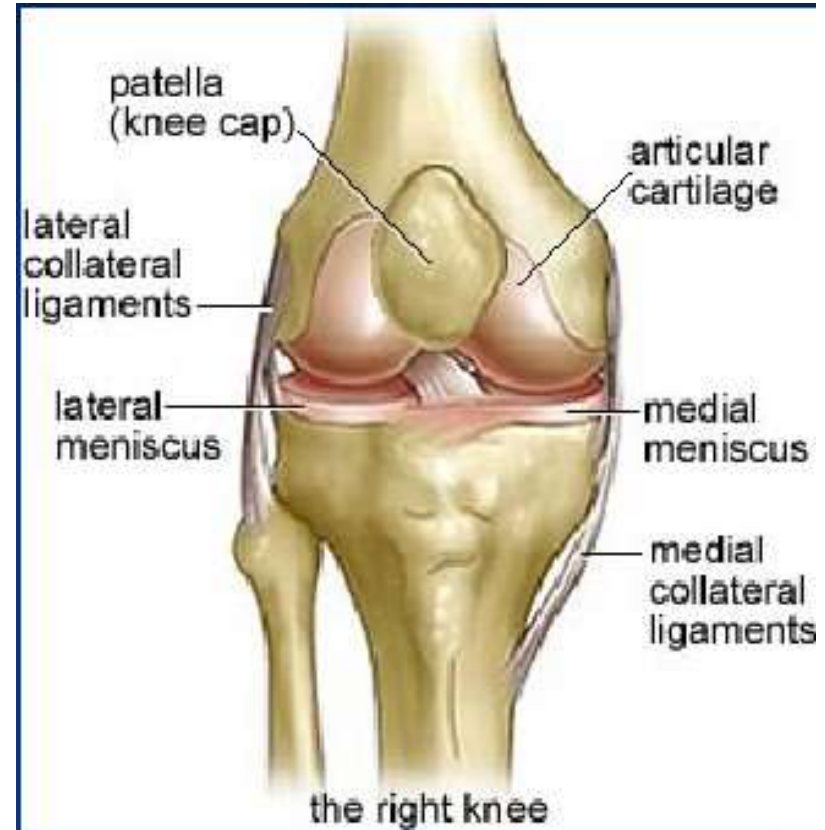


# **ACL RECONSTRUCTION**

# Ligamentous Anatomy of the Knee



# Ligaments of the Knee

## Cruciate Ligaments

- Anterior (ACL) – resists anterior translation
- Posterior (PCL) – resists posterior translation

## Collateral Ligaments

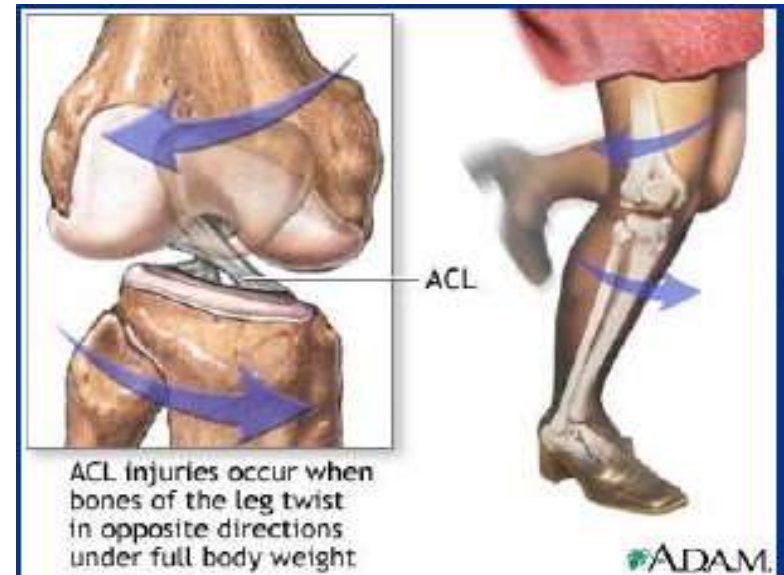
- Medial (MCL) – resists medially directed force
- Lateral (LCL) – resists laterally directed force



# Mechanism of Injury

## ACL injury mechanism of injury

- Twisting on fixed foot
- Blow to the knee
- Hyperextension
- 78% are non- contact injuries (*Noyes et al*)



# Examining the Patient

- History
  - Examination
    - Motion of knee and degree of swelling
    - Ligament specific tests of the knee
      - Lachman test
      - Anterior and Posterior Drawer
    - Look for associated injuries
- Have you heard of the unhappy triad?



