2019 May;47(6):1323-1330. doi: 10.1177/0363546519838405.

Clinical Outcomes and Predictive Factors for Failure With Isolated MPFL Reconstruction for Recurrent Patellar Instability: A Series of 211 Reconstructions With a Minimum Follow-up of 3 Years.

Sappey-Marinier E[1], Sonnery-Cottet B[1], O'Loughlin P[1], Ouanezar H[1], Reina Fernandes L[1], Kouevidjin B[1], Thaunat M[1].

- 211 PTS
- AVG F/U – 6 YR (3-9)
- AVG AGE 20 (12-48)
- 27% PREOP "J"SIGN
- 93% TROCHLEAR DYSPLASIA
- AVG TT-TG 15 MM (3-30)
- REDISLOCATION IN 10 (4.7% FAILURE)
  - RISK FACTORS: PATELLA ALTA (CD>1.3) OR = 4.9; PREOP + J SIGN – OR 3.9

IS IT GOOD??

TROCHLEAR DYSPLASIA

DUJOUR AND WALCH ET AL REV CHIR ORTHOP REPARATRICE APPAR MOT. 1990

- FLAT, PROMINENT TROCHLEA
- PATELLA NEVER ENGAGES IN GROOVE
- IF SKELETALLY IMMATURE AND TROCHLEAR D LLEN ET AL AJSM 2013)

Knee Surg Sports Traumatol Arthrosc. 2017 Dec;25(12):3869-3877. doi: 10.1007/s00167-016-4365-x. Epub 2016 Oct 27.

Results of medial patellofemoral ligament reconstruction compared with trochleoplasty plus individual extensor apparatus balancing in patellar instability caused by severe trochlear dysplasia: a systematic review and meta-analysis.

Balcarek P[1,2], Rehn S[3], Howells NR[4], Eldridge JD[4], Kita K[5], Dejour D[6], Nelitz M[7], Banke IJ[8], Lambrecht D[9], Harden M[10], Friede T[10].

- 407 KNEES
- BOTH GROUPS WITH GOOD POST OP OUTCOME SCORES
- REDISLOCATION
  - MPFL – 7%
  - TROCHLEOPLASTY – 2%

Am J Sports Med. 2018 Mar;46(4):883-889. doi: 10.1177/0363546517745625. Epub 2018 Jan 3.

Clinical Outcomes After Isolated Medial Patellofemoral Ligament Reconstruction for Patellar Instability Among Patients With Trochlear Dysplasia.

Liu JN[1], Brady JM[2], Kalbian IL[3], Strickland SM[4], Ryan CB[5], Nguyen JT[6], Shubin Stein BE[4].

- 121 MPFLS
- 95% RETURN TO SPORTS (74% SAME LEVEL OR HIGHER)
- EXCELLENT OUTCOME SCORES (KUJALA)
- 3 REDISLOCATIONS

Arthroscopy. 2019 Oct;35(10):2909-2915. doi: 10.1016/j.arthro.2019.05.007.

