Queensland Trauma Education

TRAUMATIC BRAIN INJURY

Assessment of closed head injury

Case discussion

Facilitator resource kit

Clinical Excellence Queensland
JAMIESON TRAUMA INSTITUTE
CSDS Clinical Skills Development Service
Queensland Government

Queensland Trauma Education

The resources developed for Queensland Trauma Education are designed for use in any Queensland Health facility that cares for patients who have been injured as a result of trauma. Each resource can be modified by the facilitator and scaled to the learners needs as well as the environment in which the education is being delivered, from tertiary to rural and remote facilities.

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Queensland Trauma Education
Traumatic Brain Injury – Assessment of closed head injury: Case discussion – Facilitator resource kit
Version 2.0

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About this training resource kit

This package is designed to highlight the challenges in traumatic brain injury assessment and familiarise the learner with indications and interpretation of advanced imaging.

National Safety and Quality Health Service (NSQHS) Standards

Target audience

Junior medical officers and nursing staff.

Duration

30-45 minutes.

Group size

Suited to small group participation.

Learning objectives

By the end of this session the participant will be able to:

- Assessment - history and examination in suspected traumatic brain injury.
- Investigation - imaging interpretation.
- Management - severe traumatic brain injury.
- Procedural skill - GCS and demonstration of localising signs

Facilitation guide

1. Present case discussion to participants via PowerPoint and use question and answer guide to support discussion.
2. Distribute supporting documents to participants to refer to throughout the discussion.
3. Guide the participants through the presentation to achieve learning outcomes.

Supporting resources (in Printable Resources)

1. Facilitator slide deck (PPTX)
2. Closed head injury (Adult) Clinical pathway.
3. Statewide Neurological Assessment (Adult).
4. Adult Trauma Clinical Practice Guidelines Initial Management of Closed Head Injury in Adults 2nd Ed.
5. Advantages and disadvantages of the GCS.
6. Glasgow Coma Scale vs Score.
7. GCS assessment - 2 x infographics.
8. GCS assessment.
9. Clinical and radiological features of closed head injury - infographic poster.

Case discussion

Case study

A 23 year old man is brought into your emergency department by ambulance following an alleged assault where he was struck multiple times across the head with a bat.

- No loss of consciousness.
- R) parietal haematoma, non-boggy.
- Complaining of mild headache and nausea.
- GCS with QAS 14/15 (E4, V4, M6).
- Fentanyl 25microg IV given pre-hospital.

Question and answer guide

1. What important history will help risk stratify this presentation?

Mechanism of injury

- Discuss importance of MOI:
  - patterns of injury
  - dangerous mechanisms of injury

- Discuss the MOI for this patient:
  - low velocity
  - blunt force
  - multiple blows

Timing of injury

- Why is the time of the injury important?
  - Early assessment and intervention reduces patient morbidity and mortality.[1]
  - Prevention of secondary brain injury through neuroprotective management strategies.[3]

Modifying features (specific history including medications)

- Why is a previous TBI relevant and how does this impact on subsequent traumatic brain injury?
  - Patients with recurrent TBI are known to have poorer outcomes even when a repeated injury is mild. Acutely, individuals with recurrent TBI have greater disability for a longer duration when compared to individuals with a single TBI.[4]

- What are the key management strategies when a patient sustains a head injury and is taking anticoagulants?
  - Known coagulopathy is both a strong indication for early CT scan and to check the INR. Early reversal of anticoagulation if abnormal CT scan and consider reversal if initially normal CT scan with high INR (>4) depending on clinical situation.[3]

You commence your primary assessment, and your findings are:

- Airway - maintaining own.
- Breathing - nil respiratory distress, respiratory rate is 20 and saturations 98% on room air.
- Circulation - tachycardic 100bpm, well perfused with a BP 130/80.

2. Outline your disability assessment

- Structured Neurological assessment.
- Assess GCS
- Assess motor score
- Assess pupillary response.

Disability findings

Glasgow Coma Scale

- Eyes opening response: Spontaneously – score 4.
- Best verbal response: He is confused and disorientated – score 4.
- Best motor response: Obeys commands – score 6.
- Total score: 14 out of 15.

Limb movement

- Moving all limbs to command.
- Normal power.

Pupillary response

- Pupil scale (mm): 4mm bilaterally.
- Pupil reaction to light: bilateral reaction equal to light.

3. At this stage, how would you categorise this patients head injury?

GCS 14/15 – mild head injury

4. What are the advantages and disadvantages of utilising the Glasgow Coma Scale?

Distribute supporting document titled “Advantages and disadvantages of the Glasgow Coma Scale” and discuss.

5. What factors contribute to the Glasgow Coma Scale?

E, V, M

a. **Of these, which is most predictive for traumatic brain injury?**
M — motor reponse[1]

You re-assess your patient, and your findings are:

- Airway – maintaining own.
- Breathing – nil respiratory distress, respiratory rate is 16 and saturations 98% on room air.
- Circulation – tachycardic 110 bpm, BP 160/90.
- Disability – GCS E2, V2, M5- seen to move L side but not R.
- Pupils – R 2mm reactive to light, L 5mm non-reactive to light.

6. What are your immediate treatment priorities at this stage?

GCS 9/15. Significant reduction in GCS > 2 points. Airway protection is limited. Early intervention is required to secure the airway to reduce airway aspiration and promote effective ventilation/oxygenation in line with neuroprotective management.

7. What are localising signs?

Impairment of brain function affecting specific regions of the body e.g. unequal pupils, lateralising motor weakness, retrograde amnesia.

a. **How do they help identify the location of brain injury?**
   Localising signs reflect the lobe/s where the primary injury has occurred.
b. **What impact does this have on management of this patient?**
   This patient is now demonstrating signs of having a severe traumatic brain injury. Management priorities include: early interventions, neuroprotective management and further investigations.

Discuss neuroprotective management, referring to PowerPoint slides.

Your patient is now intubated and ventilated.

8. What features on clinical assessment necessitate imaging studies?

Refer to Closed Head Injury (Adults) Clinical Pathway to discuss decision making for imaging. https://www.health.qld.gov.au/__data/assets/pdf_file/0017/432314/head-injury.pdf

9. Does a history of anti-coagulant or antiplatelet use alter your clinical concern?

Refer to Closed Head Injury (Adults) Clinical Pathway to discuss risk associated with anticoagulant use and decision making.
https://www.health.qld.gov.au/__data/assets/pdf_file/0017/432314/head-injury.pdf

A CT head scan is performed.

10. Explain what you are seeing in these images.

Level of experience: beginner/junior/novice.

- ☐ Identify bleed on scan.
- ☐ Relate to clinical signs and symptoms.
- ☐ Identify emergency presentation- discuss management options for location.

Level of experience: experienced.

- ☐ Identify pathological differences between EDH and SDH, clinical presentation and management priorities.
- ☐ Discuss the imaging variations that indicate the timing of intracerebral haemorrhage (sworl sign, density of blood).

After CT you re-assess your patient, and your findings are:

- Airway – intubated and ventilated.
- Breathing – SIMV, FiO2 1.0, Rate 18, VT 500ml, SpO2 98%.
- Circulation – bradycardic 60 bpm, BP 180/90.
- Disability – GCS E1, VT, M1.

Refer to GCS

11. What is the significance of the above assessment findings relating to TBI?

- Signs of rising intracranial pressure (ICP) include: bradycardia, hypertension and respiratory suppression.
- Cushings triad is a peri-mortum sign and can lead to cerebral herniation if not immediately treated.

12. What is the difference between Cushings triad and Cushings reflex?

- Cushings triad refers to the 3 clinical signs associated with rising ICP: bradycardia, hypertension and respiratory suppression.
- Cushings reflex is a physiological nervous system response to raised ICP resulting in clinical signs of Cushings triad.

Acronyms and abbreviations

Term	Definition
GCS	Glasgow coma scale
QAS	Queensland ambulance service
MOI	Mechanism of injury
TBI	Traumatic brain injury
CT	Computed tomography
INR	International normalised ratio
EDH	Extradural haemorrhage
SDH	Subdural haemorrhage

References

1. Rosenfeld, J.V., Maas, A.I., Bragge, P., Marganti-Kossman, C., Manley, G.T. and Gruen, R.L. (2012), Early management of severe traumatic brain injury. The Lancet, 380(9847), 1088-1098. https://doi.org/10.1016/S0140-6736(12)60864-2

2. McNett M. (2007). A review of the predictive ability of Glasgow Coma Scale scores in head-injured patients. The Journal of Neuroscience Nursing : Journal of the American Association of Neuroscience Nurses, 39(2), 68–75. https://doi.org/10.1097/01376517-200704000-00002

3. ADULT TRAUMA CLINICAL PRACTICE GUIDELINES Initial Management of Closed Head Injury in Adults 2nd Edition https://www.aci.health.nsw.gov.au/__data/assets/pdf_file/0003/195150/Closed_Head_Injury_CPG_2nd_Ed_Full_document.pdf

4. Lasry, O., Liu, E. Y., Powell, G. A., Ruel-Laliberté, J., Marcoux, J., & Buckeridge, D. L. (2017). Epidemiology of recurrent traumatic brain injury in the general population: A systematic review. Neurology, 89(21), 2198–2209. https://doi.org/10.1212/WNL.0000000000004671

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