# MRI KNEE



# MANAGEMENT

- 1/3 - No symptoms, Normal life
- 1/3 - Occasional instability, no strenuous activity
- 1/3 - Constant instability and pain
- ACL deficient- little higher rate of future medial meniscus tearing and arthritis.

# Indications for surgery

## Factors to consider

- Degree of ACL injury
- Presence of associated ligamentous, chondral and meniscal conditions
- Age/activity level/occupation
- Sports participation
- Patient compliance with post-op rehab



# ACL Surgery

ACL Tear-

No repair

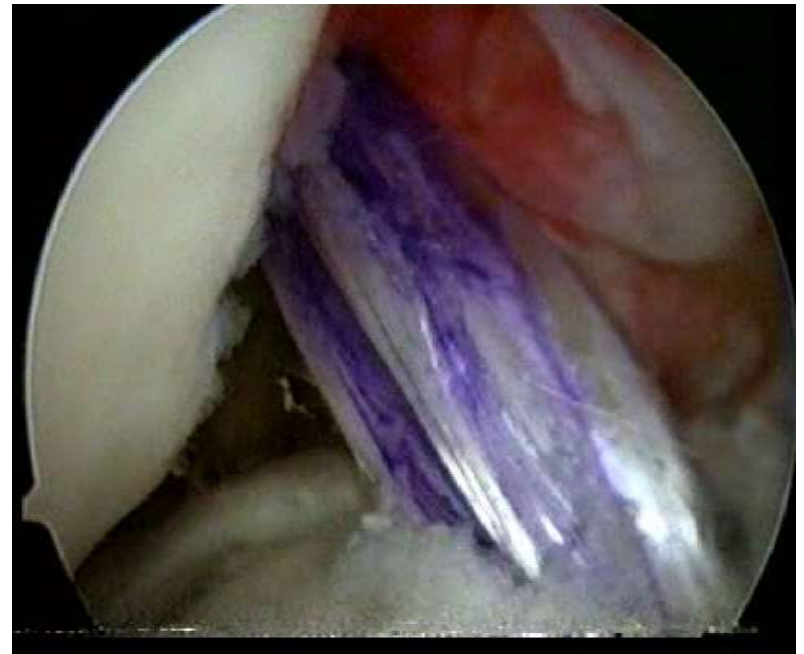
Only **Reconstruction**



Graft -

Autograft - common

Allograft



# Graft Options

- Allograft – Rarely
- Autograft – BPTB
  - Hamstring grafts
  - Quadriceps Tendon graft

## Hamstrings WHY

- Graft site morbidity- minimal
- Hamstrings regain their strength-95%
- Better Technique & fixation options
- Cosmetically appealing



**tunnels are drilled**



**graft secured**

Bony Tunnels are very precisely drilled in the tibia and femur to recreate the normal anatomic position of the ACL . The graft is passed and secured in plate.

