SPARSH
The Touch of Life

ACL AND PCL INJURIES OF THE KNEE JOINT

Dr.KN Subramanian M.Ch Orth., FRCS (Tr & Orth), CCT Orth(UK)
Consultant Orthopaedic Surgeon,
Special interest: Orthopaedic Sports Injury, Shoulder and Knee Surgery,
SPARSH Hospital for Advanced Surgeries, Infantry Road, Bangalore

BONE SCHOOL POST GRADUATE TEACHING 04/03/2012

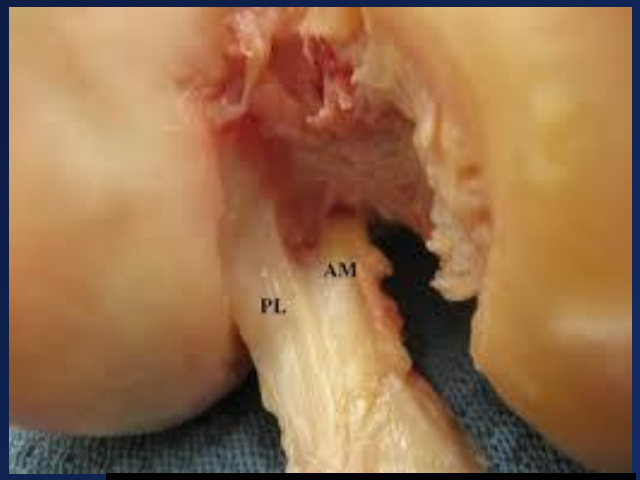
- FUNCTION OF LIGAMENTS
- ANATOMY
- INJURY ASPECTS
- DIAGNOSIS
- INVESTIGATION
- MANAGEMENT

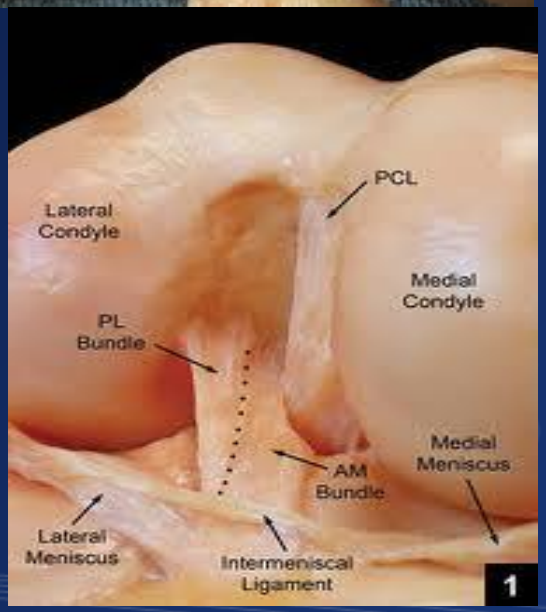
FUNCTION OF KNEE LIGAMENTS

- ACL and PCL
  - Primary restraint to ANTERIOR / POSTERIOR TRANSLATION
  - Secondary Restraint to the TIBIAL ROTATION
  - ACL – also a secondary restraint to VARUS and VALGUS ANGULATION at full extension

- LCL and MCL
  - Primary restraint to VARUS and VALGUS stress
  - LCL also Restrains EXTERNAL ROTATION OF TIBIA

- Posterolateral corner
  - Restraint to EXTERNAL TIBIAL ROTATION
  - Restraint to VARUS ROTATRION
  - Restraint to POSTERIOR TIBIAL TRANSLATION





- ACL – Anteromedial band
- Posterolateral band
- AM Band – tight in flexion
- PL Band – tight in extension

ACL injury

- Non contact pivoting injury with valgus and rotation
- Audible pop
- Immediate swelling in the knee joint (72% chance of ACL injury if the fractures are excluded)
- Football
- Hit from the side
- Extreme – can dislocate knee

