



# The Weekly Probe

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**Ultrasound Booking** – A recurrent reminder not to tell patients to turn up to Radiology for unbooked ultrasounds. Most recently there has been some feedback has been about patients turning up for US the morning after being seen without a booking. This has happened twice this week. The US department is often fully booked with inpatient and ongoing ED requests which means that these patient's cannot be accommodated. This leads to unnecessary patient dissatisfaction which reflects poorly on ED. It is generally the ultrasound department who have to pick up the pieces and deal with the upset patients.

If you feel that patients require an outpatient US then this can be organised privately with the usual forms you will be familiar with in fast track. Patient's should be given the associated list of local radiology centres and phone numbers to organise their scan. They may need to pay for any scans booked in this way and advise them what to do with the scan afterwards. Note that getting them to book outside will free up spots that may be required by your ED patients the next day

Alternatively you CAN refer back to our US department where the patient will not be charged as it is still considered part of the ED encounter.

However do not get them just to turn up the next morning - the process as follows:

- Order the US on eMR (you can keep the date as the day you assessed them in ED)
- Give the patient a 'Medical Imaging Patient Advice Form' - copies will be printed out and placed in fast track
- Reiterate to patient that they do not have an appointment for US **until they call the number on the advice form to organise the scan themselves**

**Ceftriaxone Reactions**- A cluster of cases involving reactions to Ceftriaxone have been reported to the Clinical Excellence Commission. In one case the patient experienced chest pain, the other two cases had severe reactions, with one resulting in death. The patients had no record of any previous allergy/reaction, with one patient having repeat exposure over the previous five years. The reactions occurred within minutes of administration. Though these cases may be the result of hypersensitivity/ anaphylactic reactions there occurrence in a cluster has raised concerns. The Therapeutic Good Administration (TGA) has been informed and they have not identified any variance in reporting to require action at this point in time.

Please keep an eye out for such reactions to IV administration of Ceftriaxone and as a reminder to report any adverse reactions to the TGA. ([www.tga.gov.au](http://www.tga.gov.au))

## THIS WEEK

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| <b>Lisfranc Injuries</b>                       |
| <b>Emphysematous pyelonephritis + pyelitis</b> |
| <b>Joke / Quote of the Week</b>                |
| <b>The Week Ahead</b>                          |

## LISFRANC INJURIES

A 25 yo lady presents with left foot pain after falling off a ladder – below is a diagram used in the EMR to demonstrate the location of the pain. An Xray is performed

Impression:

- 1) Ligament rupture
- 2) Fracture



adan.com



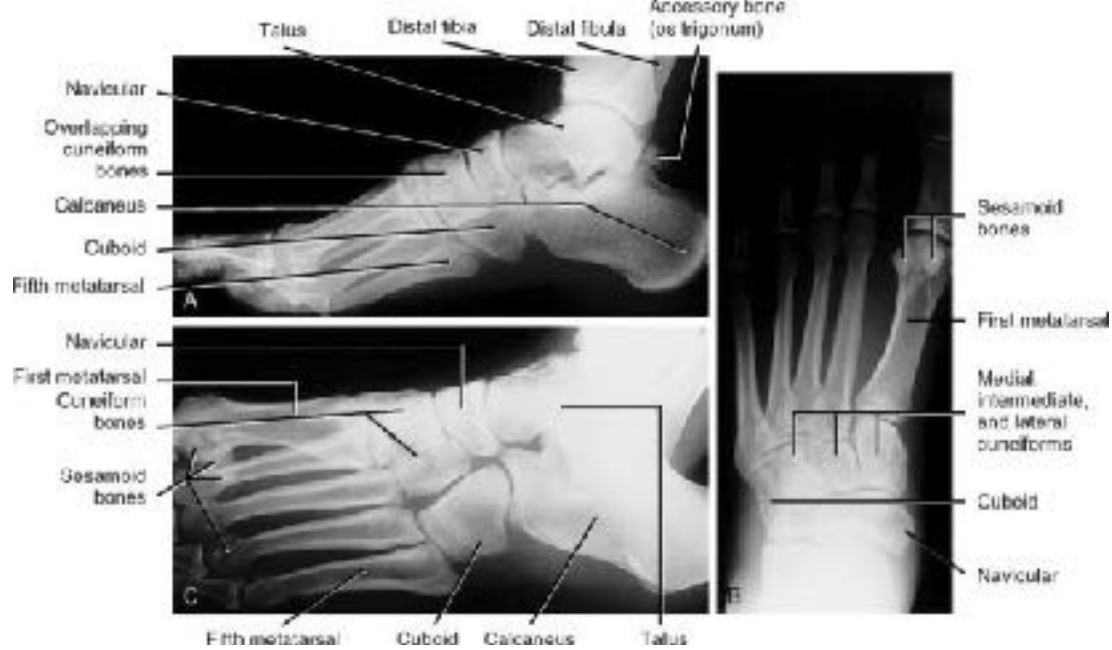
What should you be concerned about? Where to next?

