ACUTE KNEE INJURIES
ASSESSMENT AND MANAGEMENT

Ben Miller
Wide clinical range of “ACUTE KNEE INJURIES”

- Young / athletic / acute traumatic
- Middle aged / innocuous trauma / increased demand
- Elderly / spontaneous onset of pain and swelling
- Perhaps better conceptualised as “Acute Knee Presentaions” rather than acute knee injuries
- I think for mental accounting it’s most helpful to think of two groups. Principles of management similar
“ATHLETIC” ACUTE KNEE
“MIDDLe AGED” acute knee
ATHLETIC / YOUNG ACUTE KNEE
History

• Mechanism and circumstances
  • High or Low energy trauma
  • Contact or non-contact?
  • Weightbearing afterwards?
  • Continue play?

• Location of pain

• Swelling
  • How quickly did the swelling appear?
HISTORY

- Onset of swelling
  - Rapid (within hours) implies haemarthrosis
  - Delayed (after 24 hours) implies effusion

- Location of swelling
  - Can be localised on occasion - eg. MCL
  - Intra-articular swelling most commonly noticed superolateral knee
DIFFERENTIAL DIAGNOSIS

- Structures that bleed in the knee
  - Bone
  - Cruciate Ligaments
  - Knee Capsule
  - (peripheral meniscus)
DIFFERENTIAL DIAGNOSIS

• Causes of haemarthrosis

• ACL - young person, twist, “POP”, rapid swelling 75%

• Intra-articular fracture - Tibial plateau, femoral condyle, osteochondral fragment

• Patella dislocation - especially adolescent age group (tears the knee capsule and can cause intra-articular fracture)

• PCL / multiple ligament injuries
Examination

- What really matters now?

- Extensor mechanism - straight leg raise (quads, patella tendon)

- NV status - occult knee dislocations, peroneal nerve

  - Can be hard on history and sometimes also on examination to distinguish between ACL injury and multi-ligamentous injury to knee
EXAMINATION

- What is also of interest?
- Swelling
  - haemarthrosis / patella tap
  - swip test for smaller effusions
- ROM
- Stability testing
EXAMINATION

• Stability testing
• ACL
• PCL
• MCL
• LCL
ACL

Lachman’s Test
PCL
MCL / LCL

- Varus and valgus stress testing at 0 and 30 degrees
- If there is any increased laxity at 0 degrees this implies significant knee ligament disruption / possible multiligament injury
DIFFERENTIAL DIAGNOSIS

- ACL
- Fracture
- PFJ Dislocation +/- fracture
- Meniscus
- Extensor mechanism rupture - eg. patella tendon
Always do an xray first

• Xray is always the first investigation in acute knee trauma

• Readily accessible

• Cheap

• Finds fractures - no need for MRI

• Xray is not an unnecessary first step

• It is a necessary first step as it often expedites and directs care appropriately
ALWAYS XRAY

• Acute knee injury and haemarthrosis

• A knee xray series consists of four projections

• AP weightbearing, PA weightbearing, Lateral, Skyline

• Weightbearing may be difficult or impossible but lateral and skyline views are important for excluding fracture
XRAY FIRST

- Always xray first
- Skyline view
When to MRI?

- Paediatric (< 16)

<table>
<thead>
<tr>
<th>Knee</th>
<th>Following general x-ray for:</th>
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<td>- Internal joint derangement</td>
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MRI of the knee for meniscal and anterior cruciate ligament tears

MBS item description

Referral by a medical practitioner (excluding a specialist or consultant physician) for a scan of knee following acute knee trauma for a patient 16 years or older with:

- **inability to extend the knee suggesting the possibility of acute meniscal tear** (R) (K) (Contrast) (Anaes.); or
- **clinical findings suggesting acute anterior cruciate ligament tear** (R) (K) (Contrast) (Anaes.)

MRI of the knee joint can lead to improved health outcomes by reducing (or eliminating) the need for diagnostic arthroscopy.

In the majority of cases, clinical examination is as good as MRI for diagnosis and management planning.

MRI plays a role when the diagnosis is unclear and the level of patient disability or pain is such that surgery is being considered.
REAL WORLD MRI INDICATIONS

• Inability to extend the knee fully will be almost universal

• Findings suggesting ACL tear are difficult to elicit in the acutely injured, swollen, painful knee

• I would suggest “In the acutely injured and swollen knee where xray and clinical assessment has not established the diagnosis”
One slide management

- History - haemarthrosis or not?

