QUIZ 12th December 2018 (answers below)

1. **What does HHHFNPO stand for?**

2. **What Xray findings might you find in a Lisfranc injury?**

3. **What is a Segond fracture?**

4. **What are potential airway challenges in a patient post hanging?**

5. **Describe and interpret the following blood gas analysis.**

Identifications

Patient ID	
Patient Last Name	
Patient First Name	
Sex	Female
Sample type	Not specified
T	37.0 °C
$FO_2(I)$	21.0 %
PEEP	cmH2O
Pressure Support	cmH2O
SIMV	Rate
Liter Flow	L/min
Note	
Operator	
Accession No.	

Blood Gas Values			
↓ pH	**7.229**		[7.350 - 7.450]
↑ pCO_2	**85.8**	mmHg	[32.0 - 45.0]
↓ pO_2	**47.9**	mmHg	[75.0 - 105]
Oximetry Values			
*c*tHb	**148**	g/L	[115 - 165]
↓ sO_2	**78.9**	%	[95.0 - 99.0]
↑ *F*COHb	**9.5**	%	[0.0 - 1.5]
*F*MetHb	**0.6**	%	[0.0 - 1.5]
Electrolyte Values			
cNa^+	**142**	mmol/L	[137 - 146]
cK^+	**4.2**	mmol/L	[3.5 - 5.0]
cCa^{2+}	**1.27**	mmol/L	[1.15 - 1.30]
cCl^-	**99**	mmol/L	[98 - 106]
Metabolite Values			
↑ *c*Glu	**11.5**	mmol/L	[3.0 - 7.8]
*c*Lac	**0.9**	mmol/L	[0.0 - 2.2]
*c*Crea	**50**	µmol/L	[40 - 90]
Calculated Values			
ABE_c	**3.8**	mmol/L	[-]
$cHCO_3^-(P)_c$	**34.6**	mmol/L	[-]

QUIZ answers 12th December 2018

1. **What does HHHFNPO stand for?**

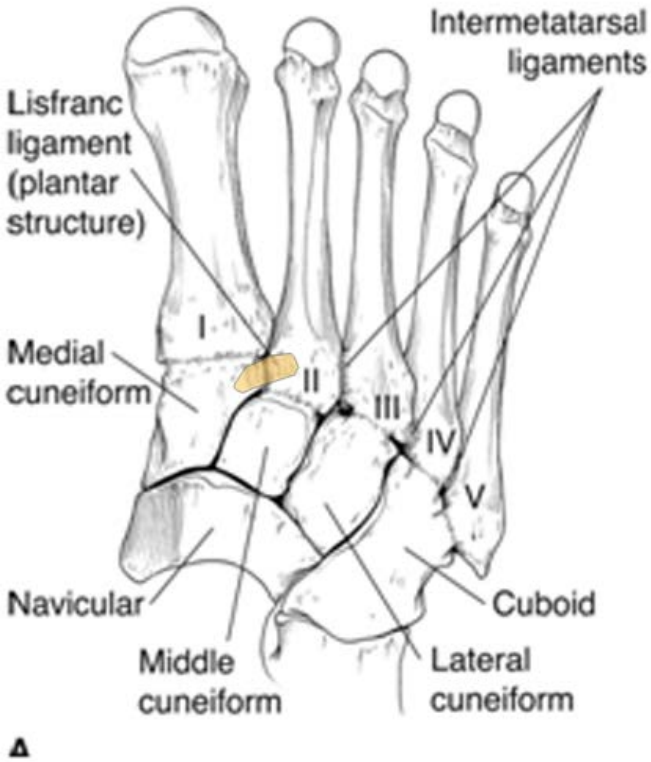
Heated Humidified High Flow Nasal Prong Oxygenation

2. **What Xray findings might you find in a Lisfranc injury?**

The Lisfranc joint is the entire tarsometatarsal joint.
(cuneiforms and cuboid to metatarsals 1-5)

The bases of the first three metatarsals articulate with the three cuneiforms (medial, intermediate and lateral). The bases of the 4th and 5th metatarsals articulate with the cuboid.

The Lisfranc ligament is a strong band attaching the medial cuneiform to the 2nd metatarsal base on the plantar aspect. It's crucial to the stability of the joint.



Gross fracture dislocation of the Lisfranc joint is obvious on Xray, but there are subtle findings to look for when it is not so apparent. Any concern for Lisfranc injury should lead to further imaging with CT.

Xray findings to look for:

- *AP foot Xray – the medial border of 2nd metatarsal should line up with medial border of middle (intermediate) cuneiform – a step can indicate a Lisfranc ligament rupture (see Xray below).*
- *Oblique foot Xray – medial border of 4th metatarsal should line up with medial border of cuboid (>1mm is pathological)*
- *Avulsion # of Lisfranc ligament (base of 2nd metatarsal to medial cuneiform) the "fleck sign" is pathognomonic*
- *Proximal metatarsal # raises suspicion for Lisfranc*
- *Lateral view – bases of metatarsal should be aligned with cuboid and cuneiforms – any step off is abnormal*
- *Weight bearing views can show a widening of the space between the 1st and 2nd metatarsal bases of >1mm*

There is a step in the alignment of the 2nd metatarsal and intermediate cuneiform with mild widening between the bases of the 1st and 2nd metatarsals
Case courtesy of Dr Henry Knipe, Radiopaedia.org, rID: 41630

3. What is a Segond fracture?

A Segond fracture is an avulsion fracture the lateral aspect of the tibial plateau. 75% of cases have ACL rupture. It is the result of varus force. AP knee Xray shows a curvilinear or elliptical bone fragment parallel to the lateral aspect of the tibial plateau – the "lateral capsular sign". The fracture is small, but the ligamentous injury usually requires surgical intervention.

