Take

- ROM Brace
- EMG
- Goniometer
- I-pad
- Business Cards
- Compex

HPMI Knee Talk

What Happens At the Physiotherapist – Management of Common Knee Problems

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Useful Resources

- AAOS website www.aaos.org
- Clinical Sports Medicine – Bruckner and Khan
- Atlas of Imaging in Sports Medicine – Anderson

When to bypass a Physio Initially

- Suspected stress fracture
- Major ligamentous disruption
- Neurovascular signs and symptoms
- The hot knee
- Possible slipped capital femoral epiphysis
- Symptoms disproportionate to mechanism
- Acute locked knee – either loose body or bucket handle meniscal tear
- Extensor mechanism disruption – note limitations of ultrasound
- Knee dislocation (neurovascular compromise)
- Suspected fracture/high velocity trauma

Demonstrations

- EMG
- Compex
- ROM Brace

Pre-requisites for effective knee rehabilitation

- Interest in this area
- EMG
- Rehabilitation area
- HD slow motion video
- Regular review
- Access to braces, splints if needed

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Modern Physio Skills

- Pathology and diagnosis
- Anatomy, functional anatomy and biomechanics
- Manual therapy
- Strapping
- Psychology
- Goal Setting and communication
- Strength and conditioning
- Fitness and functional testing
- Literature searching and evaluation

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Phases of Treatment

- Acute
  - Advice
  - Bracing
  - Walking aids
- Functional Recovery
  - Exercises to restore
    - Movement
    - Proprioception
    - Strength
    - Motor control

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Phases of Treatment

- Prevention
  - Biomechanical Analysis
  - Motor control

Knee Osteoarthritis

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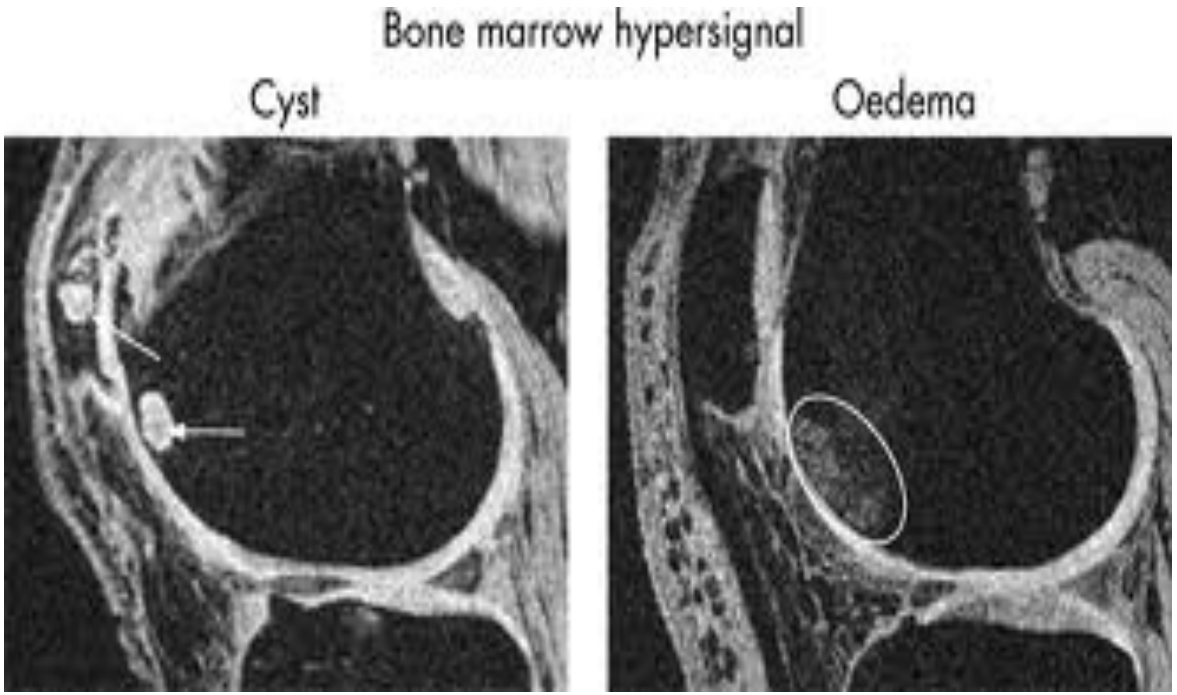
Subchondral Bone