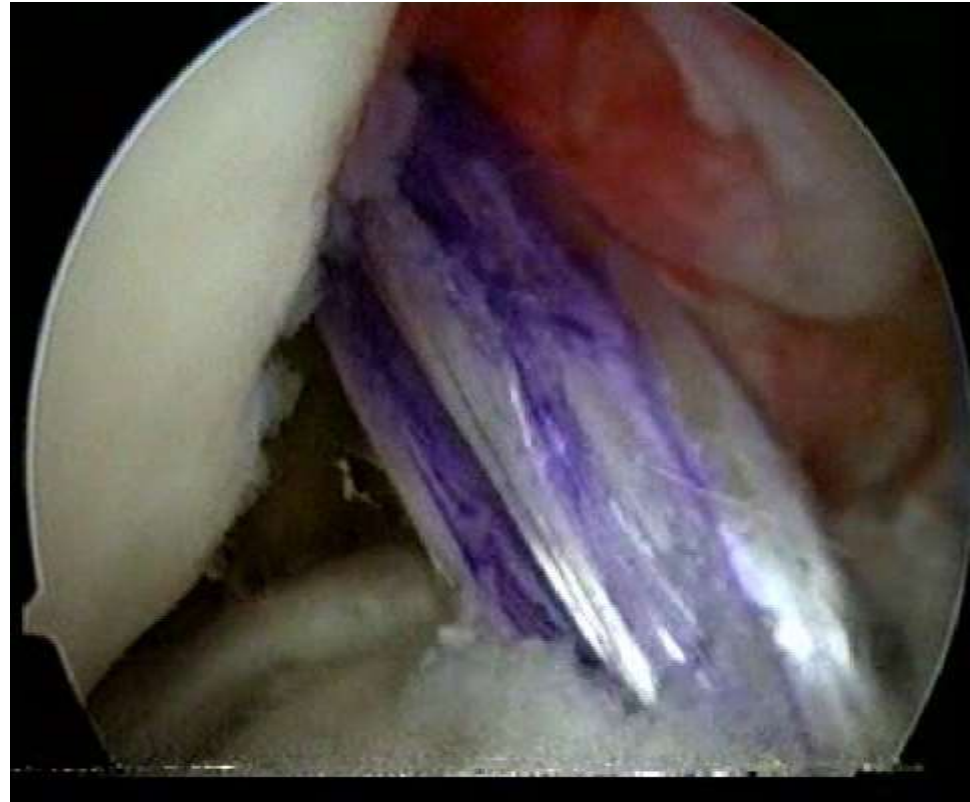
# ACL RECONSTRUCTION

## SUCCESS

Quality of the  
Graft

Appropriate  
Tunnel Placement

Strong Graft  
Fixation



# GRAFT HARVEST



# GRAFT HARVEST



# GRAFT HARVEST



# GRAFT PREPARATION





# GRAFT PREPARATION



# FAILURE OF ACL

Single Most Common  
Cause

INCORRECT TUNNEL  
PLACEMENT



# TIBIAL TUNNEL

## ENTRY POINT

Tibial jig- set at an angle of  $45-55^{\circ}$

$30^{\circ}$  medial to mid sagittal axis

Apprx. 4 cms below joint line



# TIBIAL JIG

EXIT (INTRA ARTICULAR)

## LANDMARKS-

### (A) ACL Footprint

3 mm post. to center of  
ACL footprint

### (B) LATERAL Meniscus

Post. Border of Ant.  
Horn

### (C) PCL

7 mm ant. to ant. Border  
of PCL in 90 flexion



# TIBIAL GUIDE WIRE



# IMPINGEMENT TEST



# TIBIAL TUNNEL DRILL



# FEMORAL TUNNEL

## ISOMETRIC POSITION-

Distance between tibial and femoral tunnel  
Changes  $< 2\text{mm}$  on flexion and extension.

FEMUR - Over the top position (Beware of  
Resident's Ridge)