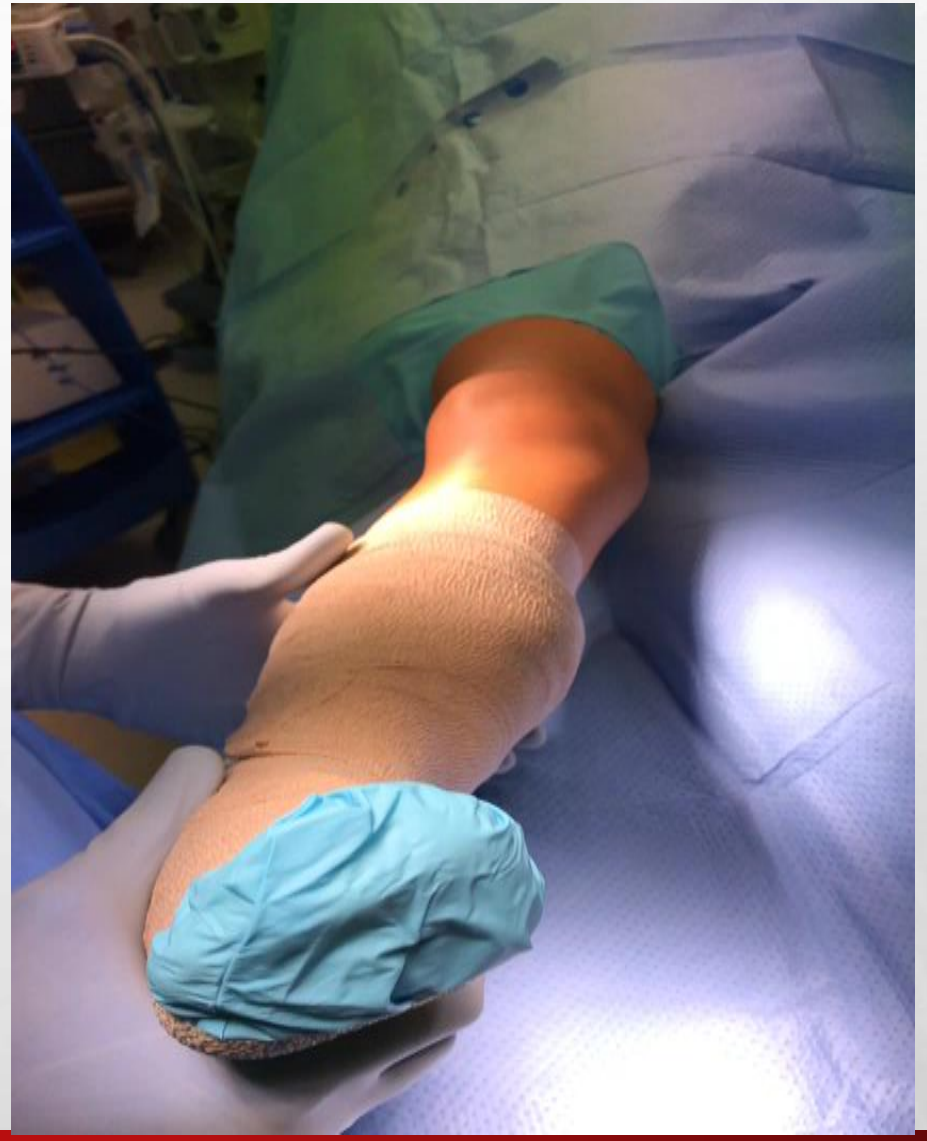
Primary Medial Patellofemoral Ligament Repair Versus Reconstruction: Rates and Risk Factors for Instability Recurrence in a Young, Active Patient Population.

Puzzitiello RN[1], Waterman B[2], Agarwalla A[3], Zuke W[4], Cole BJ[5], Verma NN[5], Yanke AB[5], Forsythe B[6].

