Head Injury

John is a 25yo male patient brought in by ambulance.

An hour ago he fell off his motorbike which he was riding in a paddock.

His head collided with the fence in the property. He sustained LOC and he has not regained consciousness.

There is significant damage to his helmet.

C-collar is in situ.

He has not received any other pre-hospital treatment.

The obs from AV are: HR 90 BP 180/90 GCS 7 ( 4 motor , 1 eye, 2 verbal), O2sats 94% RA . Faint moaning sounds.

**Primary survey**

* Airway patent, trachea midline
* Breathing is shallow but symmetric, pulse ox shows 94% saturation
* Circulation with good pulses radially bilaterally, establish access
* Disability flexion / withdrawal motor 4, eyes 1. Verbal 2
* Exposure

**Secondary Survey**

* Laceration to right temporal scalp with hematoma, minimal bleeding, pupils equal with sluggish light reactivity, face and orbits without deformity,dentition intact, TM without hemotympanum
* NECK - No obvious deformity
* CHEST - equal breath sounds with bagged, vented respirations, no crepitus or deformity
* CARDIAC - RRR without murmurs, rubs, or gallops, strong peripheral pulses ABDOMEN - soft, nontender, nondistended, diminished bowel sounds, no contusions
* PELVIS - stable with AP and lateral compression
* SPINE - No obvious thoracic or lumbar step off or contusion
* RECTAL - good tone (after succinylcholine wore off), prostate ok, no blood
* EXTREMITIES - slight deformity and contusion right ankle, no open wound
* NEURO - Flexion/withdrawal of extremities, GCS still 6 (after succinylcholine metabolized)

**Room Set Up**

Resus Cubicle

1 18G IV cannula insitu

Patient in clothes – C spine collar in situ . bandage with blood over R temporal scalp

Oxygen saturation monitoring

Non invasive

BP monitoring

Intubation and IV trolleys

Intubation equipment available

* endotracheal tube (ETT)
* 20 ml syringe
* Stylet
* Glidoscope . sleeve and introducer
* ETCO2 monitoring
* Lubricant
* McGill’s forceps
* Laryngoscope  - Size 3 & 4 McIntosh blades (light source checked and  functioning)
* Tape to secure ETT
* Drugs available for rapid sequence intubation (RSI) and potential complications/side effects
* Thiopentone 500mg powder for reconstitution
* Suxamethonium 100mg in 2ml
* Ketamine 200mg in 2ml
* Propofol 200mg in 20ml
* Midazolam 5mg in 5ml, 5mg in 1ml, 15mg in 3ml, 50mg in 10ml
* Fentanyl 100 micrograms in 2ml, 500 micrograms in 10ml
* Rocuronium 50mg in 5ml, 100mg in 10ml
* Vecuronium 4mg or 10mg powder for reconstitution

**LEARNING OBJECTIVES:**

**At this time decision should be made for RSI, given persisting GCS < 8. RSI**

* **Prioritising Ix and Rx**
* **Primary Survey**
* **Secondary Survey**
* **Preparation of equipment, tube selection with stylet or glidoscope**
* **Pre-oxygenation with 100% oxygen**
* **Paralysis and induction with appropriate agent**
* **In line immobilisation for intubation**
* **Head Elevation:**
* Probably decreases ICP
* Unclear effect on long-term outcomes
* **Mannitol:**
* Osmotic agent
* Immediately expands plasma􏰈reduces blood  viscosity 􏰈increases CBF and oxygen delivery
* Osmotic properties (15-30 min)osmotic gradient to pull water out of neuron
* Effects last for 90 minutes to 6 hours
* May move across into cerebral interstitial space and worsen cerebral edema and raise ICP
* Use if impending herniation (unilateral dilated pupil/extensor posturing) or progressive neurological deterioration
* Mannitol is effective for control of raised ICP at doses of 0.25 gm/kg to 1 g/kg body weight
* Watch for hypotension
* Unknown duration, bolus vs. continuous
* **Mannitol Adverse Effects:**
* Cardiovascular collapse if volume depleted
* May stimulate bleeding
* Renal failure: if serum osmolarity > 320 mOsm
* Concentrated in brain tissue with prolonged infusion
* **Hyperventilation in TBI**

Theory:

* dec CO2
* constriction of cerebral vasculature
* dec brain volume and ICP
* Though also decreases CBF
* Healthy volunteers: ↑RR to pCO2 = 26mmHg 1
* Cerebral blood flow: 30% reduction
* Cerebral blood volume: 7% reduction
* CBF in first 24 hours after TBI is less than half of normal individuals
* Also increases risk for cerebral ischemia
* Decreases cerebral oxygenation 1
* Increases secondary mediators of brain injury
* Cochrane database: data insufficient to suggest benefit or harm
* Brain Trauma Foundation:

1) Prophylactic hyperventilation is not recommended (Level II)

2) Consider temporary hyperventilation for ↑ICP that is refractory to other measures (Level III)

3) Avoid hyperventilation in first 24 hours (CBF is often critically reduced)

• **Bottom line: Not recommended**



**Team Work**

**a. Communication:**

* How do you deligate tasks effectively i.e. ask specific  person to do specific task
* How do you get their attention : call them by name ,  touch them , get eye contact
* Closing the loop ( leader ask person “A” to give  adrenalineperson “A” gives adrenaline-person “A” states 1mg adrenaline given)

**Roles:**

* + Who is the leader- what made them the leader? Did they  announce it? Verbal and non verbal communication ( how  they stand , what they say , what they are wearing etc)
  + Who is the scribe nurse
  + Who is who- do people introduce themselves and state  their position when they arrive?

**Control Instructions**

Initial obs set up: HR 90 BP 180/90 GCS 7 ( 4 motor , 1 eye, 2 verbal), O2sats 94% RA

After primary survey the candidates should:

Recognise the need for RSI and securing the airway

In line immobilization for intubation

Trauma x-rays : CXR / pelvis / ankle

CTB and CT c –spine

Avoid increase ICP – head up PCO2 30 – hyperventilation no longer recommended

FAST

Neurosurgery / Trauma surgeon notification

POST INTUBATION

HR 80

BP170/80

PO2 100%

POOR Rx

HR37

BP 210/110

RR6

Hemiplegia

Fixed and dilated pupil