Predisposing Factors

- Q angle
- Neuromuscular (tendency to land in more extension and more valgus)
- Notch-width
- Hormonal
- Generalized ligamentous laxity

ACL DEFICIENT KNEE

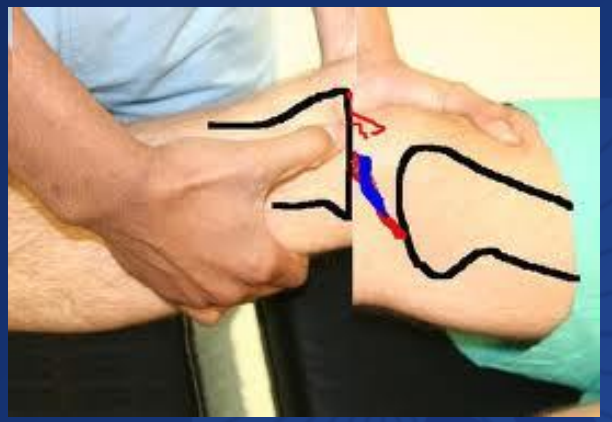
- Tibia subluxation causes stretching of the capsule and shear forces on the menisci and articular cartilage
- Late arthritis
- Medial Meniscal injury

DD of Haemarthrosis

- ACL Injury (72%)
- Osteochondral fracture
- Peripheral menisceal tear
- Retinacular tear and patella dislocation
- PCL tear
- Bleeding disorders

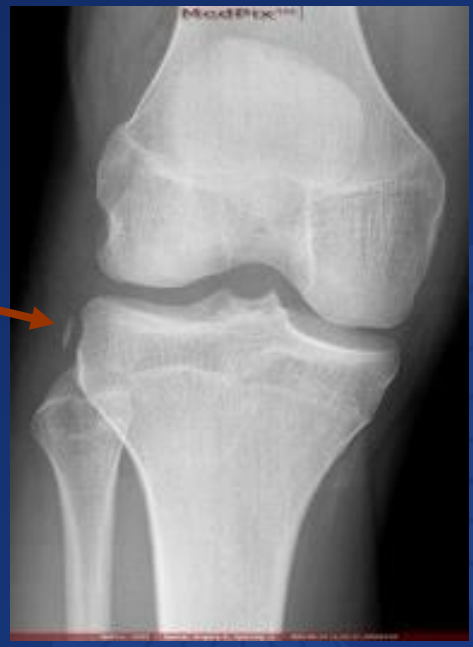
Clinical examination

- Lachman test – Highly sensitive
  - 15 to 20 degree Knee flexion, anterior thrust on the tibia
- Pivot shift test – Highly specific
  - Valgus, internal rotation bring the tibia from full extension to flexion – Subluxed tibia in extension will relocate leading on to a jerk