- Examination - extensor mechanism intact? NV intact? gross stability?

- Xray - fracture? Always before MRI

- MRI - if diagnosis not apparent at that point
Differential diagnosis

- OA
- Meniscus
- OA
- SONK / insufficiency fracture
- OA
- Crystal arthropathy
- OA
HISTORY

• History of trauma or acute incident?
• Incidental recollection of trauma?
• Increased demand recently?
• Time course of onset?
• Previous episodes?
• Able to weight bear?
  - Exacerbations of OA can seem quite dramatic at the time
SYMPTOMS IN OA

• Fluctuating

• Exacerbations and remissions can last months

• The “acute knee” in the middle aged may be and usually is nothing more than an a symptomatic exacerbation of OA without any definable cause or more specific anatomical diagnosis

• If the knee has clinical and radiological OA then practically that is usually the extent of the diagnostic process

• Delving further into specifics is usually not necessary or
EXAMINATION

- Swelling
- Tender joint lines
- Reduced ROM
- Large effusion/heat?
INVESTIGATION

• XRAY

• 4 views - AP weightbearing, PA weightbearing, lateral, skyline

• The main reason for xray is to establish the presence of osteoarthritis radiologically

• If xrays show OA then the process of investigation is complete
IMPORTANCE OF THE RIGHT PROJECTIONS

• Allows either you or the radiologist to see OA if it's there.
IMPORTANCE OF THE RIGHT PROJECTIONS
PATIENT EXPECTATIONS

• The patient may not consider the process of investigation to be complete at that point
  • “Something has happened”
  • “Something is out of place”
  • “I felt something tear”
• Want imaging to see what is out of place or torn
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News

GPs face MBS ban for over-50s knee MRIs

ANTONY SCHOLEFIELD

GPs will lose ordering privileges under Medicare for knee MRIs in patients aged 50 or older under proposals from the MBS Review Taskforce.

In its first major recommendations, the taskforce’s Diagnostic Imaging Clinical Committee says an age cutoff is needed for the MBS item because there has been a blowout in questionable knee MRI costs for older patients.

The review notes many MRI scans are being ordered for older patients in whom osteoarthritis may coexist with meniscal tears and for whom MRIs have dubious clinical value.

The taskforce therefore recommends amending the MBS schedule to disallow GPs from requesting MRIs for patients over 50 but to allow specialist requests for any age group.

“Despite an age cutoff in the item descriptor will require GPs to follow a structured process to determine whether osteoarthritis is present for patients aged over 50,” the review says.

Dr Sergei Kisselev, a Tasmanian GP and president of the Australian Association of Musculoskeletal Medicine, says he understands the concerns around inappropriate GP ordering of MRI but believes a complete ban is not the right approach.

GPs need all the options possible to ensure they can address individual clinical scenarios, including for older patients who genuinely require a knee MRI for meniscal tears, he tells Australian Doctor.

GPs need better support and education around the use of MRI rather than arbitrary restrictions.

“I am against all restrictions, but I’m also against unnecessary use of MRI,” he says. “GPs tend to refer for MRI for this arthritic stuff, and in most cases, there is not a benefit. MRI is a very specific test and not useful for screening.”

Dr Kisselev says a ‘just-have-a-look’ approach does not benefit patients and adds to healthcare costs.

GPs gained access to MBS-funded MRI imaging for knee MRIs for children in 2012, and this was extended to adults in 2013.

Since then, referrals from non-GP specialists have fallen but the total MBS cost of knee MRIs has risen from $16 million in 2011/12 to $38 million in 2013/14.

The taskforce also recommended dropping the initial requirement for a plain X-ray before MRI for children under 16 on the grounds that this would reduce unnecessary exposure to radiation.

Shake-up for ‘urgent’ after hours a win for GPs

The taskforce also recommends removing the MBS item for urgent after-hours care in nonemergency cases, which will allow GPs greater flexibility and avoid unnecessary referrals.

‘Urgent’ has long been an issue for GPs, with patients often referred to specialists only to be told they can’t be seen before a certain date.

‘Urgent’ has also been used to avoid paying for referrals when they are not required.

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What imaging to do

- XRAY

- If there is OA - no MRI

- If there is not OA - no MRI required immediately; most underlying causes are self limiting with regards to pain and should not be considered for surgical management or referral until there is a sufficient duration of symptoms

- I work off about 3 months
**Practice Point!**

MRI is not usually a first line investigation, but may sometimes be useful when first line imaging (e.g., plain X-ray) does not explain clinical findings.