- 52 KNEES RETROSPECTIVE
- REDISLOCATION RATE
  - 37% MEDIAL REPAIR/IMBRICATION
  - 6% MPFL RECONSTRUCTION

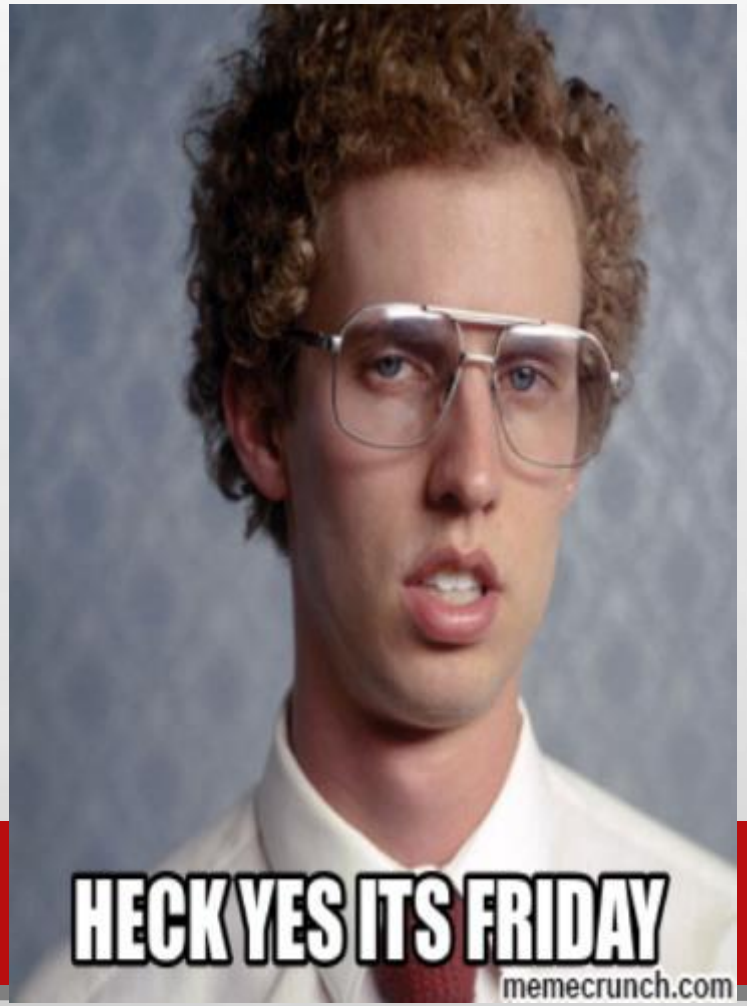
SPECIAL CONSIDERATIONS

HABITUAL DISLOCATOR



10 WEEKS POST OP

THANKS!



ANTEROLATERAL LIGAMENT


I BELIEVE

HISTORY OF ALL

- ACLS RESULT IN ANTEROLATERAL ROTATORY INSTABILITY
- IN 1950S-70S - REPAIRS OR RECONSTRUCTION
- IN 1980S - MORE EXTRA-ARTICULAR PROCEDURES
- 1990S – BACK TO INTRA-ARTICULAR AND HAS STAYED THAT WAY FOR LAST TWO DECADES

HISTORY OF ALL

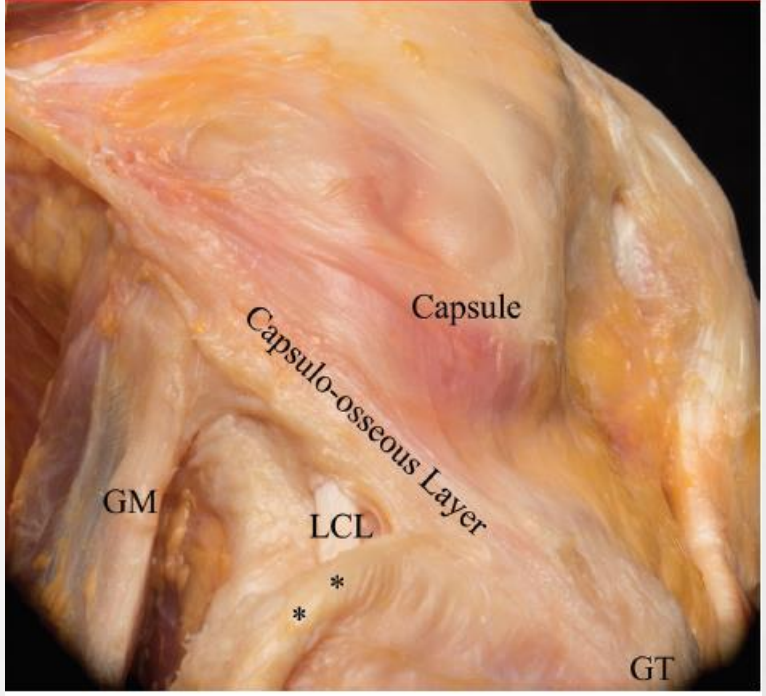
- DESPITE ANATOMIC INTRA ARTICULAR ACLR, PATIENTS STILL EXPERIENCE ALRI
  - RESULTING IN LOWER “PROS” *