# OVER THE TOP



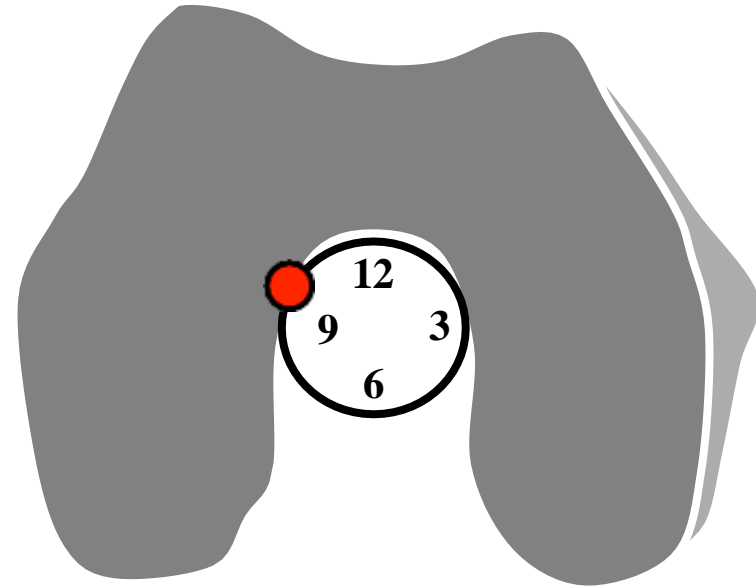
# FEMORAL TUNNEL

Access for tunnel placement

- Through the Tibial Tunnel
- Through medial instrument portal

## ANATOMICAL POSITION

- Over the top position
- Right Knee- 9 – 10pm
- Left Knee- 2 - 3 am



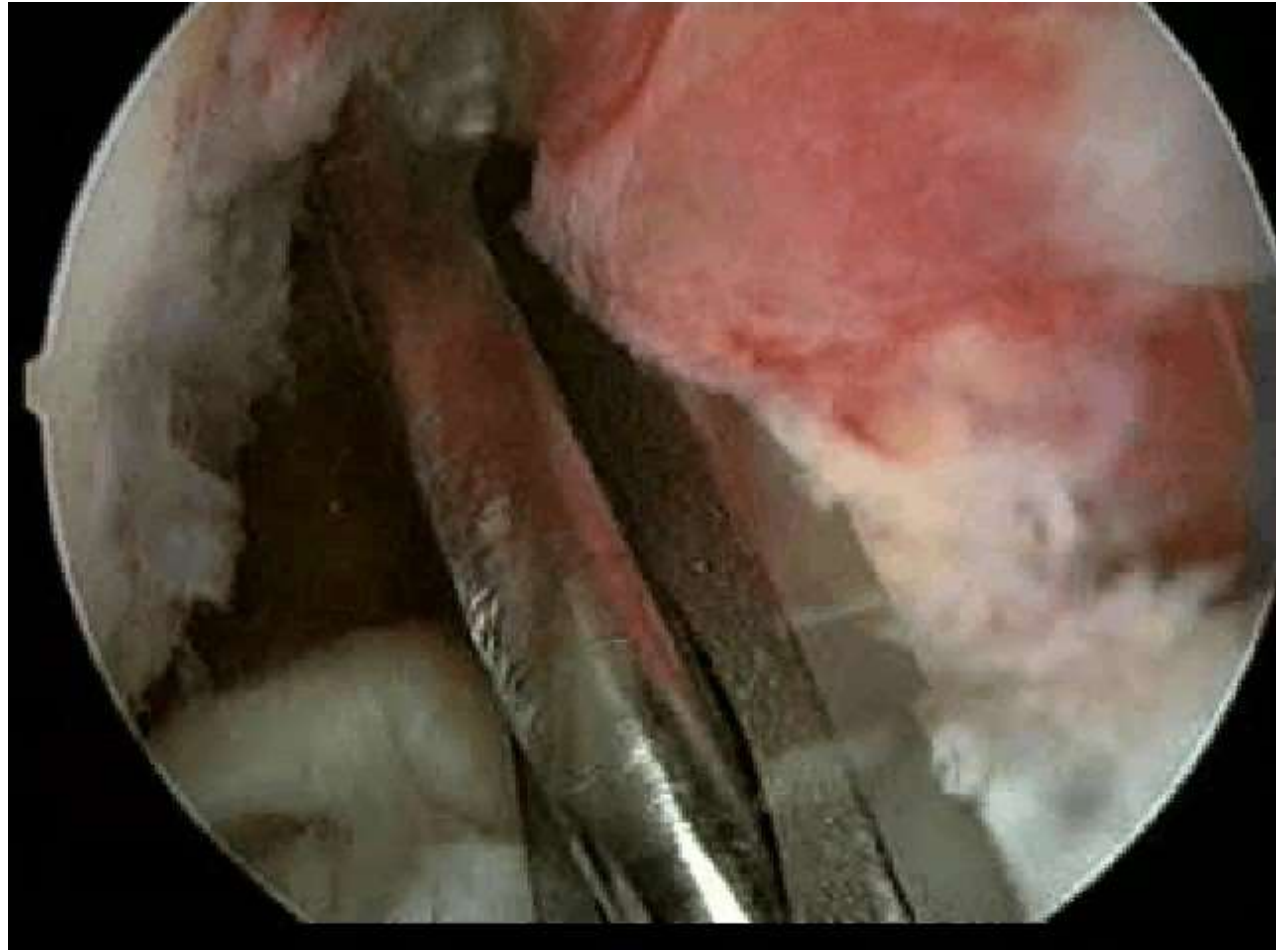
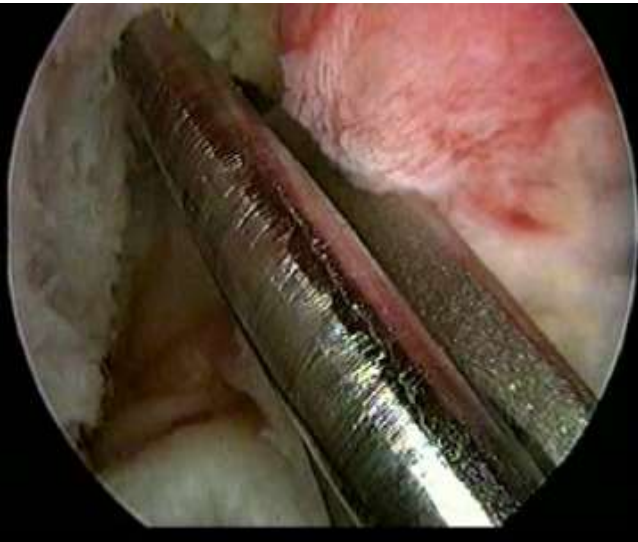
# FEMORAL TUNNEL



