BCCH Emergency Department

LOWER LUMB INJURIES

Resource pack

Developed by: Rena Heathcote RN.
Knee Injuries

- The knee joint consists of a variety of structures including:
  - 3 bones (excluding the patella)
  - Cartilage (the meniscus)
  - Ligaments that help provide stability to the joint; comprising of the collateral (side) ligaments, and the cruciate ligaments in the centre of the joint
  - Several muscles and tendons control the movement of the knee, and provide protection, alongside the patella bone, which protects the front of the knee

History

- Injuries to the knee are sustained through a large variety of mechanisms; causing the knee joint to be twisted, forcibly strained to either side, or shifted back to front / front to back. Often, a combination of more than one of these occurs, leading to serious injury.
- The common mechanisms are sports injuries eg: a football tackle causing twisting and straining of the knee structures, walking down stairs or skiing and ‘over-straining’ the knee from side to side

Rena Heathcote.     BCCH Emergency Department 2012
• The mechanism of injury, and history of the onset of symptoms is extremely useful in assessing the potential severity of the injury, and in helping aid the diagnosis
• Patients with a history of previous knee injuries /problems can often present with an ‘acute on chronic’ problem eg: locking of the knee from a piece of loose cartilage obstructing the joint surfaces

Cruciate ligament tears

Rena Heathcote. BCCH Emergency Department 2012
Collateral (outside) ligament strains / tears

Collateral Ligament Injuries

Lateral ligament  Medial ligament

Meniscal (cartilage) tears

The articular (joint) surface
Of the knee showing the
Position of the menisci

Cross section of the knee from
above, demonstrating a tear of
the medial meniscus

Rena Heathcote.        BCCH Emergency Department 2012
**Assessment**

- Assessing the ‘gait’ of the patient eg: how much are they able to weight bear, and whether they are limping, can help ascertain the severity of the injury
- Look for deformity; **Severe deformity could indicate a fracture dislocation**, which requires emergency management and manipulation
  Ruptures of the muscular/tendon structures to the front of the knee can cause the patella to dislocate
- Observe and feel for heat, swelling and bruising;
  In acute injuries there may be severe swelling and bruising, which are signs of a haemoarthrosis. This indicates significant injury inside the joint eg: a tibial plateau fracture, a cruciate ligament rupture, or a severe cartilage tear etc
  Caution: Heat can indicate inflammation, or more seriously, infection within the joint, the latter of which requires urgent treatment. **Sepsis guidelines should be followed**
- In significant injury or pain, the patient will be reluctant to move the knee, or the patient may complain that the knee is locked into a fixed position
- Distal sensation, movement and pedal pulse/ capillary refill must always be checked

**Treatment**

- Elevate and support the limb if significant injury suspected, or there is marked swelling
- Give the patient an ice pack to apply to the knee if there is an acute effusion
- Ensure the patient has received adequate analgesia
- If a fracture/dislocation is suspected, seek help immediately from a practitioner
- X-rays are indicated if a bony injury is suspected, and may be requested by the medical practitioner after the patient is fully examined. The x-ray will help elicit a fracture or bony involvement eg: tibial plateau fractures, avulsion fractures from ligamental ruptures, loose bodies inside the knee joint etc
- A vast amount of knee injuries are soft tissue injuries, and will not show on x-ray
- Treatment and follow-up is dependent upon the injury suspected
- Minor soft tissue injures are given RICE and exercise advice, and followed up at their own physician as required
- Moderate soft tissue injuries can be treated as above, or can have a splint applied for further support and stability, These tend to be followed up in the orthopaedic clinic or with a physio.
- Severe soft tissue injuries and fractures may be referred to the orthopaedic team on call if they require drainage of the effusion or surgical fixation.
• Stable fractures / moderate soft tissue injuries are referred to the orthopaedic clinic for ongoing investigations and management. These patients can be treated with a knee immobolizer, dependant upon the injury and severity
• Crutches are given to patients with difficulty in weight bearing, and the patient should have the correct technique demonstrated, and assessed that they are safe prior to discharge

**Tibia and Fibula fractures (shaft)**

**History**

• Lower leg fractures can vary immensely in their severity and treatment
• They occur through various mechanisms, from falls and sports injuries causing inversion (movement to the inside) or eversion (movement to the outside) along with the weight of their body through the lower leg, crush injuries, direct impact, motor vehicle accidents etc
• The tibia is a large, strong bone, and takes considerable force to break
• The fibula is the thinner and weaker of the two lower leg bones, and due to it being anatomically easier to invert your ankle as opposed to evert; the fibula is put under far more strain than the tibia, hence is much more commonly broken
• Fractures can occur anywhere along the shaft of these bones, and in the instance of considerable force, can occur simultaneously
• The fractures vary in type and displacement from relatively stable injuries, to unstable fractures with associated injuries to the knee or ankle / or compound fractures
• Patients with traumatic fractures to the tibia or simultaneous fractures of the tibia and fibula can loose a significant amount of blood, and require IV fluids to prevent hypovolaemia, and admission for surgical fixation
Fracture through the shaft of the tibia, with an accompanying fracture to the proximal area of the fibula, requiring internal fixation of the tibia

Assessment

- Assessing the ‘gait’ of the patient eg: how much are they able to weight bear, and whether they are limping, can help ascertain the severity of the injury. Patients with lower leg fractures are reluctant to weight bear at all, and find it extremely painful
- Look for deformity to the lower leg
- Swelling / bruising can be mild or severe.
  