Care is required interpreting MRI reports. Reported abnormalities must be carefully correlated with clinical findings.

Some pathology detected on MRI may not be clinically relevant.

**Considerations**

- MRI is not appropriate when X-rays show moderate to severe osteoarthritis changes e.g., significant joint space narrowing and osteophyte formation.
- In general, MRI may be useful when pain appears to be coming from the hip or knee region and is not explained on plain X-ray.
- Hip MRI may be appropriate if plain X-ray shows mild or no osteoarthritic changes, and labaral pathology is suspected.
- Knee MRI may be useful to exclude ligament pathology, or meniscal pathology if plain X-ray shows mild or no osteoarthritic changes, and the patient has significant mechanical symptoms such as clicking or locking.
- MRI may show osteonecrosis e.g., spontaneous osteonecrosis of the knee.

- If playing at risk sports and haemarthrosis - assume ACL tear until proven otherwise.
About acute knee presentations

Acute knee presentations are diagnosed by history, physical examination and plain X-ray (where indicated for suspected bony injury). Urgent further imaging is rarely indicated.

Re-examination after a period of conservative management is recommended and imaging may then be considered if it is likely to alter ongoing management.

The Lachman test is effective for assessing anterior cruciate ligament (ACL) integrity. The Thessaly test at 20° of knee flexion is an effective first-line screening for meniscal tears.

Careful evaluation by an experienced examiner not only diagnoses ACL and meniscal tears as well as MRI does. It also identifies patients with surgically-treatable meniscal and ACL tears with equal (of better) reliability that MRI.

It is important to note that not all meniscal and ACL tears require surgery. Rehabilitation is suggested as the primary treatment option for young adults following an acute ACL tear. More than half of meniscal tears will settle with conservative management.

Acute knee presentations and MRI

MRI should be confined to more doubtful, difficult and complex knee injuries.

For these sorts of presentations, MRI is an alternative to diagnostic arthroscopy and allows better treatment planning.

MR imaging of the knee can give both false positive and false negative results, especially with meniscal injuries.

Incidental findings, especially of the meniscus, are common and increase with age. Up to 90% of middle-aged and older people with no X-ray evidence of osteoarthritis have been shown to have knee abnormalities on MRI.

As many acute knee injuries settle over time, imaging may only reveal self-limiting injuries in some cases. MRI cannot determine the natural course of each injury.
PREVALENCE OF MENISCAL TEARS

Zanetti, M; Pfirrmann, C W A; Schmid, M R; Romero, J; Seifert, B; Hodler, J (2003). *Patients with suspected meniscal tears: prevalence of abnormalities seen on MRI of 100 symptomatic and 100 contralateral asymptomatic knees.* American Journal of Roentgenology, 181(3):635-641.

- **OBJECTIVE:** The purpose of this study was to evaluate the prevalence of MR abnormalities of the knee on the symptomatic and contralateral asymptomatic sides in patients with suspected meniscal tears. **SUBJECTS AND METHODS.** One hundred patients (mean age, 42.7 years; range, 18-73 years) referred for suspected meniscal tears were prospectively examined with MRI of both knees when the contralateral knee was asymptomatic. The prevalence of various types of meniscal tears and other MR abnormalities was determined. **RESULTS:** Meniscal tears were found in 57 symptomatic knees and in 36 contralateral asymptomatic knees. In those 57 patients with a meniscal tear on the symptomatic side, the prevalence of asymptomatic tears in the contralateral side was 63% (36/57). Horizontal or oblique meniscal tears were found medially in 32 and laterally in 11 symptomatic knees, and medially in 29 and laterally in eight asymptomatic knees. Radial, vertical, complex, or displaced tears were found medially in 18 and laterally in five symptomatic knees, and medially in five and laterally in none of the asymptomatic knees. Collateral ligament abnormalities were found in 53 symptomatic knees and in six asymptomatic knees. Pericapsular soft-tissue abnormalities were found in 64 symptomatic and in 12 asymptomatic knees. Edema-like bone marrow abnormalities were found in 36 symptomatic and in three asymptomatic knees. **CONCLUSION:** Horizontal or oblique meniscal tears are frequently encountered in both asymptomatic and symptomatic knees and may not always be related to symptoms. However, radial, vertical, complex, or displaced meniscal tears and abnormalities of the collateral ligaments, pericapsular soft tissues, and bone marrow are found almost exclusively on the symptomatic side and appear to be clinically more meaningful.