The patient was subsequently seen by her well informed GP who organised a MRI then ortho review – she then underwent internal fixation of her Lisfranc joint .

Although not good for the patient, an obvious clinically and radiologically dislocated / fractured limb always makes interesting clinical material. One such injury is the Lisfranc fracture-dislocation. However this injury can range from the severe end of the spectrum to the more subtle, difficult to diagnose patients. However even the milder patients can end up with a poor outcome, so we need to be suspicious of the injury, in order to organise appropriate investigations and treatment. What is a Lisfranc injury?

### **Anatomy**

The midfoot is a stable configuration of five bones (navicular, cuboid, medial cuneiform, middle cuneiform, and lateral cuneiform) joined together in a complex system of multifaceted, relatively immobile joints. The tarsometatarsal articulation between the midfoot and the metatarsals is known as the Lisfranc joint. The second metatarsal cuneiform joint is the most stable of the entire complex. Two factors contributing to the second metatarsal cuneiform joint stability include a recessed bony configuration (acting as a keystone in an arch) and a strong plantar ligament connecting the base of the second metatarsal to the medial cuneiform (Lisfranc's ligament)- this has three parts – a plantar , dorsal and interosseous components.



When looking for a Lisfranc injury, assess the cuneiform / cuboid – MT junction. The base of the 1<sup>st</sup> metatarsal articulates with the medial cuneiform. The 2<sup>nd</sup> metatarsal articulates with the intermediate cuneiform. The 3<sup>rd</sup> metatarsal articulates with the lateral cuneiform, and the 4<sup>th</sup> and 5<sup>th</sup> metatarsals articulate with the cuboid. The most important relationship for recognizing a subtle Lisfranc injury is the 2<sup>nd</sup> metatarsal and 2<sup>nd</sup> cuneiform joint. The medial borders of the 2<sup>nd</sup> metatarsal and 2<sup>nd</sup> cuneiform should line up. If this alignment is disrupted with any lateral displacement of the 2<sup>nd</sup> metatarsal then a Lisfranc fracture-dislocation should be considered.

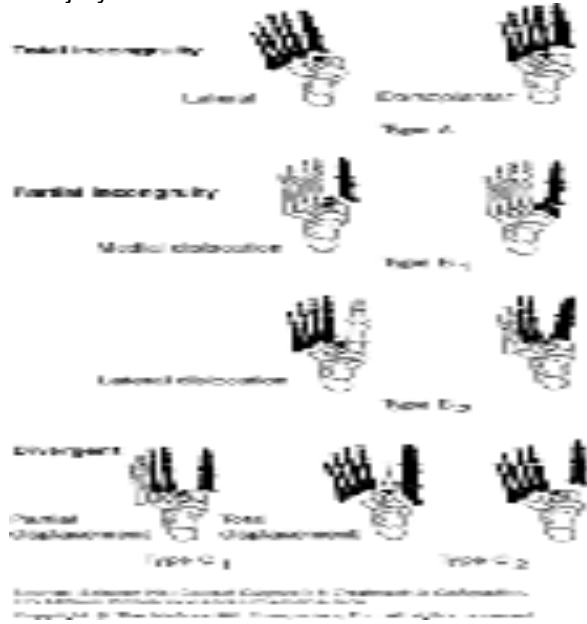
**How do we injure this ?** The mechanism of injury is either direct crushing or indirect loading of the fixed forefoot with subsequent acute abduction of the forefoot (most common) and forced plantar flexion of the forefoot. A significant amount of force is required to produce fracture-dislocation. However with less force we may see sprains or undisplaced #. Mechanisms which may result in this injury include motor vehicle accident including having foot run over by car + falls, catching the forefoot in a hole in the ground, or a horseback rider falling off a horse and hanging the forefoot in the stirrup.