  Caution: Always consider compartment syndrome\(^1\) in a patient with a history of an injury to the lower leg, with swelling/bruising, and complaining of severe pain. Their pain can often seem inappropriate to the apparent injury, but should be perceived as a warning sign for above.

- THIS IS AN ORTHOPAEDIC EMERGENCY, AND CAN OFTEN REQUIRE AN IMMEDIATE FASHIOTOMY TO PREVENT NEURO-VASCULAR COMPROMISE AND TISSUE DESTRUCTION
- The patient may well be able to identify the area of tenderness to the lower leg
- Distal sensation, movement and pedal pulse/ capillary refill must always be checked

---

\(^1\) Compartment syndrome: a painful condition resulting from the expansion or overgrowth of enclosed tissue (as of a leg muscle) within its anatomical enclosure (as a muscular sheath) producing pressure that interferes with circulation and adversely affects the function and health of the tissue itself (Medlineplus, 2005)
Treatment

- Elevate and support the limb, if significant injury suspected, or marked swelling
- Give the patient an ice pack to apply to the lower leg if there is significant swelling and pain
- Ensure the patient has received adequate analgesia
- If compartment syndrome is suspected, seek immediate help from a medical practitioner, and ensure the limb is highly elevated. Neuro-vascular observations should be taken every 15 minutes. The patient requires immediate intervention
- The treatment of the fracture is dependant upon the site and stability
- Fractures of the shaft of the tibia and fibula are discussed with the orthopaedic team, and surgery/fixation is carried out dependant upon the severity of the fracture
- All fractures are placed in a below or above knee back slab cast (dependant upon the site of the fracture), and are either admitted for surgical fixation, or followed up in the fracture clinic
- Crutches are given to all patients, and the patient should have the correct technique demonstrated, and assessed that they are safe prior to discharge

Ankle fractures
History

- Ankle injuries usually through overly inverting, or less frequently, evertting the ankle joint. This put strain on the structures to that side, causing a fracture through the bone, an avulsion fracture (a chip of bone pulled away by the ligament or tendon connecting to that area), or varying degrees of a sprain/strain to the soft tissue structures, including total rupture.
- The mechanism of injury, as well as the history of how the patient has been post injury and on arrival in the department gives a good indication of the possible diagnosis.
- Significant eversion / inversion, or less commonly other mechanisms can cause a fracture through the medial and/or lateral malleolus at the ankle joint.

An AP ankle x-ray taken through a cast showing fractures through the medial and lateral malleolus

- Less frequently, patients sustain fractures to other bones that make up the ankle joint ie: talus and calcaneum. Calcaneal (heel) fractures are usually sustained from jumping from a height.

Rena Heathcote. BCCH Emergency Department 2012
Assessment

- The patient will be extremely reluctant to weight bear on the injured leg, and will generally be walking with an obvious limp
- There will most likely be marked swelling and often bruising to the affected side(s)
- The patient will complain of bony tenderness to the area of the ankle fractured
- Distal sensation and pedal pulse/capillary refill must always be checked
- **Caution:** Patients that have jumped from a height and complain of heel pain, may well have broken their heel(s), but may also have accompanying ankle, knee, hip, back or neck injuries due to the velocity of the force
- **Caution:** Patients that complain of inverting their ankle often have a fracture to the base of the 5th metatarsal, due to it’s prominence at the side of the foot, and its tendon attachment ‘pulling’ it away

Treatment

- Elevate and support the limb, if significant injury suspected, or marked swelling
- Give the patient an ice pack to apply to the lower leg if there is significant swelling and pain
- Ensure the patient has received adequate analgesia
- X-ray shows the severity and displacement of the fracture
- Management is dependant upon the displacement of any fracture(s)
- Severely displaced fractures, or patients with fractures at more than one site in the ankle / lower leg are referred to the on call orthopaedic team. These fractures are considered ‘unstable’, and often require surgical fixation
- ‘Stable’ or isolated fractures with minimal displacement are treated in a below knee cast and are reviewed in the orthopaedic clinic
Ankle ligament sprains

History

- The mechanism tends to be the same as fractures ie: inversion or eversion injuries, causing strain on the ligaments of the ankle joint
- This leads to varying degrees of injury to the ligaments, ranging from minor ‘over-stretching, partial tear, or complete rupture of the ligament(s)
- In minor sprains, the patient will often give a history of still being able to weight bear after the injury, and noticed an increase in pain sometime later, often associated with the onset of swelling or stiffening up overnight