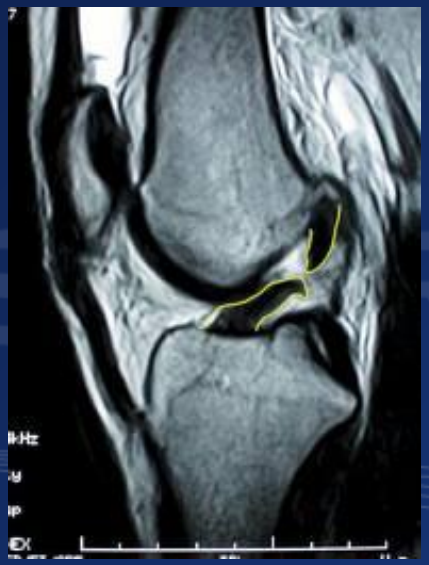


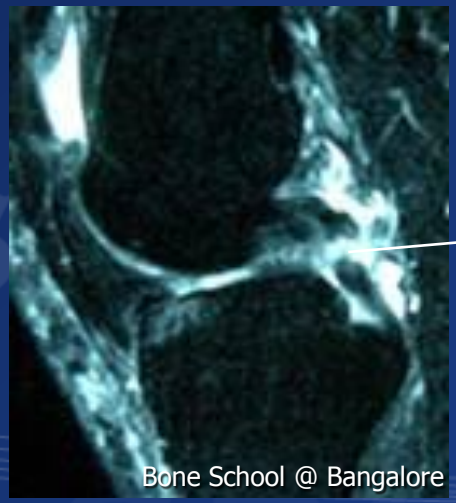
Imaging

- Segond fracture – Avulsion of lateral capsule – PATHOGNOMIC for ACL injury



- MRI





RUPTURED PCL

Bone School @ Bangalore

The Touch of Life

ACL Injury management

ACL INJURY WITH
GR II or III MCL/LCL, Mensicus tears → Reconstruct ACL

Isolated ACL Injury in a
Competitive player, Athlete,
Sternuous activity,
Moderate activity level individual, → Reconstruct ACL

Light Activity/Sedantary → Non op

ArthroscopicACL Reconstruction

- SURGICAL STEPS:
  - EUA
  - Diagnostic arthroscopy
  - Graft Harvesting
  - Graft bed clearance
  - Femoral tunnel and Tibial tunnel positioning
  - Femoral tunnel 10.30 and 1.30
  - Tibial tunnel – 7mm anterior to PCL, just lateral to medial tibial spine, a line parallel to posterior border of anterior horn of lateral meniscus
  - Graft fixation with endobutton or interference scres

Grafts for Ligament Reconstruction

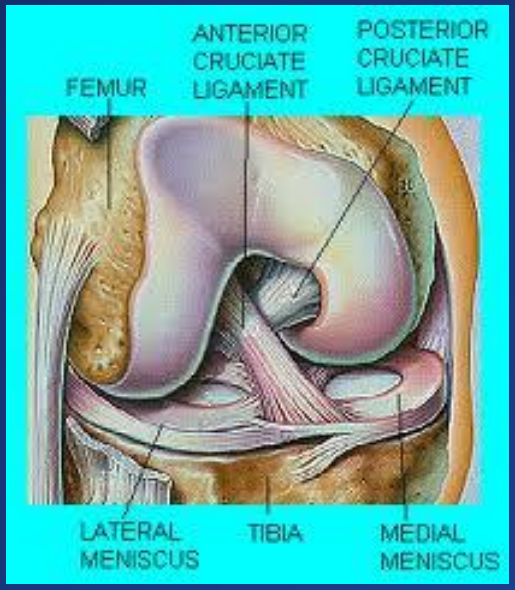
- Autograft
  - Hamstring – Biomechanical strength 2560N
  - Patella tendon – Biomechanical strength 2100N
  - Normal ACL – Biomechanical strength 2060N
- Allograft
  - Tendoachilles
- Synthetic

Rehab - Goals

- 1 to 2 weeks
  - Decrease pain and swelling and increase ROM
  - Static contraction of Quads and Hamstring
  - PWB
- 2 to 6 weeks
  - Increase ROM, Weight bearing, Control on Hamstrings and Quads
  - Gait re-education and Static proprioception exercises –Balancing on the affected leg, pool work
- 6 to 12 weeks
  - General muscle strengthening, Balancing on the wobble board, jogging, Cycle, Swim
- 12 weeks to 6 months
  - Sport specific exercises, to improve agility and reaction times.