**What happens?** The weak dorsal capsular structure tears then the strong plantar ligament between the medial cuneiform and the base of the second metatarsal tears +/- fracture of chondral and bony structures on both sides of the joint. Depending on the displacement that occurs at the time of injury, the joint complex either returns to a nondisplaced state or remains displaced owing to the interposition of the capsule and osteochondral fragments.

**How bad can they get ?** Injuries can range from stretch, partial tear, or complete rupture of the Lisfranc capsule and supporting ligaments, including the Lisfranc ligament. This may result in

- 1) ligament sprain with no diastasis or loss of arch height on a weight-bearing radiograph.
- 2) diastasis of 1 to 5 mm between the first and second metatarsals without arch height loss
- 3) diastasis and loss of arch height as defined by a decrease or reversal in the distance between the plantar medial cuneiform base and the fifth metatarsal base on a weight-bearing lateral foot radiograph.

Below is a chart of the different types of displaced Lisfranc #-dislocations. Note in every case there is an injury to the base of the 2<sup>nd</sup> MT



**Presentation** - The injury is associated with a pop or snap followed by pain, swelling, and ecchymosis localized to the midfoot (as depicted nicely in the EMR diagram above). On examination there may be diffuse midfoot swelling with associated ecchymosis. With associated dislocation there may be obvious deformity of the foot depending on the extent and direction of displacement as noted above.

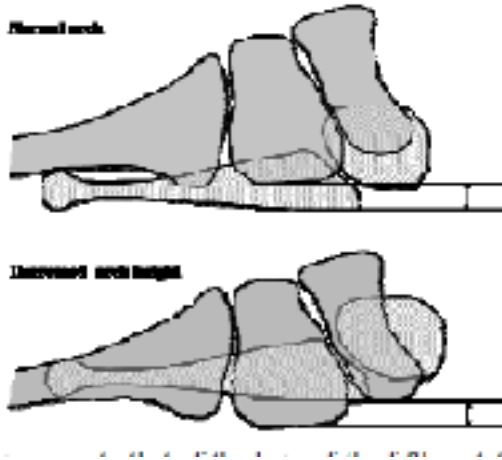
**Xrays** – look at the medial and lateral borders of the MTs and see if they line up with the medial and lateral borders of the cuneiform and if the medial base of the 4<sup>th</sup> MT lines up with the medial cuboid- the xray below shows malalignment of the medial base of 2<sup>nd</sup> and the medial aspect of the intermed cuneiform. Be suspicious when there is a gap where the ligament extends ie between the lateral aspect of the medial cuneiform and the medial base of the 2<sup>nd</sup> MT > 2mm. Diastasis > 5mm between the bases of the first and second metatarsals suggests an unstable injury.

A small fragment of bone, called the fleck sign, represents an avulsion fracture of the Lisfranc ligament from the base of the second metatarsal.



Dorsal displacement of the metatarsal bases is best assessed on the weight-bearing lateral projection. Weight-bearing lateral and oblique views of the foot may be obtained IF post analgesia then patient can weight bear- this may also help in defining functional instability. The AP views above show displacement with weight bearing (right) not seen on non-weight bearing films (left).

With a lateral weight bearing film , normally the base of the 5<sup>th</sup> MT sits lower than the inferior aspect of the medial cuneiform. However if the arch is now unstable, the medial cuneiform sits level with or below that of the 5<sup>th</sup> MT.



CT- better for assessment of alignment, displacement, and subtle bony injuries

MRI – gold standard for identifying acute ligamentous injury or to differentiate complete and partial tears.