- Much of the pain comes from the subchondral bone
  (Hunter 2009 Radiological Clinics North America 2009 (539 -531)



Osteoarthritis

- **Acute Phase**
  - Protect injured structures
    - Strapping, Bracing, Crutches
  - Modalities for pain relief – ?TENS, ?Ultrasound
  - Advice/Education

Osteoarthritis

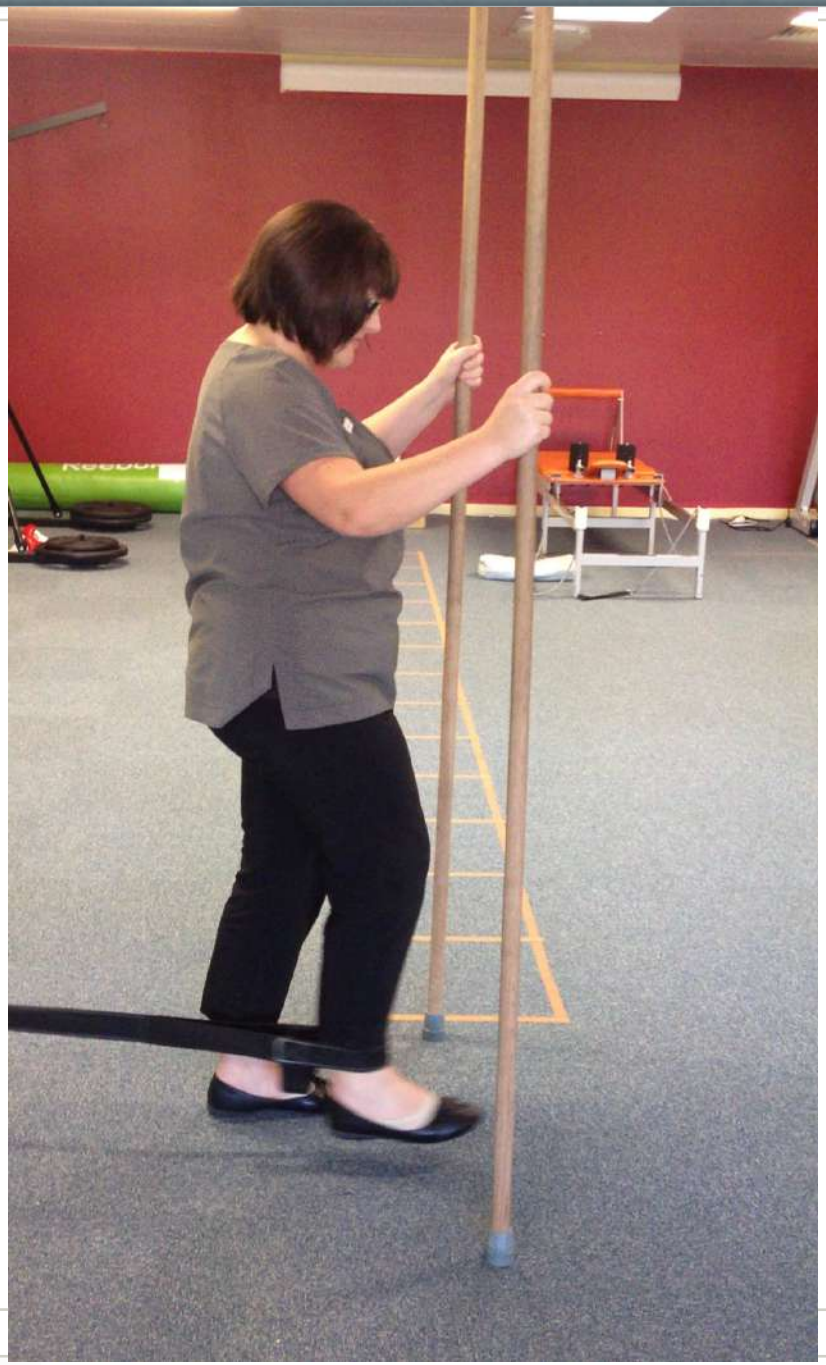
- **Functional Recovery Phase**
  - Exercises and Mobilisation to restore range of motion
  - Exercises to restore local muscle function in particular quadriceps (especially VMO)
  - Exercises to restore other muscles – load sharing throughout kinetic chain
  - Advice and Education
  - Substitution of impact activity for lower impact

