

February 2013 Minor Injuries Series

Episode 3: The Paediatric Ankle Injury

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Ankle injuries are the most common presenting complaint to Emergency Departments, and their mechanism is usually 'going over' on the ankle, often whilst walking, running, going down stairs or playing sports. This going over usually results in inward rotation of the foot in relation to the leg, called an 'inversion' injury but can also occur in the other direction (an eversion injury)

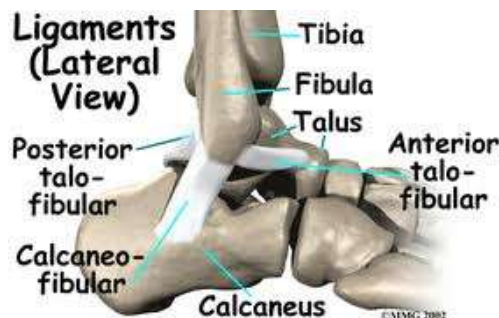


There are also other mechanisms, such as heavy object dropped on the ankle or pulling hard to release a trapped foot.

So thinking of these very common inversion, and less common eversion injuries,

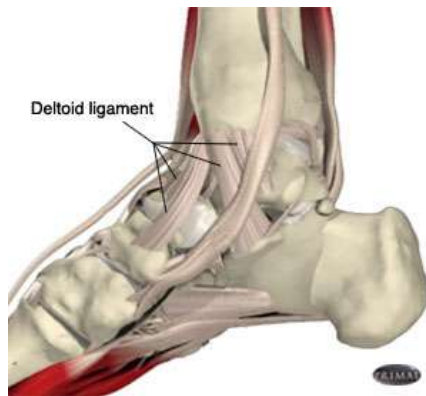
- 1) what structures do you imagine could be damaged?
- 2) how do you decide if an x-ray is warranted?
- 3) how do I classify a bony injury?
- 4) what is the management?

1: in children ligaments are surprisingly strong whilst the bones are less so when compared with adults. This means that a bony injury is MORE likely in a child with the same mechanism of injury. On the lateral surface of the ankle we have the following structures:



The lateral malleolus is the distal articulating part of the fibula, and then there is the ligament complex consisting of the posterior talofibular, calcaneofibular and anterior talofibular ligaments

On the medial surface we have the following structures:



The branching deltoid ligament makes up the soft tissue strength medially, whilst the distal tibia articulates with the talus.

When assessing the child it is important to undress the child to **above the knee** (at least) and compare the injured with the uninjured side to allow proper evaluation of size/deformity/swelling



Examine carefully starting first of all with inspection:

- A significant bony or ligamentous ankle injury is uncommon without swelling. Bruising is also a sign that points toward bony injury and occurs within a few hours of fractures.
- Follow the orthopaedic mantra of **look, feel, move** taking care not to cause undue distress to a scared child.
- Remember to assess proximally to the knee – proximal fibula fractures are a possibility in inversion injuries so make sure you have palpated well at the knee to know you do not need a tib/fib xray in addition to the ankle xray.
- Remember also the foot – an eversion injury tends to cause EITHER a lateral ankle injury OR a base of 5th metatarsal injury (the bony prominence on your lateral foot half way down) so always check the pain is actually originating from the ankle and not this bone – if it is, xray the foot (most base of 5th MT fractures heal conservatively, but occasionally if displaced badly they need K wiring to ensure good union).
- Beware in children of WHAT IS NORMAL here: there is an APOPHYSIS here (same as an EPIPHYSIS but non articulating) Generally speaking, **an apophysis = vertical black line, fracture = horizontal black line**



2: The wonderful thing about ankle injuries is that there is a reliable, commonly used, validated assessment of the injury that helps you to decide if an xray is indicated. This tool was developed by a group in Ottawa, Canada and for that reason bears the name “the Ottawa Ankle Rules” which are as follows: Carry out an ankle xray (AP and lateral) if:

- The patient could not walk 4 paces immediately after the injury OR
- The patient cannot walk 4 paces now OR
- There is bony tenderness along the posterior aspect of the lateral OR medial malleolus from distal tip extending up 6cm
(or xray the foot instead if base of 5th metatarsal tenderness)

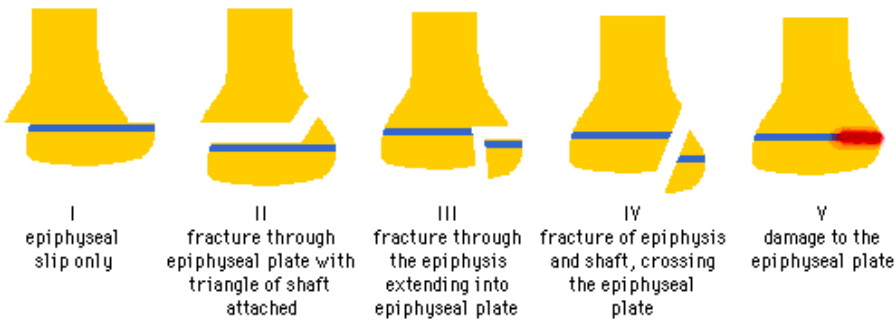
You are very welcome to carry out an xray in those who do not fit these criteria if you are worried but there is a very low likelihood of there being a bony injury