- Meniscal tears in 57% of symptomatic knees and 36% of asymptomatic knees
- Horizontal and oblique tears more commonly seen in asymptomatic knees
Incidental Meniscal Findings on Knee MRI in Middle-Aged and Elderly Persons

Martin Englund, M.D., Ph.D., Ali Guermazi, M.D., Daniel Gale, M.D., David J. Hunter, M.B.,B.S., Ph.D., Piran Aliabadi, M.D., Margaret Clancy, M.P.H., and David T. Felson, M.D., M.P.H.


Framingham Massachusetts

991 50 to 90 Yo Ambulatory Patients

The prevalence of a meniscal tear or of meniscal destruction in the right knee as detected on MRI ranged from 19% (95% confidence interval [CI], 15 to 24) among women 50 to 59 years of age to 56% (95% CI, 46 to 66) among men 70 to 90 years of age; prevalences were not materially lower when subjects who had previous knee surgery were excluded. Among persons with radiographic evidence of osteoarthritis (Kellgren–Lawrence grade 2 or higher, on a scale of 0 to 4, with higher numbers indicating more definite signs of osteoarthritis), the prevalence of a meniscal tear was 63% among those with knee pain, aching, or stiffness on most days and 60% among those without these symptoms. The corresponding prevalences among persons without radiographic evidence of osteoarthritis were 32% and 23%. Sixty-one percent of the subjects who had meniscal tears in their knees had not had any pain, aching, or stiffness during the previous month.
The clinical importance of meniscal tears demonstrated by magnetic resonance imaging in osteoarthritis of the knee.

Bhattacharyya T, Gale D, Dewire P, Totterman S, Gale ME, McLaughlin S, Einhorn TA, Felson DT.

Source
Arthritis Center, Department of Orthopaedics, Boston University Medical Center, Massachusetts, USA

- Magnetic resonance imaging and plain radiography of the knee were performed in a group of 154 patients with clinical symptoms of knee osteoarthritis and a group of forty-nine age-matched asymptomatic controls

- Meniscal tears present in 91% of clinically osteoarthritic knees

- No difference in pain between those with and without meniscal tears

- Asymptomatic knees of age matched controls had 76% rate of meniscal tearing; mean age of 67
• 45% increase in knee arthroscopy in ten years

• Highest increase in 45 to 64 year old

• Availability of MRI; defensive medicine

• Patient and societal expectations of function
Which Meniscal tears are relevant?

- Meniscal tears are almost universal in osteoarthritis.
  - Tears and extrusion.
  - Represent a failing compartment rather than primary meniscal pathology or source of symptoms.
- Meniscal tears on MRI increase in prevalence with age.
  - Analogous to IV disc, Rotator cuff (grey hair = cuff tear).
  - Labrum of hip.
- May represent ageing / degeneration rather than pathology.
interpreting mri in light of this

• Displaced, radial, longitudinal and complex tears more likely to be symptomatic

• Horizontal and oblique tears less significant

• Interpret in light of symptoms, age, coexisting chondral changes

• Need to avoid this situation:
  
  • KNEE PAIN + ABNORMAL INVESTIGATION = OPERATION
WHEN IS MRI USEFUL IN THE MIDDLE AGED KNEE?

• Normal xray

• Non resolving symptoms

• It is well worth playing for time in the middle aged acute knee

• In the long term, time is not a friend to any of us

• In the medium term, it will probably be helpful to the knee
WHAT MIGHT BE FOUND?

• OA

• Symptomatic meniscal pathology

• OA

• SONK

• OA

• Insufficiency fracture - tibial plateau

• OA
ONE SLIDE MANAGEMENT

- History and examination
- Xray - if OA, then that is the diagnosis
- MRI - if no OA on x-rays and symptoms not resolving
• CASES
• 55 yo

• Prison guard

• 12 months of medial knee pain post injury at work
• 65 yo farmer
• Hit by sheep
• Previously asymptomatic knee
• 57 yo woman

• 3 months of severe knee pain including night pain after increase in activity
• 75 yo woman
• Sudden onset severe medial knee pain
• Difficulty weightbearing
• Not resolving at 6 weeks
• Effusion on examination
• 62 yo lady
• “Something went crack” last week
• Can’t walk
• “Pluck it out”
• Medial pain
• 76 yo man

• Intense medial knee pain

• 6 weeks

• Can’t sleep