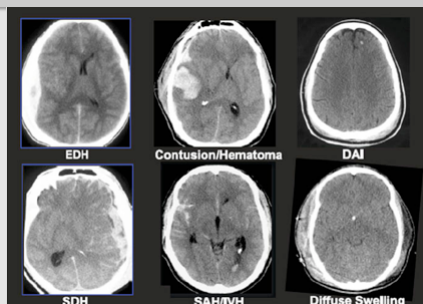


Head, Facial & Spinal Injury

January 2017

RCEM Curriculum

- Head Injury CAP18
- Major Trauma – Max Fac C3AP1d
- Major Trauma – Spine C3AP1c

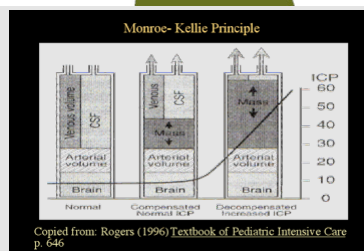
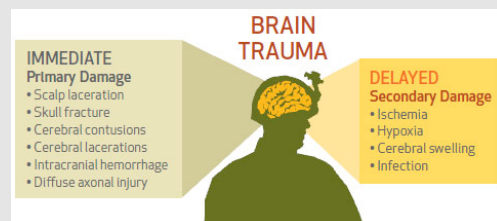


HEAD INJURY

Background

- Common – 1.4 million attend ED (UK) / Year
- Commonest cause of death / disability <40yo
- Primary Vs. Secondary injury

Secondary Injury

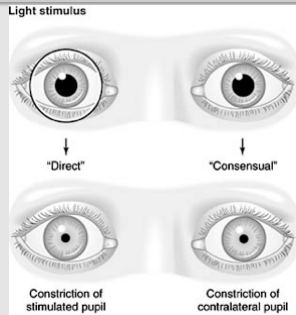


Risk of ICH (Needing Surgery)

- Without Skull Fracture:

GCS (Arrival)	Risk
15	1 in 3,615 1 in 31,300 (no amnesia)
9-14	1 in 51
3-8	1 in 7

Assessment - 1



Glasgow Coma Scale		
Eye Response	Open Spontaneously	4
	Open to Verbal command	3
	Open in response to pain	2
	No response	1
Verbal Response	Talking / Orientated	5
	Confused speech / Disorientated	4
	Inappropriate Words	3
	Incomprehensible sounds	2
	No response	1
	Motor Response	Obeys commands
Localizes pain		5
Withdraws from pain		4
Abnormal flexion		3
Extension		2
No response		1



Risk of ICH (Needing Surgery)

- With Skull Fracture:

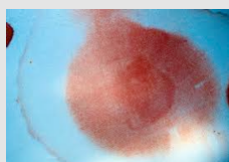
GCS (Arrival)	Risk
15	1 in 81
9-14	1 in 5
3-8	1 in 4

Risk of ICH (Needing Surgery)

- Without Skull Fracture:

GCS (Arrival)	Risk
15	1 in 3,615
9-14	1 in 51
3-8	1 in 7

Assessment - 2



Management

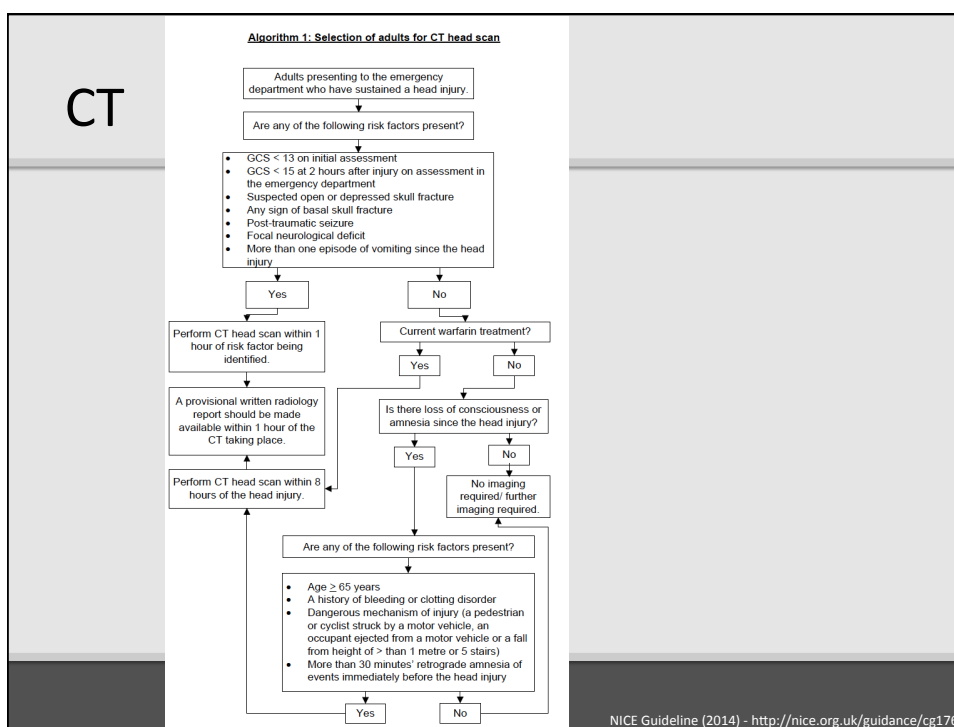
- **Airway**
- **+ C-Spine control**
- **Breathing**
- **Circulation**
- **Disability**
- **Environment**



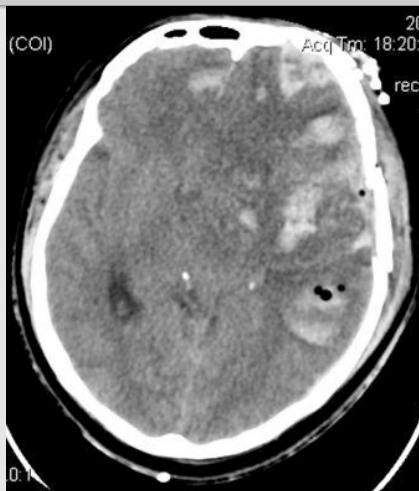
Skull X-ray

1.4.4 Do not use plain X-rays of the skull to diagnose significant brain injury without prior discussion with a neuroscience unit. However, they are useful as part of the skeletal survey in children presenting with suspected non-accidental injury. [2007]

NICE Guideline (2014) - <http://nice.org.uk/guidance/cg176>



Haemorrhagic Contusions



- Common (20-30%)
- Mainly frontal & temporal lobes
- May evolve into haematoma



Frontal symptoms ...

Extradural Haematoma



- Lens shaped
- Usually temporal or temporoparietal
- Middle meningeal or other artery / vein injury



Lucid Interval

Subdural Haematoma



- More common (30%)
- Worse prognosis
- Bridging vein injury



Elderly / EtOH

Diffuse Axonal Injury



- Shearing forces (accel/deceleration)
- Low GCS / may be inconsistent with CT
- Poor prognosis

Prevention of Secondary Injury

- Surgery
- Intubate / Ventilate PRN
PaO₂ > 13, PaCO₂ 4.5-5
Use short acting sedation
- Maintain BP (MAP ≥80)
- Nurse 30° Head Up
- Blood glucose
- Manage Seizures
- Hypertonic saline / Mannitol (if advised)

1.7.8 Intubate and ventilate the patient immediately in the following circumstances:

- Coma - not obeying commands, not speaking, not eye opening (that is, GCS 8 or less).
- Loss of protective laryngeal reflexes.
- Ventilatory insufficiency as judged by blood gases: hypoxaemia (PaO₂ < 13 kPa on oxygen) or hypercarbia (PaCO₂ > 6 kPa).
- Spontaneous hyperventilation causing PaCO₂ < 4 kPa.
- Irregular respirations. [2003, amended 2007]