# FEMORAL TUNNEL (OFFSET DRILL GUIDE)



# FEMORAL GUIDE WIRE



# FEMORAL TUNNEL DRILL



# FEMORAL TUNNEL



# PASSAGE OF GRAFT





# ACL GRAFT



# Graft fixation

- Secure graft fixation is paramount to a successful reconstruction
- ACL rehab emphasizes on immediate movement and weight bearing
- High demand on initial graft fixation
- Ultimate long term success of an ACL reconstruction depends on healing of the graft fixation sites and biological healing

# Graft Fixation

- Choice of graft fixation depends on
  - Surgeon preference
  - Choice of graft
  - Surgical technique
- Fixation Options
  - Femoral – Interference screws
    - Cross pin fixation
    - Endobutton Fixation
  - Tibial
    - Interference Screws
    - Suture discs, Post with washer

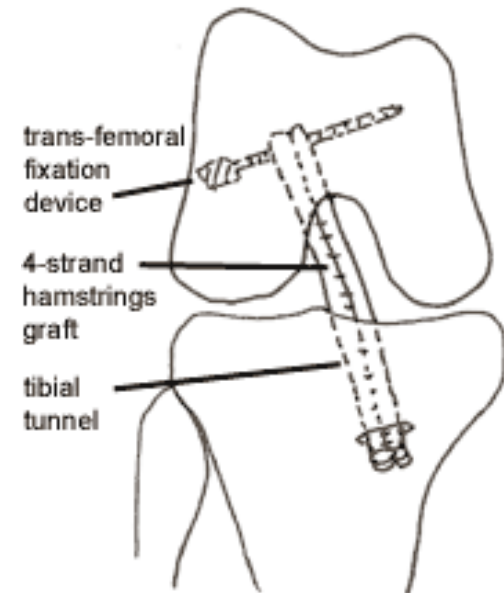
# Bio-Interference Screw Fixation

- Aperture Fixation
- Compaction drilling
- Dependent upon cancellous bone
- Post wall blowout
- Concern -Graft maceration & failure at physiological loading