Osteoarthritis

- **Prevention**
  - Exercises to strengthen whole kinetic chain
  - Instruction in non-risky exercise
  - Weight loss measures
    - For every 2 units of BMI increase there is a 36% increase in the risk of developing knee OA
    - For every 5 kg decrease in body weight during the preceeding 10 years the risk of OA of the knee declines by more than 50%. (MJA 2004)

Weight Loss Programs

- Diet + Exercise
- Exercise needs to be of a low impact nature
  - Low-med intensity bike
  - Swimming
  - Upper body
  - ?walking



AAOS Recommedations for OA Knee

- RECOMMENDATION 1
- We recommend that patients with symptomatic osteoarthritis of the knee participate in self- management programs, strengthening, low-impact aerobic exercises, and neuromuscular education; and engage in physical activity consistent with national guidelines.
  Strength of Recommendation: Strong

AAOS Recommendations for OA Knee

- RECOMMENDATION 2
- We suggest weight loss for patients with symptomatic osteoarthritis of the knee and a BMI ≥ 25.
- Implications: Practitioners should generally follow a Moderate recommendation but remain alert to new information and be sensitive to patient preferences.

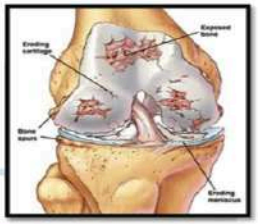
Patient Information Sheet

Osteoarthritis (OA) of the Knee

Osteoarthritis (OA) of the Knee

Most joints in the human body are covered in a layer of **articular cartilage**. The cartilage functions by assisting joint lubrication and shock absorption and provides a low friction surface for bones to move against each other. Osteoarthrosis (more commonly termed osteoarthritis) describes degeneration of the articular cartilage.

This is a condition that develops over quite a long period of time. It is more commonly associated with the older population but can occur in younger age groups for reasons stated below.



x-ray showing narrowed medial compartment of the knee due to advanced OA

Causes

Knee osteoarthritis is a condition that will usually develop over a long period of time. Common predisposing factors are:

- Overweight (high Body Mass Index)
- Previous injury, damage to cartilage or ligamentous instability
- Congenital or developmental deformities
- Certain occupations – for example high intensity manual labour
- Genetic factors
- Poor lower limb strength

Clinical Features of Knee Osteoarthritis

- Joint space narrowing on x-ray
- Pain
- Swelling
- Deformity
- It is typically progressive and worsens with advancing age
- It is usually made worse by high intensity activity (although some lower intensity activities seem to benefit symptoms)

Diagnosis

A detailed history and skilled clinical examination are important. X-rays are sensitive to moderate to severe changes and MRI provides a large amount of detail. These investigations assist in grading the degree of the pathology, and assist in excluding other sources of pain.