Discharge

- No indication for further imaging / admission
- Alert / GCS 15
- Someone suitable at home to supervise
- Always give **written and verbal** head injury advice
- Occupational Therapy

ADVICE FOR PATIENTS FOLLOWING HEAD INJURY

EMERGENCY DEPARTMENT PHONE: 01 436 2763

You should have a responsible adult stay with you and check on you for the next 48 hours. Please give this sheet to them. If you develop any of the problems listed below you should come back to St James's Hospital or go to your nearest Emergency Department as soon as possible.

- unconsciousness, or lack of full consciousness (for example, problems keeping eyes open)
- any confusion (not knowing where you are, getting things muddled up)
- any drowsiness (feeling sleep) that lasts for longer than 1 hour when you would normally be awake
- any problems understanding or speaking
- any loss of balance or problems walking
- any weakness in one or both arms or legs
- any problems with your eyesight
- a very severe headache that won't go away
- any vomiting (getting sick)
- any fits (convulsions or passing out suddenly)
- clear fluid coming out of your ear or nose
- bleeding from one or both ears
- any weakness in one or both ears.

Things that will help you get better:

- Have plenty of rest and avoid stressful situations.
- Stay within easy reach of a telephone and medical help.
- Do not remain alone for the first 48 hours after leaving hospital.
- Do not take any alcohol or drugs.
- Do not take sleeping pills, sedatives or tranquilisers unless advised to do so by your doctor.
- Do not stay confined (for example, luggy or hospital) for three weeks without talking to your doctor first.
- Do not return to your normal school, college or work activity until you feel you have completely recovered.
- Do not drive a car, motorcycle or bicycle or operate machinery until you have completely recovered.

Things you need not worry about:

You may feel some other symptoms over the next few days, which should disappear in the next two weeks. These include a mild headache, feeling slightly sick (without vomiting), irritability or bad temper, problems concentrating or problems with your memory, tiredness, lack of appetite or problems sleeping. If you feel very concerned about any of these symptoms in the first few days after discharge, you should go and see your own doctor to talk about them. If these problems do not go away after 2 weeks, you should go and see your doctor. We also recommend that you seek your doctor's opinion about your ability to drive a car or motorcycle.

Long-term problems:

Most people recover quickly from their accident and experience no long-term problems. However, some people only develop problems after a few weeks or months. If you start to feel that things are not quite right (for example, memory problems, not feeling yourself), then please contact your doctor as soon as possible so that he or she can check to make sure you are recovering properly.

You may find it helpful to discuss with others - such as HEADWAY (<http://www.headway.ie>) 1800 200 276

EDD003

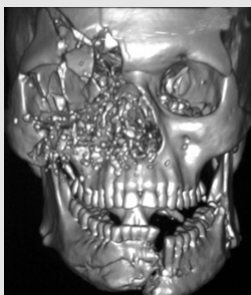
Head Injury

CAP18 Head Injury

The trainee will be able to evaluate the patient who presents with a traumatic head injury, stabilize, assess, appropriate investigate and implement a management plan.