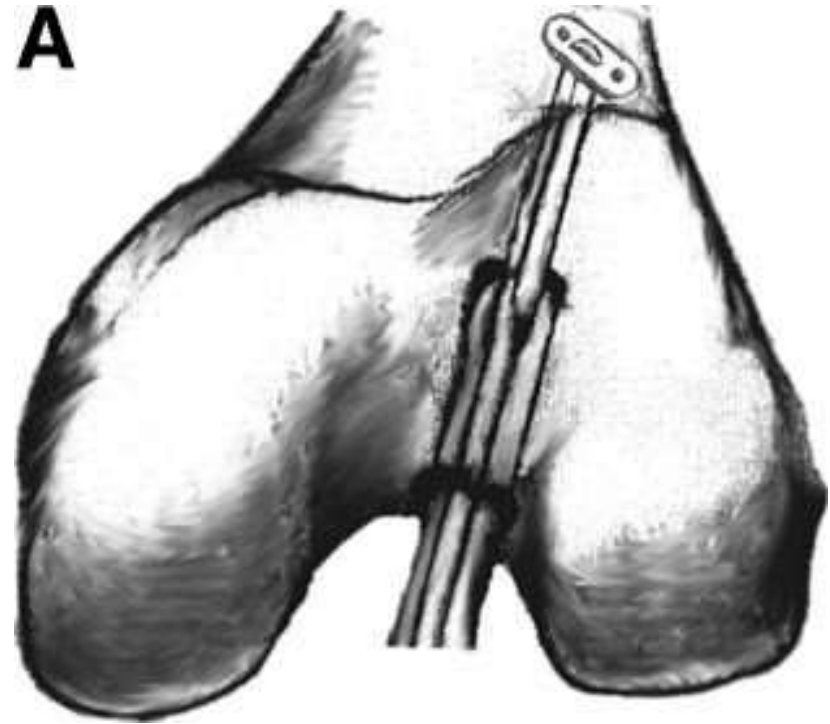
# Cross pin fixation

- Impacted transversely into lateral cortex
- Implant passed under looped graft
- Implant perpendicular to graft
- Highest ultimate load failure and stiffness
- Concern- tunnel widening and windshield wiper effect



# Endobuttton Fixation

- Fixation at lateral femoral cortex
- No wear or abration of graft
- Advantages-  
Osteoporotic bones & femoral tunnel blowout
- Problems- fixation away from aperture- tunnel widening & bungee effect



# POST-OP



# Rehab following ACL reconstruction

Rehab depends on:

- graft selection
- graft quality
- graft fixation
- associated procedure-meniscal repair, Chondral debridement, associated ligament reconstruction

Emphasis on immediate movement & weight bearing

**MOVE IT OR LOSE IT**



# Rehab following ACL reconstruction

## IMMEDIATE POST-OP

Ice Packs

ROM exer- CPM

Isometric Hams & Quads Exer

Weight bearing with a Brace & Stick

## 2-3 WEEKS

Walk without stick but brace on( 6-8 wks)

Knee ROM- upto 90<sup>0</sup>

Closed chain Quads & Hams Strength Exer

# Rehab following ACL reconstruction

**6-8 WEEKS**

Open Chain Exer- Quads & Hams

ROM- Full

**Straight running, Jogging-** 2-3 mnths

**Cutting** – 5-6 mnths

**Return to Sports-** 9 mnths

# Complications

## Pre-op consideration

- Patient selection- Non compliant/  
Apprehensive
- Timing of the operation
- Immature Athlete
- Med. Comp OA with ACL insufficiency

# Complication- Graft

## Graft harvest

- Graft cut short
- Small size

## Prevent

- careful harvest technique
- Cut all band attached before using stripper

## Dropped graft

- Careful passing of graft
- Another graft harvest

# Complications femoral tunnel

## Improper tunnel placement-Anterior femoral tunnel

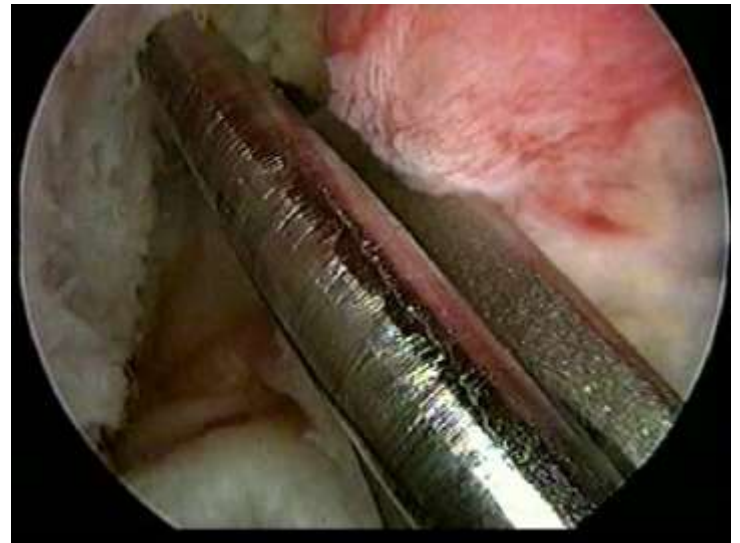
- Residents ridge
- Use femoral tunnel guides