Rena Heathcote. BCCH Emergency Department 2012
Assessment

- As for ankle fractures
- The patient may well still be weight bearing, and walking with a minimal limp, dependant upon the severity of the sprain
- There is often swelling/bruising over the affected ligamental structures
- A rupture of the Achilles tendon may be missed if not considered and assessed

Treatment

- An x-ray may be requested by the practitioner, if there is any suspicion of a fracture (ie: the patient complains of tenderness over the bone when examined), or suspicion of a large avulsion fracture where the ligaments attach to the bone
- Patients with simple, minor sprains are advised how to care for their sprain at home following the RICE (Rest, Ice, Compression, Elevation) and MICE (Mobilise, Ice, Compression, Elevation) mnemonic
- Moderate to severe ankle sprains are treated with either strapping or a below knee back slab to rest the joint, and are followed up by orthopaedics if instability / complete rupture suspected
- Crutches are given to aid mobilisation in patients with moderate to severe sprains, but are discouraged in minor sprains, due to reluctance of the patient to exercise and start weight bearing on the injury if using crutches, which slows down the healing of the sprain, and the patients rehabilitation
Metatarsal Fractures

History

- These injuries usually occur through force, either by inversion of the ankle eg: fractured base of 5th Metatarsal (see ankle fractures), or from direct force by foot being crushed
- Isolated or multiple fractures can occur, dependant upon the mechanism and force involved
- Stress (March) fractures are caused from continuous force on the metatarsal, are usually along the shaft or neck of the 2nd metatarsal (McRae, 2005) eg: long distance runners, athletes. These are often so subtle that they do not always show on x-ray initially, hence are often only evident when callus formation is visible on the x-ray (2-3 weeks afterwards)
- Severe injuries can cause fracture/dislocations to the base of the metatarsals

Assessment

- There may be swelling and bruising
- The patient will be extremely reluctant to weight bear on the affected foot, due to pain
- Assess the integrity of the skin, especially with reported crush injuries
- The patient will complain of tenderness over the region of the fracture(s)
- If there is suspicion of multiple fractures or dislocation, seek immediate assistance from an ENP / Doctor to initiate an x-ray and urgent management
- Distal sensation, movement and pedal pulse/ capillary refill must always be checked

Treatment

- Ensure the patient has received adequate analgesia
- An X-ray shows whether the injury is a soft tissue injury or an underlying fracture(s)
- Treatment is dependant upon the severity and displacement of the fracture
- Isolated and stable ( undisplaced) fractures are treated conservatively with compression / support, crutches and analgesia. If the patient is in severe pain, a below knee back slab or walking cast may be applied

Rena Heathcote.        BCCH Emergency Department 2012
• Crutches are given to patients with difficulty in weight bearing, and the patient should have the correct technique demonstrated and assessed that they are safe prior to discharge
• Multiple, displaced fractures or dislocations require urgent surgical fixation, hence are referred to the on-call orthopaedic team
• All patients with metatarsal fractures are followed up in the orthopaedic clinic

Toe Fractures / Dislocations

History

• Injuries to the toes are often sustained through a ‘stubbing’ mechanism, or result from a heavy weight falling on the foot / crush injuries
• Dislocations can occur to any of the joints of the toe, but most commonly occur at the site of the metatarsal phalangeal joint or proximal interphalangeal joint
• Fractures can often be ‘open’ due to overlying lacerations/ nail bed injuries

Assessment

• The patient will be limping and reluctant to fully weight bear onto the injured toe
• There is often accompanying swelling / bruising, and trauma to the overlying skin / nail, including a subungal haematoma
• A dislocation of either joint is apparent on examination, with visible deformity
• If there is suspicion of dislocation, seek prompt assistance from an practitioner to initiate an x-ray and management
• Distal sensation, movement and capillary refill must always be checked

Treatment

• Potential fractures / dislocations are clinically assessed. Suspected simple fractures of the phalanges are not routinely x-rayed. This is due to the need to minimise unnecessary radiation exposure, as the x-ray will not change the management of the injury

Exceptions to this rule are
1 if there is a significant deformity/potential complicated dislocation that requires reducing
2. Possible Fracture of the big toe as this is necessary for weight bearing
• Simple, clinically diagnosed toe fractures / strains are treated with buddy strapping and do not require follow up
• Simple advice is given to the patient regarding ice, elevation, over the counter analgesia, how to self apply strapping as required, and informed that the healing time averages six weeks
• Complicated fractures / dislocations are reduced under digital nerve block with local anaesthetic, and dependant upon end result, are splinted using buddy strapping, zimmer splints and are followed up in the orthopaedic clinic
• Crutches are not routinely given out, but can be given to patients with difficulty in weight bearing. The patient should have the correct technique demonstrated, and assessed that they are safe prior to discharge

References