- RECENTLY A “NEW” LIGAMENT HAS BEEN DESCRIBED WHICH MAY PLAY A ROLE IN RESTRAINT OF INTERNAL ROTATION

*Pivot shift as an outcome measure for ACL reconstruction: A systematic review. Knee Surg Sports Traumatol Arthrosc 2012

ANATOMY

- DETAILED DESCRIPTIONS OF LATERAL DISSECTION

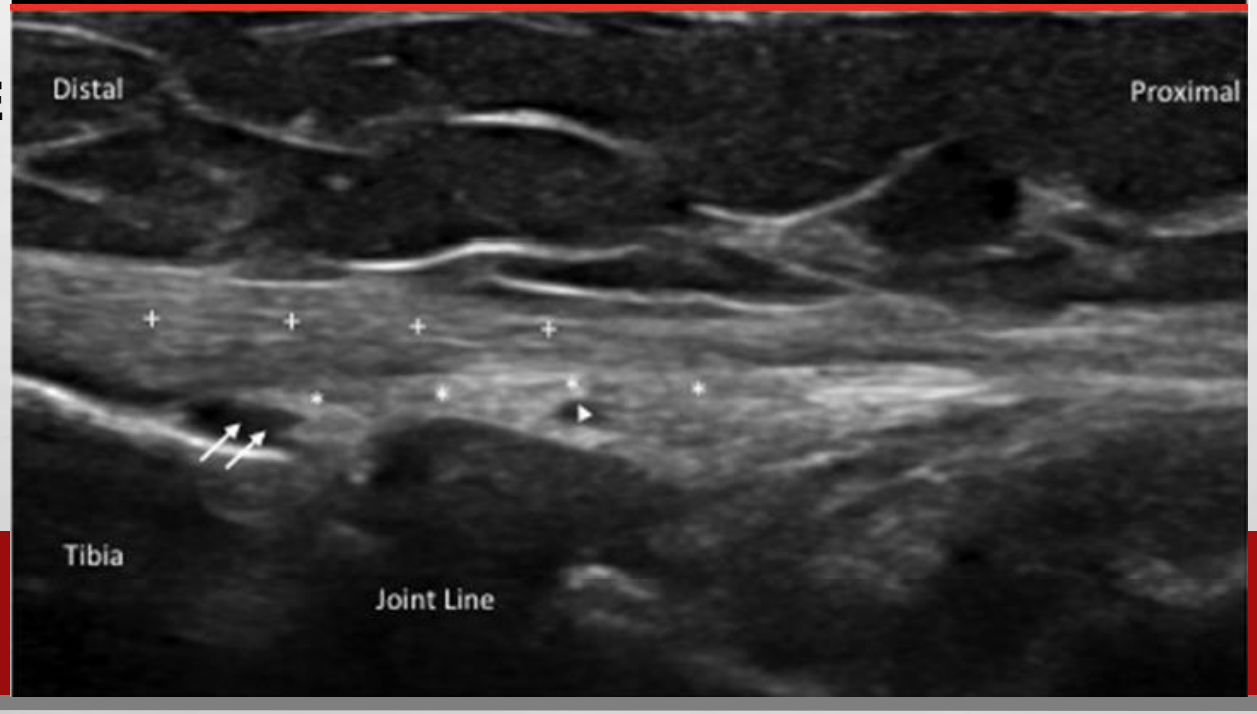


- ALL IS LIKELY A CAPSULAR THICKENING OF THE ANTEROLATERAL JOINT CAPSULE
  - PREVIOUSLY DESCRIBED AS CAPSULE-OSSEOUS LAYER
    - ACTUALLY THE DEEPEST PORTION OF THE ITB