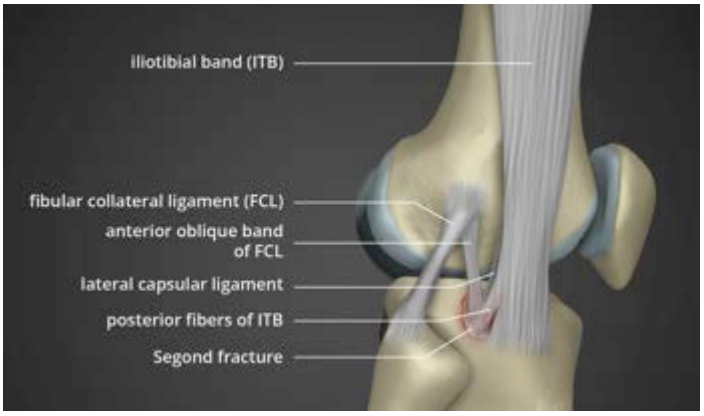
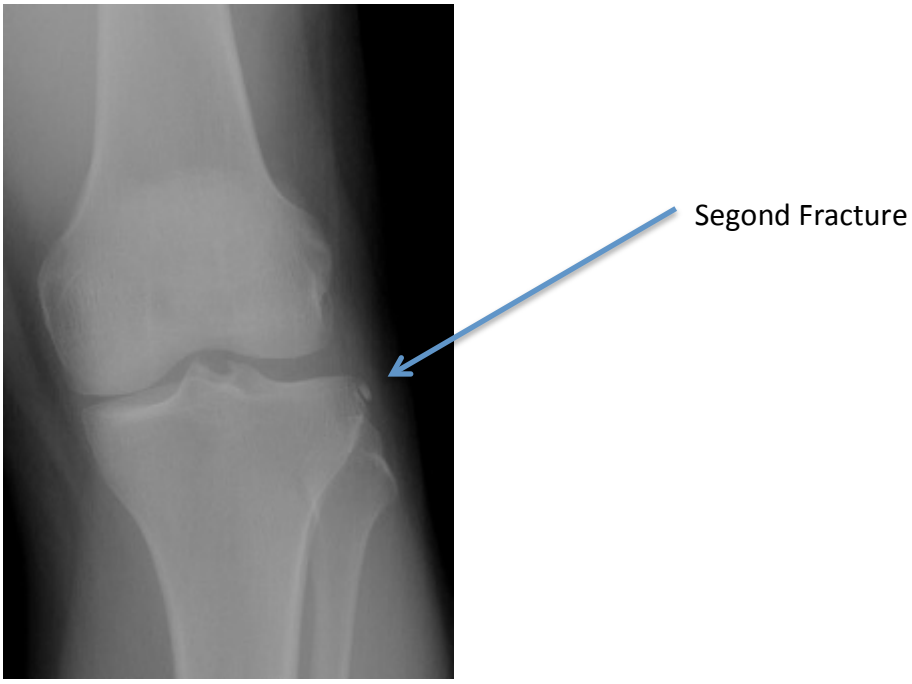


Diagram looking laterally at the knee
Courtesy of Dr Matt Skalski, Radiopaedia.org, rID: 37558



Case courtesy of Dr Fakhry Mahmoud Ebouda, Radiopaedia.org, rID: 31951

4. **What are potential airway challenges in a patient post hanging?**

In addition to the airway challenges in all ED trauma patients, patients post hanging can have the following issues:

- *Progressive airway swelling causing obstructed and distorted anatomy*
- *Airway fracture can cause distorted airway anatomy*
- *Haemorrhage can obstruct the view of the airway*
- *Airway perforation may be present or can occur as a result of intubation*
- *Partial laryngeal-tracheal separation may be converted into complete separation by intubation attempts.*
- *Hypoxic brain injury already present*
- *Post airway asphyxiation pulmonary oedema may be developing*

These patients require a timely decision as to whether intubation in ED is necessary, or should be postponed for fibreoptic intubation in OT by anaesthetics.

5. **Describe and interpret the following blood gas analysis.**

pH 7.229 Acidosis

pCO_2 85.8 Hypercapnia = respiratory acidosis

If this was acute and there was no concurrent metabolic acidosis:
Every 10mmHg of pCO_2 over 40 ⇒ ↑HCO_3- 1mmol/L from 24mmol/L = 29mmol/L
This would result in pH 7.15

If this was all chronic respiratory acidosis:
Every 10mmHg of pCO_2 over 40 ⇒ ↑HCO_3- 4mmol/L from 24mmol/L = 42.3mmol/L
This would result in pH 7.32

In this gas, HCO_3- is 34.6mmol/L (10.6 above normal of 24mmol/L)
If this is a chronic compensation for chronic hypercarbia, we can retrace the steps:
10.6 ÷ 4 x 10 + 24 = 66.5

(In the context of respiratory acidosis, this rise in bicarbonate is more than likely a chronic elevation, rather than a primary metabolic alkalosis + respiratory acidosis, but history is everything)

pO_2 47.9mmHg Appropriate for venous gas
Hypoxia with sats 79% if arterial – should be obvious!

COHb 9.5% <10% can be background level in a smoker
10% is usually asymptomatic, marker of CO exposure in non smoker
Foetal Hb binds CO more avidly, so foetus more susceptible to injury

➔ *Acute on chronic ventilatory failure*
Usual pCO_2 for this patient is 66.6mmHg
Likely smoker, otherwise CO exposure