#### Treatment

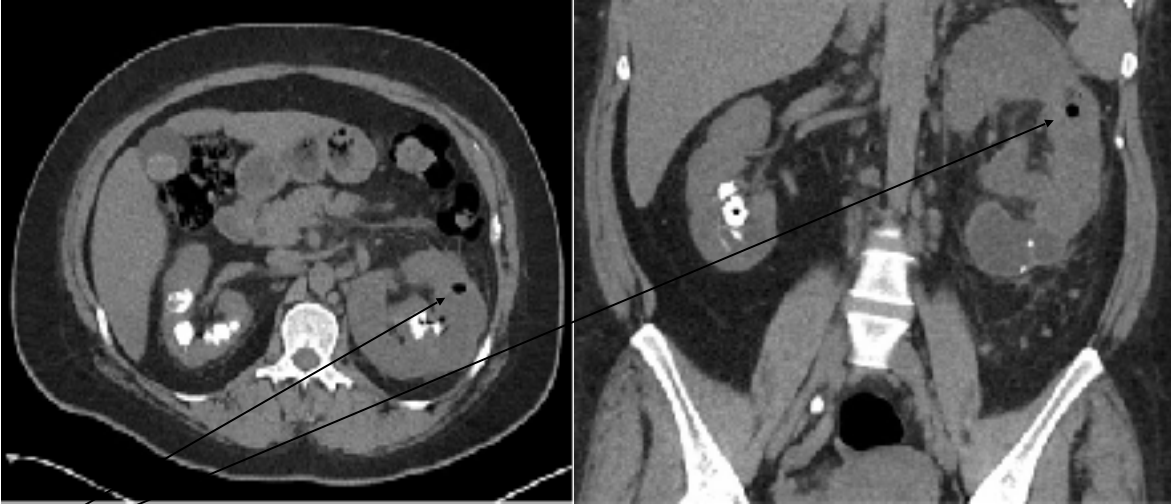
- Address life / limb threatening injuries
- Analgesia++
- Consider reduction if neurovascular or skin compromise- grab toes and provide longitudinal traction – slab then image
- Look for signs of compartment Syndrome
- Diagnose and refer
- Grade I Lisfranc Sprain - These injuries are immobilized in a short leg cast and kept from bearing weight for 4 to 6 weeks.
- Grade II Lisfranc Sprain - includes injuries with 2 to 5 mm of displacement with no loss of arch . Treatment is controversial - ?closed reduction and internal fixation ?open
- Grade III Lisfranc Sprain - Unstable nondisplaced injuries- open reduction and internal fixation- non-weight bearing for 8-10 weeks.

So from our ED perspective if you suspect a Lisfranc injury- reduce, immobilise, organise appropriate imaging (Xray +/- weight bearing views or MRI ) and refer to orthopaedics.

### EMPHYSEMATOUS PYELITIS / PYELONEPHRITIS

42yo lady with a Hx of previous renal calculi requiring instrumentation, UTI , type 2 DM and gout presented with left flank pain and fevers. Temp 37.4C left flank tenderness

CT showed are “multiple calculi within the proximal and mid left ureter with moderate hydronephrosis and mild perinephric stranding. The left kidney is swollen with multiple cystic areas replacing normal parenchyma. There are multiple gas locules in the upper pole of the left kidney (some within the calyces).”



Gas

She was transferred to interventional radiology for nephrostomy tube insertion under CT guidance



Micro on nephrostomy sample showed Gm -ve rods and Gm

+ve cocci



Emphysematous pyelitis is rare and potentially life-threatening inflammatory condition defined as gas confined within the renal pelvis and calices. ~50% of cases are diabetics- male:female ratio 1:3 - Patients are usually middle-aged. 70% of cases are associated with E. coli UTI- look at previous growth and sensitivities to guide your antibiotic choice. In 50% of cases, there is obstruction of the collecting system. Patients present with non-specific signs and symptoms of fever, abdominal pain, nausea and vomiting. Prognosis is better than in emphysematous pyelonephritis where there is gas forming organisms within the kidney yet overall mortality is 20%. If there is no co-existent obstruction, antibiotics alone are generally curative & relief of the obstruction is essential for adequate antibiotic response (nephrostomy or stents).