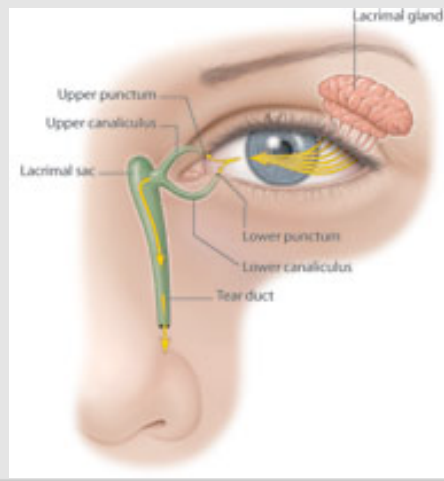
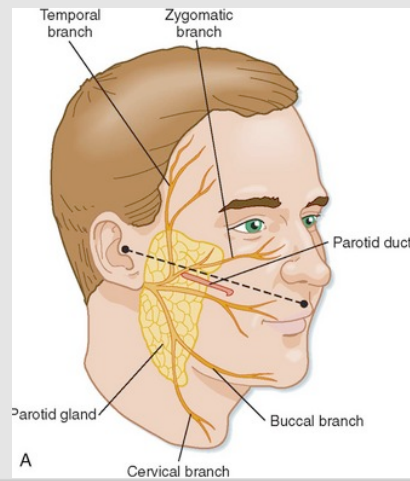
Knowledge	Assessment Methods	GMP Domains
Know the anatomy of the scalp, skull and brain, the pathophysiology of head injury (primary and secondary brain injury) and the symptoms and signs	E, C, M, ACAT	1
Know the indications for urgent CT scanning (national guidelines for CT imaging in head injury). Know the CT appearances of the common head injuries	E, C, M, ACAT	1
Know the indications for admission following head injury	E, C, M, ACAT	1
Know which patients can be safely discharged	E, C, M, ACAT	1
Skills		
Be able to use the ABC approach to the management of a head injury patient, with cervical spine immobilisation	E, D	1
Be able to demonstrate to use of the GCS and ability to identify those who will need intubation and ventilation	E, M, ACAT	1
Elicit the important facts from the history and undertake a full neurological exam to elicit signs of head injury and neurological deficit	E, M, C	1
Recognise and initially manage the secondary consequences of head injury (e.g. loss of airway patency, seizures, raised ICP)	M, S, D	1
Behaviour		
Know when to seek senior and anaesthetic, neurosurgical support	ACAT, C	2
Optimize team working between Intensive Care Medicine, neurosurgery, emergency and acute medicine	ACAT, C	2

RCEM Curriculum 2016



MAXILLOFACIAL TRAUMA

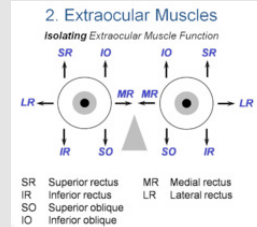
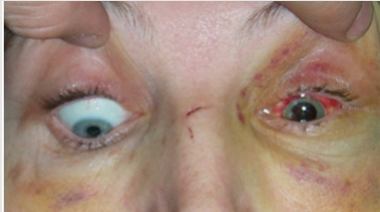
Wounds



Nasal Fracture



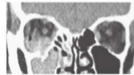
Orbital Floor Fracture



(A) A periorbital hematoma.



(B) Proptosis



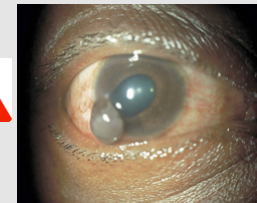
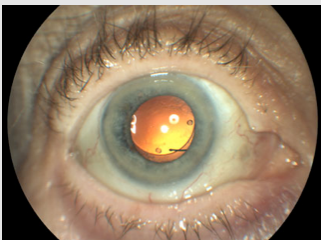
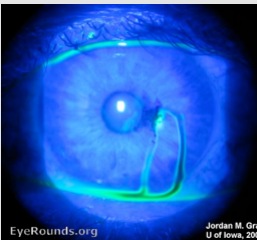
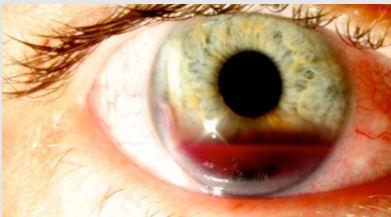
(C) Axial CT scan demonstrating an orbital floor fracture and an inferior orbital hematoma.