## Solution

- Notchplasty

## Posterior wall blow-out

- Endobutton or transfix



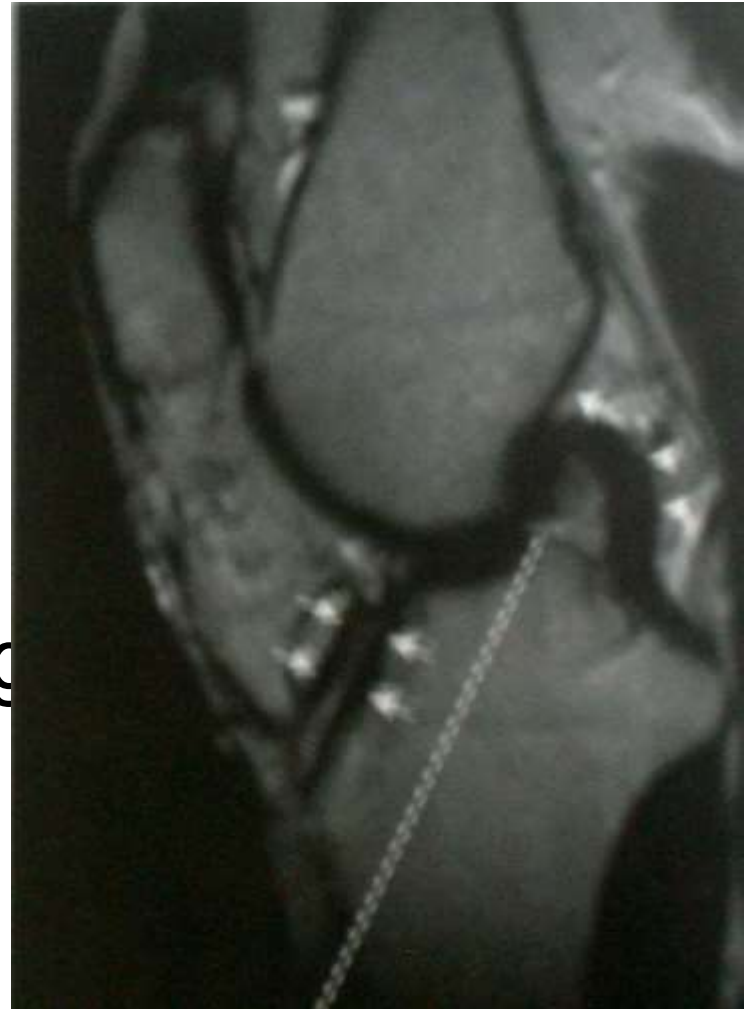
# Complications Tibial Tunnel

## Improper tibial tunnel- anterior tunnel placement

- Intra-articular landmarks
- Check guide wire impingement before drilling

## Solution

- Notchplasty
- Chamfering of the tunnel



# Complications

- Neurovascular** – most serious complication
- Vessel behind Post. Horn Lat. meniscus
  - Early recognition and prompt repair
  - Careful handling of shaver and burr in posterior compartment

# Complication

- **Recurrent Effusions**

- Debris during surgery
- Reaction to bioabsorbable implants
- Vigourous physio

Management- Repeated aspirations

- **Infection** - < 1%

Management- antibiotics & arthroscopic deb.

- **Stiffness** –

- Improper tunnels
- Post-op arthrofibrosis
- Cyclops lesion
- Inadequate physio/ non-compliant patient

Management- Gentle MUA / Arthr. Adesiolysis





**THANK YOU**