- DISCREPANCIES IN ORIGIN BUT APPEARS TO BE MOST CONSISTENTLY POST AND SUP TO THE LE

IMAGIN

- ULTRASOUND
  - SOME PEOPLE



IMAGING ALL

- MRI
  - ALSO DEBATABLE
  - ONE REPORT SHOWED ENTIRE ALL IN ONLY 11% OF ALL MRIS
  - ANOTHER SHOWED 100% OF ALL SEEN BY 2 MSK RADIOLOGISTS
    - HOWEVER, ONE SHOWED ALL TORN IN 26% WHILE OTHER SHOWED TORN IN 62%

BIOMECHANICAL FINDINGS OF ALL

- MANY STUDIES BUT MOST INVOLVED DIFFERENT LEVELS OF SECTIONGING
  - MANY INVOLVE CUTTING THE ITB
    - ITB IS CRUCIAL FOR ROTATORY STABILITY – INCREASES INTERNAL ROTATION SUBSTANTIALLY WHEN CUT
    - IN FACT, CUTTING ALL WITHIN IN TACT ITB DOES NOT INCREASE ROTATORY INSTABILITY (3 STUDIES)

CONTRIBUTION OF THE ALL

- GREATEST INCREASE IN INTERNAL ROTATION AT 60° IN ALL DEFICIENT KNEE
- MAXIMUM INCREASE IN PIVOT SHIFT OF 2.7° IN ALL DEFICIENT VS INTACT KNEE (WITH ACL RECON)
- MAX INCREASE IN PIVOT SHIFT OF 3.3° AT 45° FLEXION IN ACL DEFICIENT KNEE
  - INTERESTING THING IS THAT PIVOT SHIFT HAPPENS AT MUCH SMALLER DEGREES OF FLEXION THAN 45
    - SUGGESTS THAT ALL ROLE IS NEGLIGIBLE AT PHYSIOLOGIC RANGES OF TIBIAL TRANSLATION

CONTRIBUTION OF ALL

- **CONCLUSION** - ANTEROLATERAL CAPSULAR AND EXTRA-CAPSULAR SOFT TISSUES DO CONTRIBUTE TO ROTATORY INSTABILITY. HOWEVER, THE ITB PLAYS A RELATIVELY LARGE ROLE, AND THE CONTRIBUTION OF THE ALL ALONE IS UNLIKELY TO ACCOUNT FOR LARGE CHANGES IN ANTEROLATERAL ROTATORY KNEE STABILITY.

MANAGEMENT OF ALL INJURIES

- RECONSTRUCTION VS TENODESIS (LET)
  - BOTH REDUCE INTERNAL TIBIAL ROTATION
  - ALLR CAN RESULT IN OVERCONTRAINT OF IR WITH KNEE FLEXION >30°
  - LET RESTRAINS IR BUT INCREASES EXTERNAL TIBIAL ROTATION COMPARED WITH IN TACT ACL OR ALLR

LET CAUSES ARTHRITIS?

- **FERRETTI** ARTHROSCOPY 2016
  - 51% OF PATIENTS WITH ACLR BUT NO LET HAD ≥ GRADE 2 OA AT 10 YEARS COMPARED WITH 14% WHO HAD ACLR AND LET

- **YAMAGUCHI** KNEE SURG SPORTS TRAUMATOL ARTHROSC 2006
  - 24 YEAR FU - MOD-SEVERE OA IN 71% ACLR AND LET
  - 16% PATIENTS WITH ISOLATED ACLR

WHEN TO PERFORM?

- AT LEAST ONE STUDY SHOWS DECREASE IN PIVOT SHIFT
- HOWEVER ANOTHER SHOWED STILL 8% PIVOT SHIFT IN ACL AND ALL RECONSTRUCTED KNEES

WHEN TO PERFORM?

- CERTAINLY CONSIDER IN REVISION SITUATIONS WHERE OTHERWISE ACL APPEARED TO BE PERFORMED CORRECTLY
- GRADE 3 PIVOT SHIFT
- YOUNG ATHLETE WITH HYPEREXTENSION >10 DEGREES, LIGAMENTOUS LAXITY, HIGH GRADE PIVOT SHIFT.
- MUST ADDRESS OTHER STABILIZERS AS WELL (ACL, MENISCI, COLLATERALS)


NEPTUNE