

# INCREASED INTRACRANIAL PRESSURE

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PGY1

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# Question 1

- An 8 year old female was brought to the ER 20 minutes after an MVC. She was an unrestrained passenger in the front seat. On impact with another car she was thrown through the windshield window. At the scene of the accident her GCS is 10.
- On arrival to the ER her GCS is 7. Her pupils are small and poorly reactive. She is flexed at the elbow with clenched fist and legs outstretched.

# Question 1

- Which of these is NOT an accepted option in management of this patient?
  - a) Administration of opioid or benzodiazepine
  - b) Administration of 3% NaCl or Mannitol
  - c) Administration of corticosteroid
  - d) Hyperventilation
  - e) Decompressive Craniectomy

# Answer 1

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# Rationale 1

- The skull and dura is a relatively fixed space containing brain, blood, and CSF
- Increase in 1 of these compartment must result in a decrease in the others – Monroe-Kellie Doctrine
- The aim of therapy in raised ICP are to
  - Decrease cerebral volume
  - Decrease cerebral metabolism
  - Control CSF volume
  - Maintain CPP (MAP – ICP)

# Rationale 1

- 1<sup>st</sup> tier therapy
  - Elevation of the head of the bed to 30 degrees
  - Sedation and analgesia with opioid and benzodiazepine
  - Hyperosmolar solution administration
  - Hyperventilation
- 2<sup>nd</sup> tier therapy
  - Barbiturate coma
  - CSF Drainage
  - Hypothermia
  - Decompressive Craniectomy

# Rationale 1

- Steroid may play a role in reducing vasogenic edema and other inflammatory processes (such as tumors and abscesses).
- They are not useful in the management of elevated ICP from infarction, hemorrhage or head trauma.

## Question 2

- A 1 month old boy is brought to the ER by his mother with a 2 day history of fever, poor feeding, vomiting and irritability. On examination the infant is found to be lethargic, with bulging anterior fontanelle, and his eyes appears as shown in photo below.
- His vitals are as follows:
- T 40.2, R 18, HR 52, BP 147/98



## Question 2

- The infant's head is elevated to 30 degrees, she is given muscle relaxant and intubated for controlled ventilation. Labs are drawn including CBC, Blood culture, urinalysis and urine culture. She then receives start doses of Acetaminophen, Ampicillin, Gentamicin and Phenytoin.
- IV Mannitol is also started and the infant wrapped in a cooling blanket.

## Question 2

- The medical student on the team ask why a lumbar puncture was not done. You explain
  - a) Lumbar puncture is unlikely to identify a causative organism
  - b) It is unlikely that this patient symptoms are due to meningitis
  - c) Lumbar puncture should be deferred until after CT scan when raised ICP is being consider
  - d) Lumbar puncture will cause hypotension in this patient

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## Rationale 2

- Lumbar puncture may only be performed in cases of increased ICP if
  - the basal cisterns are open,
  - there is no evidence of midline shift or a significant mass lesion on neuroimaging.
- CSF drainage may be both diagnostic and therapeutic
- Guides antimicrobial therapy in meningitis and
- Provides an immediate but transient decrease in ICP due to reduction in the CSF

# Midline shift



# References

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- Little RD, Increased intracranial Pressure. *Clinic Ped Emerg Med* 9:83 – 87
- