The ABCs of

Assessment of Head Trauma

UNDERSTANDING THE FACTS BEHIND

1. Definition

- Any trauma to the head, with or without injury to the brain.
- Traumatic brain injury (TBI) is evidence of damage to the brain as a result from trauma to the head, represented with a reduced Glasgow Coma Scale or presence of a focal neurological deficit

2. Classification

1. By clinical severity
   a. Minor TBI: GCS 13-15; mortality 0.1%
   b. Moderate TBI: GCS 9-12; mortality 10%
   c. Major TBI: GCS <9; mortality 40%
2. By broad aetiology
   a. Blunt TBI: occurs when external mechanical force leads to rapid acceleration or deceleration with brain impact
   b. Penetrating TBI: occurs when object pierces the skull and breaches dura mater, usually seen in gunshot and stab wounds
   c. Blast TBI: combination of contact and inertial forces, overpressure an acoustic waves (bombing, warfare etc)
3. By involvement
   a. Diffuse brain injury
      i. Includes diffuse axonal injury (DAI), hypoxic brain injury, diffuse cerebral oedema, diffuse vascular injury
   b. Focal brain injury
      i. Includes specific lesions like contusions, intracranial haematomas, infarctions, axonal tears, cranial nerve evolutions and skull fractures

3. Glascow Coma Scale

TABLE 38-2
Glasgow Coma Scale

BEHAVIOR	RESPONSE	SCORE
Eye opening response	Spontaneously	4
	To speech	3
	To pain	2
	No response	1
Best verbal response	Oriented to time, place, and person	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	No response	1
Best motor response	Obeys commands	6
	Moves to localized pain	5
	Flexion withdrawal from pain	4
	Abnormal flexion (decorticate)	3
	Abnormal extension (decerebrate)	2
	No response	1
Total score:	*Best response*	15
	Comatose client	8 or less
	Totally unresponsive	3

4. Red flag signs

- Impaired consciousness level
- Dilated pupils which do not respond to light (“fixed and dilated”)
- Signs of basal skull fracture
- Focal neurological deficit or visual disturbances
- Seizures or amnesia
- Significant headache or nausea and vomiting

5. Initial Assessment

1. Cervical spine
   a. Cervical spine may be injured particularly in high energy trauma
   b. Consider whether the cervical spine requires immobilisation via a semi-rigid collar, blocks, and tape
   c. Decision to immobilise is usually made at the start of the initial assessment as it will affect subsequent airway manoeuvres and moving of the patient
2. Airway
   a. Any patient with GCS of 8 or less is at risk of being unable to maintain own airway
3. Breathing
   a. Ensure adequate ventilation and oxygenation as after initial insult to the brain, secondary insult, most commonly brain ischemia secondary to tissue hypoxia may occur
4. Circulation
   a. Ensure adequate tissue perfusion to prevent further secondary ischaemic damage
   b. Good circulating volume is maintained with fluid resuscitation
5. Disability & neurological examination
   a. Record accurate GCS on admission, repeated every 30-60 minutes
   b. Assessment of pupils: size, symmetry and response to light
6. Exposure
   a. Examine for lacerations, evidence of facial fractures, depressed skull fractures, or basal skull fractures [battle’s sign, periorbital ecchymosis, CSF rhinorrhea or otorrhoea]

6. Imaging

- CT scan usually made after ABCDE assessment, follows set criteria
- NICE guidelines for CT scan patient selection:
  - GCS <13 on first assessment or GCS <15 at 2 hours after injury
  - Signs of basal skull fracture, or open or depressed skull fracture
  - Seizure or >1 episode of vomiting
  - Focal neurological deficit (e.g. focal weakness or paraesthesia)
- CT scan should be performed within 8 hours if patients are on any anticoagulants, suffered loss of consciousness or memory loss with the following signs:
  - Aged >65 years
  - Previous bleeding disorder
  - ‘Dangerous’ mechanism of injury, e.g. cyclist vs. vehicle or fall from height >1m
  - More than 30 minutes of retrograde amnesia of events before the head injury

7. History

(if patient is conscious, adequately resuscitated and does not require immediate imaging or intervention)

- Mechanism of injury and detailed description of nature and type
- Any loss of consciousness, amnesia
- Seizure, confusion, deterioration in mental status
- Vomiting or headache
- Drug or alcohol use
- Past medical history of any CNS surgery, past head trauma, seizures, bleeding disorders, comorbidities etc
- Current medications (anticoagulants!)

8. Referral to Neurosurgery

- Current guidelines for referral:
  - Significant abnormality on imaging
  - GCS 8 or less after resuscitation, or drop in GCS after admission (especially in motor component)
  - Unexplained confusion >4 hours
  - Focal neurological signs or seizures without full recovery
  - Suspected penetrating injury or evidence of cerebrospinal fluid leak

CREDITS
Content- Joanne Thong Yuen Heng; *Design* - Chia Yen Lek (SIGMUM 2021/2022)