PCL Anatomy

- Anterolateral and Posteromedial band
- Anterolateral band strongest
- Originates from the intercondylar notch – roof on the medial femoral condyle
- Insertion in the posterior aspect of the tibial plateau 1cm below the articular surface
- PCL cross sectional anatomy: 30% bigger and strongerthan ACL
- Crescent shaped insertion on femur
- Difficult to find "isometric" point



Injury mechanism

- Direct blow to the anterior tibia
- Hyperflexion with a plantarflexed foot
- Hyperextension injury
- More often associated with other ligament injuries(30% isolated and 70% associated with other ligaments)

Clinical symptoms

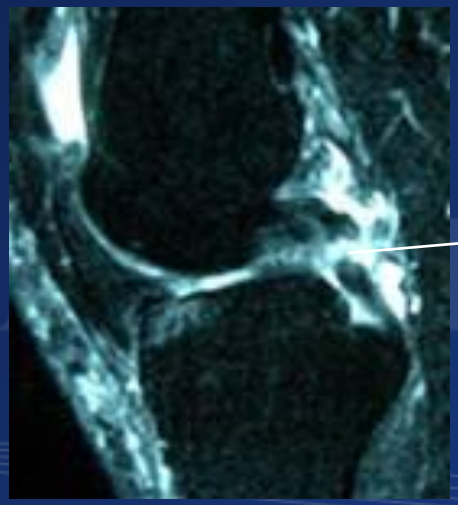
- Discomfort in a semiflexed position with ascending or descending stairs
- Starting a run
- Lifting a load
- Walking longer distance
- Retropatellar pain due to posterior sag

Signs

- Posterior tibial sag
- Quads active test – Knee flexed to 90 degree, Restrain ankle and Quadriceps movement causes tibial translation >2mm
- Posterior Drawer – Knee flexed to 90 degree in neutral rotation – Do posterior thrust on the tibia - Posterior tibial translation will be positive

Imaging

- X ray – Haemarthrosis, Avulsion fracture of tibia
- MRI – Demonstrate PCL tear



RUPTURED PCL

PCL Injury treatment Algorithm

PARTIAL PCL INJURY, ISOLATED PCL → REHAB

COMBINED PCL and PLC/MCL/LCL

FUNCTIONALLY UNSTABLE

FAILED REHAB → RECONSTRUCT PCL

Multiligament injuries

- PLC/MLC/LCL – If Grade III
  - Should be repaired immediately
  - Late repair is not possible and Reconstruction needs to be done but the results are inferior to early repair
- PCL – Early Reconstruction
- ACL Delayed Reconstruction
  - Early ACL Reconstruction – Higher incidence of Arthrofibrosis

SPARSH
The Touch of Life

THANK YOU

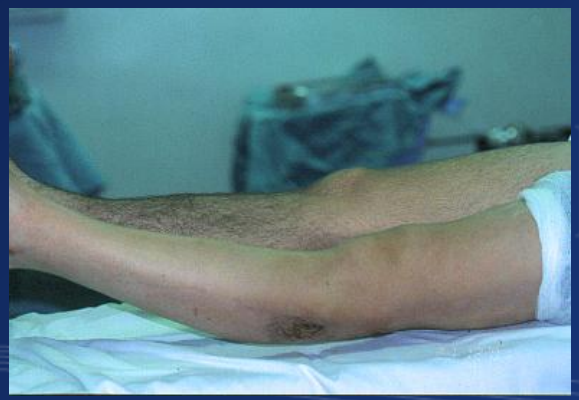
PLC – Three main static stabilisers

- FCL
- PFL
- PL capsule

PLC:

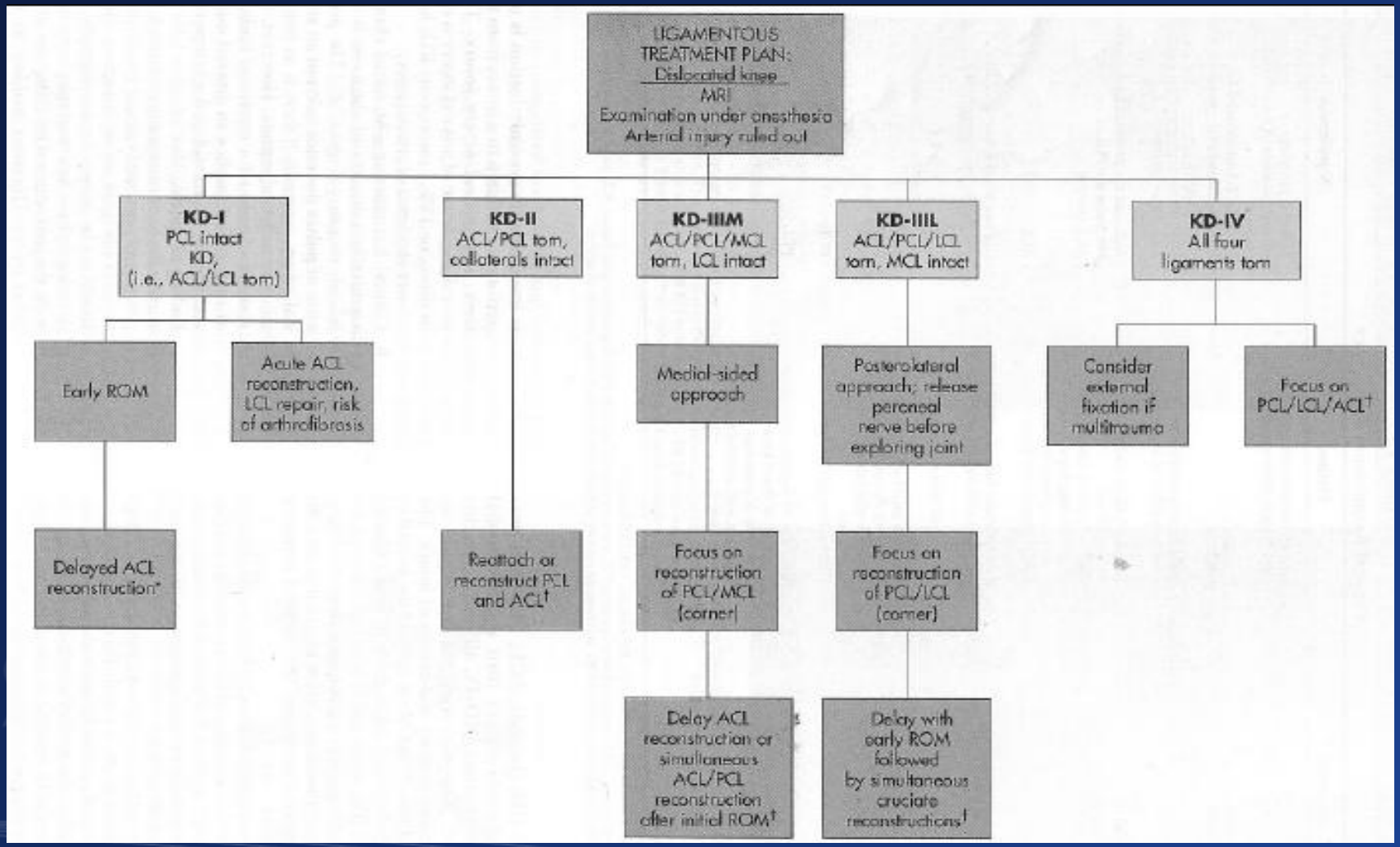
- 5° Grade I
- 10° Grade II
- 15° Grade III
- An increase of 10-15 ° external rotation at 30° flexion - Injury to PLC

Gollehan et al *J Bone Joint Surg* 1987
Grood et al *J Bone Joint Surg* 1988
Noyes et al *Am J Sports Med* 1993
Bleday et al *Arthroscopy* 1998



Order of fixation

- PCL at 90 degrees with anterior drawer
- ACL in full extension
- PL corner at 60 degrees with IR



KD I	Intact PCL
KD II	Both cruciates torn
KD III M	Both cruciates + medial collateral
KD III L	Both cruciates+ lateral collateral
KD IV	Both cruciates + both collaterals
KD V	Peri articular fracture