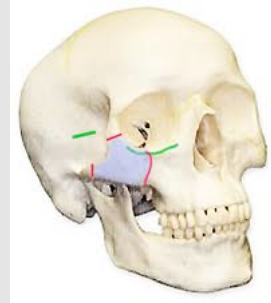
(D) A sagittal CT scan demonstrating proptosis, an orbital floor fracture and a subperiosteal hematoma extending to the orbital apex.



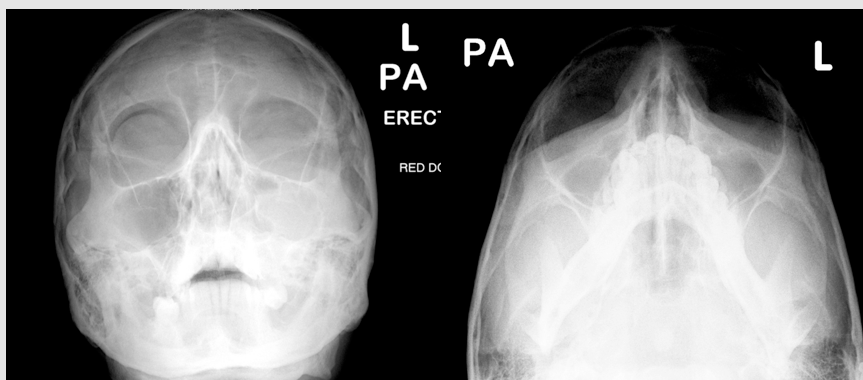
Eyes



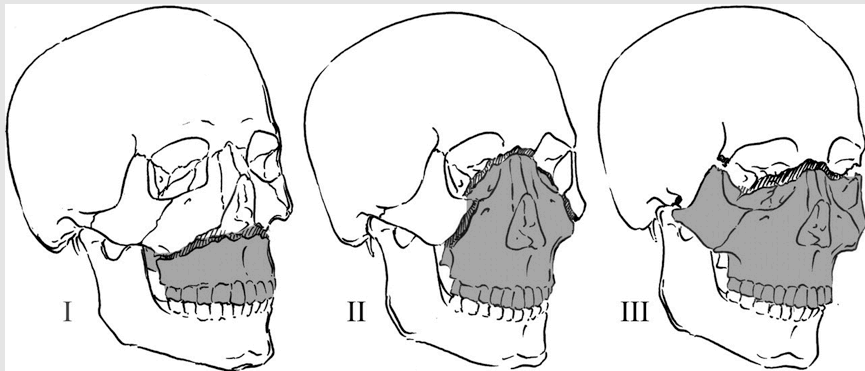
Zygoma / Maxilla Fracture



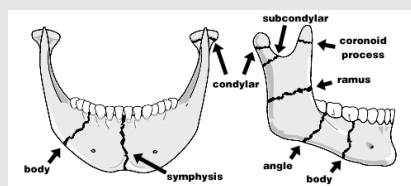
Imaging



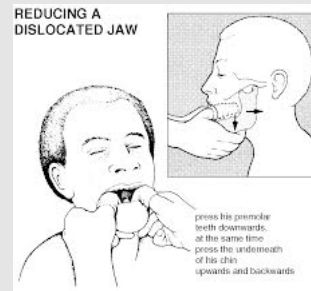
Le Fort



Mandibular Fracture



TMJ Dislocation



Dental Fracture / Avulsion



Maxillofacial Trauma

CSAP1d Major trauma - Maxillofacial

The trainee will be able to evaluate the patient who presents with major trauma and to identify and treat the life-threatening presentations, to produce a valid differential diagnosis, appropriate investigation and implement a management plan. The trainee builds on previous training with more detailed knowledge, skills and behaviours

Maxillofacial trauma - to identify those patients and characterise their injuries, including eye trauma

