EM Physicians Less Exposed to MSK Medicine

- Musculoskeletal Medicine becoming the ‘Poor relation’ of EM
- Emphasis on Acute medicine and Critical care
- Knee Examination poorly taught/mastered at Medical School
- GPs not confident about knee examination/diagnosis
- Orthopaedics no longer part of many EM training Schemes
- *Low threshold for referring undiagnosed knee problems to orthopaedics*
- NPs and ESPs now look after much of Musculoskeletal Medicine
- Younger EM physicians less exposure to acute knee assessment- at risk of ‘losing skills’
HISTORY

Mechanism of injury is vitally important

- Flexed/Twisting
- Forced flexion/Hyperextension
- Falls/Direct Blow
- Swelling  Rapid/Gradual
- Previous Knee Problems
- Sports injury - Able to play on?

A Focussed History often reveals the Diagnosis
## Historical Clues to Knee Injury Diagnoses

<table>
<thead>
<tr>
<th>Injury Type</th>
<th>Likely Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twisting Injury</td>
<td>Meniscal Tears</td>
</tr>
<tr>
<td>Noncontact injury with “pop”</td>
<td>ACL tear</td>
</tr>
<tr>
<td>Contact injury with “pop”</td>
<td>MCL or LCL tear, meniscus tear, fracture</td>
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<tr>
<td>Acute swelling</td>
<td>‘Internal Derrangement’</td>
</tr>
<tr>
<td></td>
<td>ACL tear, PCL tear, fracture, knee dislocation, patellar dislocation’</td>
</tr>
<tr>
<td>Lateral blow to the knee</td>
<td>MCL tear</td>
</tr>
<tr>
<td>Medial blow to the knee</td>
<td>LCL tear</td>
</tr>
<tr>
<td>Knee “gave out” or “buckled”</td>
<td>ACL tear, patellar dislocation</td>
</tr>
<tr>
<td>Fall/ direct trauma to flexed knee</td>
<td>Patellar #/ PCL tear</td>
</tr>
</tbody>
</table>

### Focused History Questions

- **Onset of Pain**
  Date of injury or when symptoms started

- **Location of pain**
  - Anterior
  - Medial
  - Lateral
  - Posterior

**Match the pain to the Anatomy**
Surface Anatomy

Palpation Medially - R knee

Palpation Laterally – R knee

Don’t Forget Pes Anserinus Bursitus!

Palpation Posteriorly – Popliteal Fossa

Abnormal bulges
- Popliteal artery aneurysm
- Popliteal thrombophlebitis
- Baker’s cyst

Focused History Questions

Injury-Associated Events

Pop heard or felt?

- Swelling after injury (immediate vs delayed)
- Catching / Locking
- Buckling / Instability (“giving way”)
- Unable to play on

Aggravating / Relieving Factors

- Activities, changing positions, stairs, kneeling
- Treatments tried
  - Ice, medications, crutches
- History of previous knee injury or surgery
Knee Examination

Adequate Exposure – Supine Position
Compare both knees

Look
Wasting, swelling, deformity
redness, scars, local trauma, patella position

Feel
Temp, Effusion, crepitus

Move
Passive, Active
Resting position, SLR, Extension, flexion, collateral
ligaments, cruciates menisci

Only Examine the knee in the Supine Position

Knee Examination

ALWAYS CHECK THE HIP FIRST

• Especially in the young knee pain may be referred from the hip
• Roll the leg if comfortable
Knee Examination

Develop your own standard routine – you will not forget anything!
(Reassure the patient)

**GENERAL STEPS**
- Inspection
- Palpation
- Range of motion
- Strength testing
- Assess stability of 4 knee ligaments via applied stresses*

Special tests-

*Don’t forget SLR!*
*Don’t forget to test full extension*

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**Soft Tissue Injuries**

*Always ask the patient to SLR!*

- **Ruptured Quadriceps**
  *commonly missed!*
  - Unable to straight leg raise
  - Possible palpable defect.
  - Surgical repair

- **Ruptured Patellar Tendon**
  - Unable to straight leg raise
  - Possible palpable defect.
  - Displaced patella
  - Avulsion of tibial tuberosity
  - Surgical repair.

To exclude Extensor Mechanism Injuries make sure pt is not externally rotating their leg
Sit pt on edge of bed- eliminates iliotibial band involvement
Range Of Motion (ROM)

- Test for active & passive ROM while the patient is supine
  - Flexion 140°
  - Extension 0°/-10°
  - Internal rotation 10°
  - External rotation 10°
- Always compare to the other, “healthy” knee!

“Locked” Knee

Full extension blocked.
Degree of which can vary.
Possible meniscal injury.
X-ray for loose body.
Usually Requires MRI and possible arthroscopy.