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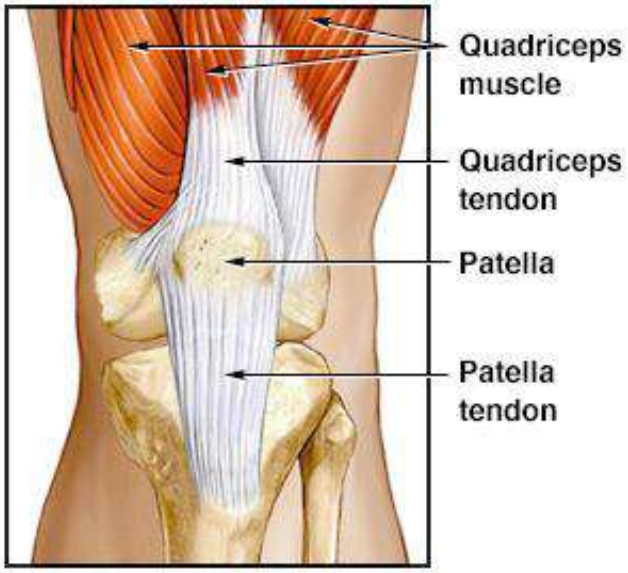
Tendinopathies

- Most are tendinoses
- Most Common one in the knee is patellar tendinopathy
- Not self limiting (Young et al 2005)
- As with all other tendinopathies the greatest risk factor for patellar tendinopathy is Adiposity (Gaida 2009)
- And this includes rotator cuff tendon pathologies



Physiotherapy Treatment of Patellar Tendinopathy

- BMI optimisation
- Rest is not always required
- Improve biomechanics and technique
- Exercises to produce adaptive changes in the tendon
- 100 days to produce a new tenocyte
- 3 – 12 months to treat a tendon

Eccentric Exercises

Ligament Injuries

Anterior Cruciate Ligament Tears

Common

- Mechanism is sometime subtle
- 50% of patients will have OA changes at 10 years
- Clinical testing frequently inaccurate, Imaging sometimes inaccurate
- Natural history
- Reconstruction dependent on
  - Degree of functional instability
  - Physical condition of rest of knee
  - Age of patient
  - Ability or willingness of patient to undergo 12 months rehabilitation
  - Surgical Philosophy

Pre-operative Physio

- Restore range of motion
- Improve function
- And will result in lower post surgical morbidity
- Faster Recovery

Post-operative Physiotherapy ACL Tear

- 6 -12 months
- Approximately 150 rehab sessions to restore range, strength and neuromuscular control of which approximately 20 should be fully supervised
- Preventative program very important
  - PEP
  - FIFA 11+

Anterior Cruciate Ligament Injury Prevention – PEP program Santa Monica Orthopaedic and Sports Medicine Research Foundation

- 1041 female subjects, RCT
- Results: During the 2000 season, there was an 88% decrease in anterior cruciate ligament injury in the enrolled subjects compared to the control group.

Patient Information Sheet

Anterior Cruciate Ligament Injury

Anterior Cruciate Ligament Injury

Mechanism of Injury
This injury usually occurs when the knee is forcefully twisted or hyper-extended. Usually the tearing of the ligament occurs with a sudden directional change with the foot fixed on the ground or when a deceleration force crosses the knee. This type of injury is common in soccer, skiing, football, and other sports with lots of stop-and-go movements, jumping, or weaving. Like any other body part, the ACL becomes weaker with age.

Pain and Symptoms

- Associated with the injury the person will often hear a 'pop', 'crack' or feel a 'snap' within the knee.
- The knee often swells within the first few hours of the injury. This may be a sign of bleeding inside the knee joint. Swelling that occurs rapidly is usually a sign of a serious knee injury.
- Giving way or instability of the knee particularly with twisting
- Restricted movement and pain, particularly in the first few weeks following the injury

Diagnosis
If an injury to the anterior cruciate ligament is suspected further imaging will be required with the aid of an MRI and a specialist orthopaedic surgeon's opinion required.

Acute Management
Initial management will focus on decreasing swelling, increasing range of motion and strengthening the leg and hip muscles. Even in situations where surgery is required this is important.

Surgical Intervention
The role of surgery is to restore the mechanical stability to the knee. The graft takes around 6 months to fully strengthen.