Knowledge	Assessment Methods	GMP Domains
Know the anatomy of the facial structures	E, Mi, C, ACAT	1
Know when underlying structures may be at risk from facial lacerations specifically parotid duct, facial nerve and lacrimal duct	E, Mi, C, ACAT	1
Be able to identify and initially manage nasal, LeFort, mandibular, orbital and zygomatic fractures and TMJ dislocation. Be able to identify and initially manage dental fractures, tooth avulsion	E, Mi, C, ACAT	1
Be able to recognise hyphaema, lens dislocation, orbital floor fractures, penetrating injuries of the eye and eyelid lacerations	E, Mi, C, ACAT	1
Skills		
Be able to systematically assess the facial structures and recognise when the airway is threatened	Mi, C, D	1
Be able to initiate management of torrential nasopharyngeal bleeding by the use of Foley catheters and reduction of mid-face fractures	Mi, C, D	1
Behaviour		
Know when to refer to maxillofacial specialists in a timely fashion	Mi, C	2



SPINAL INJURIES







When to Consider Spinal Injury

- Any injury above the clavicles
- Falls
- RTCs
- Explosions
- Pre-hospital concern

Mechanism

Mechanisms of Spinal Injury

- Hyperextension
- Hyperflexion
- Compression
- Rotation
- Lateral Stress
- Distraction

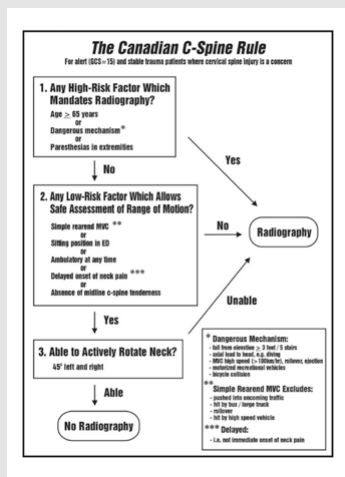
DESCRIPTION	DIAGRAM	EXAMPLES
Hyperextension Excessive posterior movement of head or neck		Face into windshield in MVC Elderly person falling to the floor Football tackle Dive into shallow water
Hyperflexion Excessive anterior movement of head onto chest		Rider thrown off of horse or motorcycle Dive into shallow water
Compression Weight of head or pelvis driven into stationary neck or torso		Dive into shallow water Fall of greater than 10 to 20 feet onto head or legs
Rotation Excessive rotation of the torso, head and neck, moving one side of the spinal column against the other		Rollover MVC Motorcycle accident
Lateral Stress Direct lateral force on spinal column, typically shearing one level of cord from another		"T-bone" MVC Fall
Distraction Excessive stretching of column and cord		Hanging Child inappropriately wearing shoulder belt around neck Snowmobile or motorcycle under rope or wire

Assessment

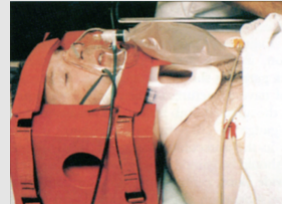
- Assess for Neurological deficit
- Palpate for:
 - Step
 - Crepitus
 - Tenderness
- Log-roll and examine whole spine
- Check perianal tone & sensation



Assessment



Immobilisation



Assessment

ASIA INTERNATIONAL STANDARDS FOR NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY (ISNCOS) (ISNCSCI)

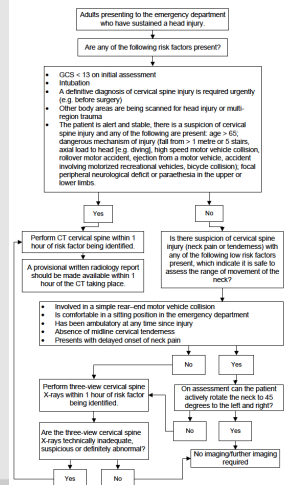
Patient Name: _____ Date/Time of Exam: _____
 Examiner Name: _____ Signature: _____