To Exclude a locked knee ask pt to trap your hand between the back of his knee and the surface of the bed

Knee Referral Advice

**LOCKED KNEES ARE AN EMERGENCY**

**WHY??**

One chance to repair meniscus in under 30s

*Do not let patients Weight Bear – Urgent Ortho Referral*
Collateral Ligament Injury

Examination
Tenderness, stress testing in flexion

Grading

Grade I
Local tenderness + slight or no laxity

Grade II
Local tenderness + laxity with endpoint. Orthopaedic follow up

Complete rupture
No endpoint. POP cylinder or brace. Analgesia, Crutches. Orthopaedic referral

Medial & Lateral Ligament Testing

Use a standard exam routine
Direct, gentle pressure
No sudden forces

Abnormal test
1. Excessive motion = laxity
2. Soft/mushy end point

When assessing for MCL injury after valgus force and applying valgus force to knee - if pt has lateral and medial knee pain think? Tibial plateau fracture

Three out of 4 ligament laxity think occult knee dislocation (caution high BMI)

When testing collateral ligaments make sure the knee is not straight as inherent joint & ACL stability will mask ligament instability (30 degrees flexion)
The Knee

- **Tibia Plateau fracture**

  Fall extended leg, compression # proximal tibia.

  **Valgus** stress,
  # lateral tibia plateau

  **Varus** stress,
  # medial tibia plateau

  Proximal tibia examination reveals tenderness.

  Swelling, haemarthrosis, ligament damage.

  X-ray

  **X-ray pearls**
  Subtle tibial plateau fracture—
  normally lateral subchondral line higher than medial line except with depressed lateral tibial plateau fracture
  Oblique view – depressed fracture

Assess Meniscus – Knee Flexion

- **History crucial**
  Usually “twisting” injury

- **Most sensitive test is full flexion**
  Examiner passively flexes the knee or has patient perform a full two-legged squat to test for meniscal injury

- **Joint line tenderness**
  Flexion of the knee enhances palpation of the anterior half of each meniscus

- **McMurray’s Test**
Tests For Meniscal Injury

TESTS FOR MENISCAL INJURY

- **Joint line tenderness**: medial joint line tenderness-medial meniscus tear; lateral joint line tenderness-lateral meniscus tear.

- **McMurray test**: knee acutely flexed forcibly; palpate postromedial margin of joint + knee external rotation + knee extention-click s/o medial meniscus tear; palpate poserolateral margin + internal rotation + knee extention-click s/o-lateral meniscus tear. Negative Mcmurry’s test doesn’t rule out tear.

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<tr>
<th>Test Type</th>
<th>Sensitivity</th>
<th>Specificity</th>
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<tr>
<td>Joint Line Tenderness</td>
<td>76%</td>
<td>29%</td>
</tr>
<tr>
<td>McMurray Test</td>
<td>52%</td>
<td>97%</td>
</tr>
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</table>

Tests for ACL Assessment

Lachman’s, Anterior Draw and Lellie’s/Lever Test

If the pt has a large knee and you have small hands use your own knee to support/stabilise the back of the pt’s knee for Lachman’s test.
**ACL Assessment**

- **Lever (Lelli) Test** – high interrater reliability, most specific.  
  Positive Lever Sign – Ruptured ACL

- **Lachman’s Test**

- **Anterior Draw**

- **Pivot Shift**

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**Tibial Sag = PCL Rupture**

- Tibial Tubercle normally Anterior to Patella on lateral view, Ski Jump Sign.

**Beware missing PCL/Posterior sag due to large haemarthrosis**
**Dislocation of the Knee**

**True Dislocation**

- Serious ligamentous and soft tissue damage.
- Assess above & below knee.
- Vascular/Nerve damage common.

**Reduction**

- Adequate analgesia
- Traction/Reduction of deformity

**MUST Check and DOCUMENT Pulses**

- Vascular Assessment
- CT Angio/MRI
- POP backslab or Brace
- Refer for Admission

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**Ottawa Knee Rules**

- **X-rays are only required if the following are present**
  - Isolated bony tenderness of the patella.
  - Bony tenderness of the fibula head.
  - Patient cannot flex knee to 90°
  - Patient cannot weight bear (4 steps) after injury or in ED

*(Exceptions Acute on Chronic eg Osteochondral Defect and loose body)*
Haemarthrosis can be managed by Knee Aspiration & LA Injection

Inject 10-20 mls of chirocaine into knee for effective pain relief and ability to re-examine knee

Floating Patella

Knee Hemarthrosis Differential Diagnosis

- ACL 70%
- Meniscus 50%
- Fracture 20%
- Patellar dislocation
- PCL

KNEE ASPIRATION

- Use Venflon cannula if possible as allows comfortable aspiration of large volumes
- Look at aspirate and send to bacteriology lab if not a lipohaemarthrosis
- Fluid Level on Lateral Xray

Lipohaemarthrosis (Blood and Fat) = FRACTURE

Aspiration from the Lateral side easier
Questions?

Summary

• Focussed History is the key to accurate assessment of the acute knee

• Comprehensive examination and appropriate investigations should confirm the diagnosis

• Accurate timely Emergency Department Assessment leads to better patient outcomes

• Competent Knee Examination is mandatory for ED physicians

• Keep Teaching the juniors!