A disrupted cruciate ligament increases the risk of re-injury to the knee due to the instability.

It also increases your risk of developing early onset osteoarthritis once again because of the lack of stability in the knee.

Surgery involves replacing the torn cruciate ligament with a graft that reproduces the normal stabilising role of the ligament. There are several procedures available and your surgeon can guide you with this. Surgery is usually performed via an arthroscope using the hamstring tendons as a graft.

Post-Operative Treatment
Time: 8-12 months

Initial management will focus on increasing range of motion in the knee, improving quadriceps recruitment and managing pain levels. Depending on the surgery bracing will be used initially until a straight leg raise can be performed and crutches will be used for the first 4-6 weeks.

Further management will focus on restoring strength, fitness and balance/proprioception. Crucial to the rehabilitation is an ACL injury prevention program.

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Highlighting Physiotherapy Options for Medical Patients

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Proprioceptive Training Reduces ACL Injury Seven Fold

December 2010
Abstract: In addition to structural stability, muscular control and responsiveness protect the knee joint. This dynamic stability relies first on accurate and efficient proprioception. A study involving 600 Italian football players found that proprioceptive training programs reduced ACL injuries seven fold. The Santa Monica Program, a similar program introduced to female soccer, reduced ACL injuries by 88%.[1] Rehabilitation and injury prevention programming should include programs that retrain proprioception in a sports specific manner. Advanced Physiotherapy is providing free education to interested parties.

Proprioception refers to the body's internal sensory system that informs the nervous system as to body movements and posture. Inasmuch as appropriate muscle force, timing of muscular contraction, and coordination of muscular contractions all play a role in joint protection, proprioception plays an important role in preventing joint injury. Inadequate information from the proprioceptive system compromises a person's ability to adapt to external destabilizing forces (e.g. unexpected uneven terrain), and it compromises a person's ability to apply muscular force in a measured fashion (e.g. failing to use the hamstrings in a timely fashion to decelerate a kicking motion).

Caraffa and colleagues studied proprioception and ACL injury among Italian football players.[2] They followed 600 amateur and semi-professional football players (40 teams) for three seasons. People with previous knee injuries were excluded. Twenty teams trained as they normally would. Twenty experimental teams were taught to include an increasingly difficult proprioceptive program in their training regimen. The proprioceptive program consisted of activity with various balance boards, up-step exercises, and neuromuscular facilitation techniques. After three seasons, the 20 control teams experienced 70 ACL injuries compared to only 10 injuries in the teams that used the proprioceptive training program.

The protective effects of proprioceptive training may be even more important among patients who have already experienced joint injury. Joint injury often disrupts articular mechanoreceptors that play an important role in normal joint protection.[3] It is likely that patients who have experienced joint injury have even less dynamic / functional joint protection than they did pre-injury. Even previous ankle sprains can damage proprioception in ways that compromise the functional stability of both the ankle and the knee.

From a clinical perspective this information has several important implications. Firstly, any rehabilitation program should include a closely supervised proprioceptive component with an emphasis on controlling the movement of the knee and hip when landing or with lateral movement. Secondly, it should be possible to prevent a large proportion of the non-contact knee injuries. Thirdly, although these studies only looked at ACL injuries it is probable that the results can be generalized to most non-contact traumatic knee injuries.

This programming must be repeated sufficiently so it becomes a reflexive movement pattern. As with the Santa Monica program, replacing the "usual sports warmup" would appear to be an ideal time to do this.

Advanced Physiotherapy and Injury Prevention through its association with the Hunter Academy of Sport, Newcastle Jets and local sporting clubs plans to have provided over 100 coaches with instruction in a knee injury prevention program (via an injury prevention warmup routine) prior to the commencement of the 2011 winter sport season. This will be done through an extension of our free educational series "*Essentials of Prevention*", which is open to sports coaches, athletes, doctors and physiotherapists.