RIGHT		SENSORY		SENSORY		LEFT	
MOTOR KEY MUSCLES		KEY SENSORY POINTS		KEY SENSORY POINTS		MOTOR KEY MUSCLES	
		Light Touch (L2T) Pin-Prick (PP)		Light Touch (L2T) Pin-Prick (PP)			
C2		C2		C2		C2	
C3		C3		C3		C3	
C4		C4		C4		C4	
UER (Upper Extremity Right) Elbow flexors C5 Wrist extensors C6 Elbow extensors C7 Finger flexors C8 Finger abductors (little finger) T1						UEL (Upper Extremity Left) Elbow flexors C5 Wrist extensors C6 Elbow extensors C7 Finger flexors C8 Finger abductors (little finger) T1	
LER (Lower Extremity Right) Hip flexors L2 Knee extensors L3 Ankle dorsiflexors L4 Long toe extensors L5 Ankle plantar flexors S1						LEL (Lower Extremity Left) Hip flexors L2 Knee extensors L3 Ankle dorsiflexors L4 Long toe extensors L5 Ankle plantar flexors S1	
(VA) Voluntary Anal Contraction (N/A)						(DAP) Deep Anal Pressure (N/A)	
RIGHT TOTALS (MAXIMUM) (50) (50) (50)						LEFT TOTALS (MAXIMUM) (50) (50) (50)	
MOTOR SUBSCORES UER <input type="checkbox"/> + HEL <input type="checkbox"/> = UEMS TOTAL (20) LER <input type="checkbox"/> + LEL <input type="checkbox"/> = LEMS TOTAL (20)				SENSORY SUBSCORES LTR <input type="checkbox"/> + LTL <input type="checkbox"/> = LT TOTAL (112) PPR <input type="checkbox"/> + PPL <input type="checkbox"/> = PP TOTAL (112)			
NEUROLOGICAL LEVELS 1. SENSORY LEVEL (SL) <input type="checkbox"/> 2. MOTOR LEVEL (ML) <input type="checkbox"/> 3. NEUROLOGICAL LEVEL OF INJURY (NLI) <input type="checkbox"/> 4. COMPLETE OR INCOMPLETE ZONE OF PARTIAL PRESERVATION (CIP) <input type="checkbox"/> 5. ASIA IMPAIRMENT SCALE (AIS) <input type="checkbox"/>							

This form may be copied freely but should not be altered without permission from the American Spinal Injury Association. MAY 1993

Imaging

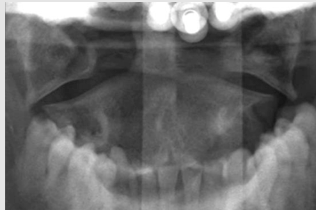
Algorithm 3: Selection of adults for imaging of the cervical spine



X-ray



Jefferson Fracture



- Burst Fracture of C1
- Axial loading

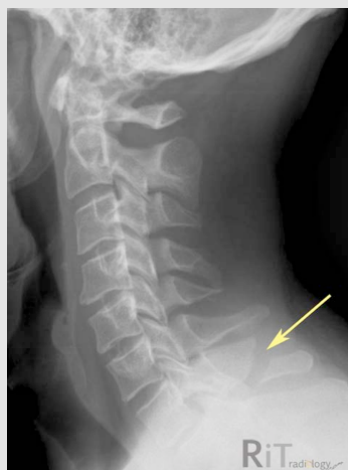


Hangmans Fracture



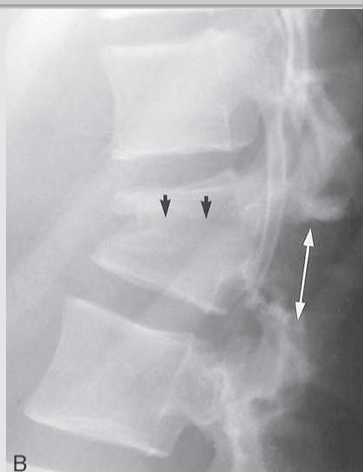
- # Posterior elements C2
- Extensor injury