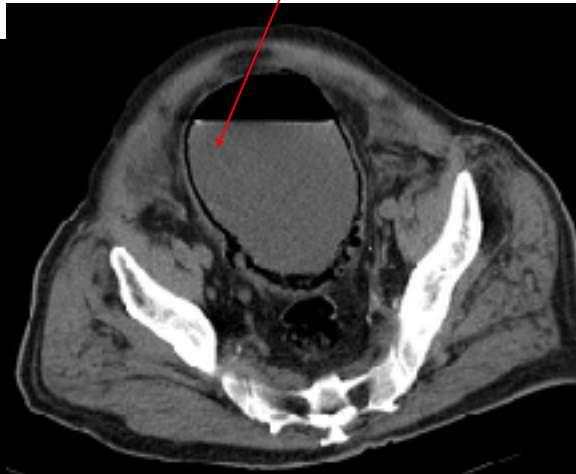
**Radiology:** On plain Xrays, pneumonephrosis may be evident. On ultrasound, with pyelitis gas within the collecting system appears as hyperechoic areas with posterior acoustic shadowing. These are found on the anti-dependent aspects of the pelvicaliceal system, and move with patient position. CT is the most sensitive modality to confirm the diagnosis and to assess the extent of involvement. CT is also sensitive for the detection of obstructing urolithiasis. (Air in a dilated renal pelvis)



Emphysematous pyelitis has to be differentiated from emphysematous pyelonephritis and renal abscess as these require different management strategies- IV antibiotics, supportive care, nephrostomy if obstruction, with drainage +/- nephrectomy in some cases.

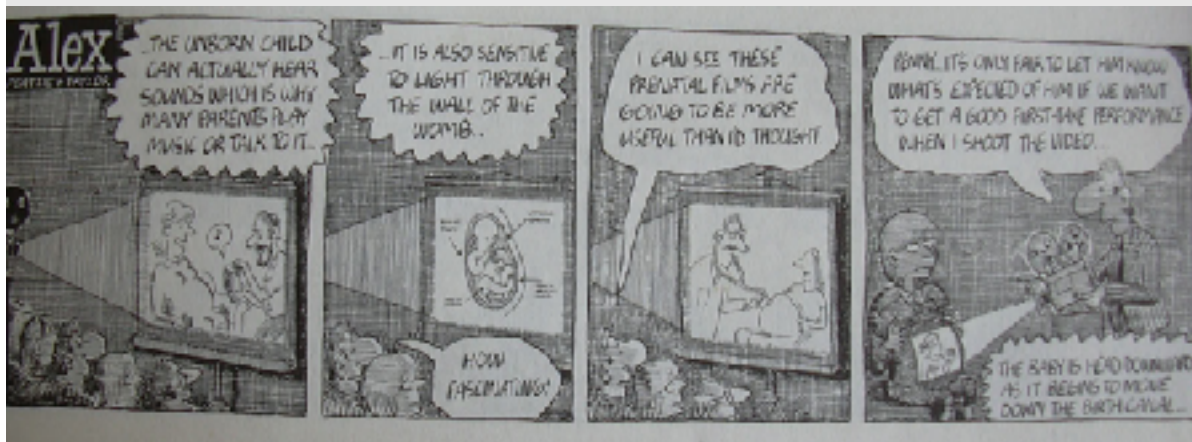
In this case the patient had evidence of both with air in her collecting system yet more prominently within her renal parenchyma

(Below are examples of air in renal parenchyma with emphysematous pyelonephritis (left) - air in the bladder wall with emphysematous cystitis (right))



Refs – [auntminnie.com](http://auntminnie.com) / [emedicine](http://emedicine)

## JOKE / QUOTE OF THE WEEK



Please forward any funny and litigious quotes you may hear on the floor (happy to publish names if you want)

### THE WEEK AHEAD

*Tuesdays - 12:00 – 13:45 Intern teaching -Thomas & Rachel Moore*

*Wednesday 0800-0900 Critical Care Journal Club. ICU Conf Room / 12.00-1.15 Resident MO in Thomas & Rachel Moore*

*Thursday 0730-0800 Trauma Audit. Education Centre / 0800-0830 MET Review Education centre / 1300-1400 Medical Grand Rounds. Auditorium.*