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Collateral Ligament Tears

- Medial Collateral ligament is most common
- These do not require reconstruction in most cases and will heal well with a conservative approach in 4 – 16 weeks

Show ROM Brace

Acute Meniscal Tears

Adolescent

- Place on crutches NWB and refer for immediate orthopaedic opinion
- These are repairable in some situations if seen early

Adult

- Unless acute locked knee (indicating bucket handle tear) , refer to Physio with concurrent orthopaedic referral

Degenerative Meniscal Tears

- Older patient (> 45 yo)
- Slow onset of symptoms
- Trial 6 weeks of Physio first
  - Strengthening
  - BMI/adiposity optimisation
- Menisectomy followed by 6-8 weeks of exercises if conservative care fails

Meniscal Tear with Osteoarthritis – Evidence

- Katz (2013) 351 patients Surgery + Physio and Physio Only
- Both groups showed improvement, but not statistically significant
- 35% of Physio only patients elected for surgery due at 12 months
- Surgery is always an option but 65% may not need it
- Even if they do pre-operative Physio is likely to assist surgical outcomes

Patellofemoral Pain

- Variety of causes
- Generally Physiotherapy referral will suffice and treatment typically consists of
  - Quadriceps strengthening
  - Stretching exercises
  - Patella tape
  - Biomechanical correction
  - Hip strengthening
  - Correction of sporting technique

Patient Information Sheet
Knee Meniscal Cartilage Injury

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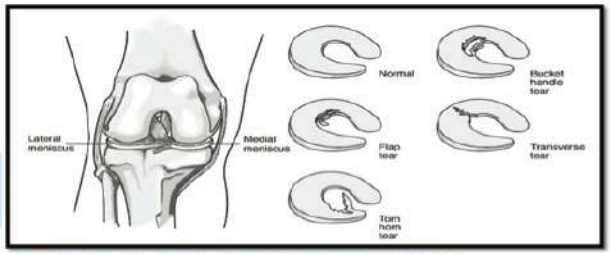
Knee Meniscal Cartilage Injury

There are two menisci in the knee; each rests between the thigh bone (femur) and shin bone (tibia). The menisci are made of tough cartilage and conform to the surfaces of the bones upon which they rest. The menisci function to distribute a person's body weight across the knee joint and to improve the shape of the join between the 2 bones, contributing to the stability of the knee joint. Without the meniscus present, the weight of your body would be unevenly applied to the bones in your legs (the femur and tibia). The function of the meniscus is critical to the health of the knee.



Pain and Symptoms

- **Pain.** The degree of this will vary according to the site and extent of the injury and the type of activity being performed. There may be severe pain if a torn fragment of meniscus catches between the tibia and femur. Sometimes, a past injury causes pain months or years later, particularly if the affected knee is injured again.
- **Swelling.** The knee may swell immediately if blood vessels are damaged with the injury, or swell more slowly as part of the inflammatory process that occurs following injury. Swelling is sometimes difficult to see.
- **Knee function.** You may be unable to straighten or bend the knee fully. In severe cases, no walking is possible due to the intensity of the pain. The knee may click, or may 'lock' from time to time if the torn fragment interferes with normal knee movement. A locked knee means that it gets stuck when it is bent and cannot be straightened without manually moving or manipulating the leg).

Causes of Injury

The two most common causes of a **meniscal tear** are due to traumatic injury (often seen in athletes) and degenerative processes (seen in older patients who have more brittle cartilage). The most common mechanism of a traumatic **meniscus tear** occurs when the knee joint is bent and the knee is then twisted. The meniscus may tear fully or partially. The seriousness of the injury depends on its size, and the exact site and shape of the tear.

In severe injuries, other parts of the knee may also be damaged in addition to a meniscal tear. For example, a person may also sprain or tear a ligament or have problems, with the joint surface.

Meniscal cartilage does not repair very well once it is torn since it does not have a good blood supply, except in children where some repair is possible. In the adult the outer edge of each meniscus has some blood vessels, but the

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