Clayshoveler's Fracture



- Avulsion of the posterior spinous process
- Hyperflexion with sudden exertion at muscle attachment

Chance Fracture

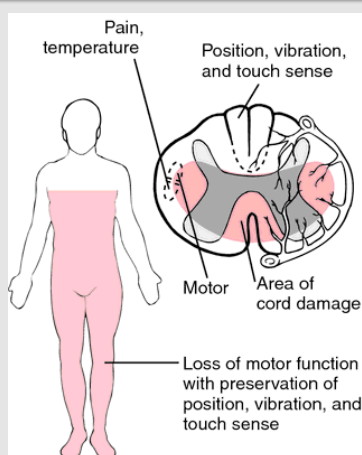


- Flexion / Distraction
- RTC
- Unstable
- N.B> Other injuries

SCIWORA

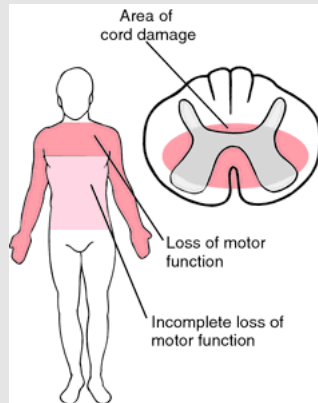
- Spinal cord
 - Injury
 - WithOut
 - Radiographic
 - Abnormality
- Up to 66% of severe cervical injuries in <8yo

Anterior Cord Syndrome



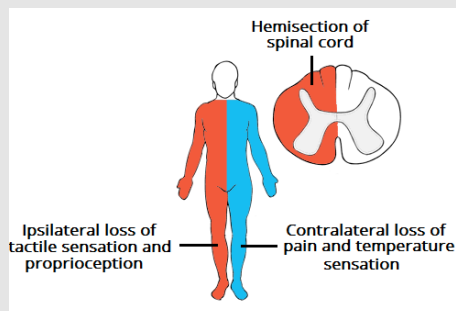
- Motor / Pain / Temp. lost
- Vibration / Proprioception / deep pressure preserved
- Usually due to infarction
- Poor prognosis

Central Cord Syndrome



- Motor loss greater in arms than legs
- Varying sensory loss
- Hyperextension injury

Brown Sequard



- Hemisection of the cord
- Ipsilateral motor and position loss
- Contralateral pain and temp. lost (1-2 levels below)

Spinal Injury

C3AP1c Major trauma - Spine

The trainee will be able to evaluate the patient who presents with major trauma and to identify and treat the life-threatening presentations, to produce a valid differential diagnosis, appropriate investigation and implement a management plan. The trainee builds on previous training with more detailed knowledge, skills and behaviour

Spinal injury - recognise those patients who have suffered a spinal cord, peripheral nerve or plexus injury by appropriate history examination and investigation

Knowledge	Assessment Methods	GMP Domains
Know the patho-physiology of the different mechanisms of spinal trauma	E, Mi, C, ACAT	1
Know how to interpret imaging for the whole length of the spine, including plain films, CT and MRI	E, Mi, C, ACAT	1
Know how to care for the spinal-injured patient	E, Mi, C, ACAT	1
Skills		
Be able to examine a patient with possible spinal injury	Mi, C, D, L	1
Be able to immobilise a patient with spinal injury	Mi, C, D, L	1
Be able to log roll and transfer a patient	Mi, C, D, L	1
Behaviour		
Communicate effectively with the neurosurgical or orthopaedic team in a timely fashion	Mi, C	1,2

Summary

- Don't discharge if GCS < 15
- Check for signs (N.B> Visual acuity)
- If in doubt **ASK** (and document advice)

References

- NICE
- LITFL
- Canadian c-spine rules
- ATLS
- Radiopedia
- Trauma.org
- RCEM learning
- ASIA