3. When you have your xray back, how do you then classify the injury?

CHILD SPECIFIC classification and the SITE SPECIFIC classification:

Child: Salter Harris classification tells you about the bony injury in relation to the child’s growth plate. As mentioned in Episode 1 of this series, the involvement of the growth plate has the potential to disrupt growth at this joint and therefore could cause significant problems as the child grows.

The Harris and Salter classification of epiphyseal injuries



This lovely simplistic diagram demonstrates all you need to understand. You'll see that I and V may be difficult to distinguish in practice – both can look like undisplaced injuries with an abnormal growth plate (maybe narrower or wonky compared to normal) – V will generally have been associated with a much more significant mechanism.

The Salter Harris classification comes with a nice acronym: **SALTR**

I - Slip

II – Above the growth plate (i.e. in the metaphysis)

III – Lower than the growth plate (ie in the epiphysis)

IV – Through the growth plate, and involving therefore both metaphysic and epiphysis

V – Ruined: growth plate severely disrupted

Anything **III** and above should be discussed with orthopaedics

Site specific classification:

Ankle fractures need to be classified as either stable and therefore likely to heal well with conservative management (immobilisation in cast) or unstable (likely that fracture fragments will move and therefore needs operative fixation). The ankle can be considered as a ring in which bones as well as ligaments play equally important roles in the maintenance of the stability of the joint. If the ring is broken in one position the ring remains stable. When it is broken in two positions the ring is unstable.

So on the x-ray look for two things: the integrity of the joint space – should be equal width along its three sides:



This shows a nicely spaced out joint, equal width on all three sides



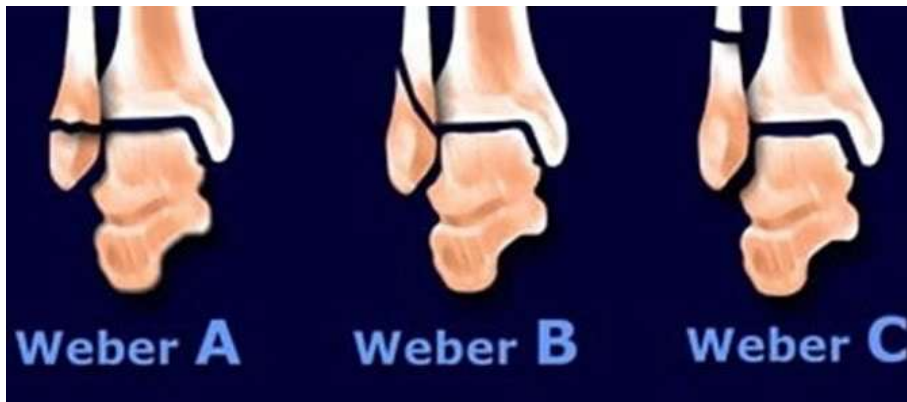
This picture demonstrates the widening of the joint space medially – UNSTABLE

Weber classification helps with this decision regarding stability:

Weber A – below syndesmosis (STABLE)

Weber B – at syndesmosis (UNSTABLE)

Weber C – above syndesmosis (UNSTABLE)



Also look clinically and radiologically for signs of dislocation – marked deformity, distortion of anatomy, significant mechanism of injury – and in cases suspicious of dislocation/subluxation ensure you can locate a good pulse distally and that capillary refill in the toes is equal to the uninjured side and that there is no sensory deficit to the foot – ankle dislocations, even without obvious neurovascular deficit need reduction asap to prevent both neurovascular insult and lasting damage to the joint surface. Reduction would normally be achieved by paramedics or in the Emergency Department's resuscitation room as the patient will need iv analgesia, possibly with sedation or entonox, and then reduction with firm traction to the foot and immediate plaster application and reimaging to ensure good post reduction positions

4. Management

As already alluded to in point 3, a stable injury will heal fine with conservative management i.e: a plaster of paris backslab for the first week (a 'backslab' means a non-circumferential cast as there will be a lot of swelling after a fracture and you must not cause compartment syndrome by giving this swelling nowhere to go) with crutches, non weight bearing, elevation, analgesia), followed by review in fracture clinic and conversion to a fibreglass cast (lighter and more durable) about a week after the injury

If unstable, refer to orthopaedics for operative fixation and follow up – typically screws and plate.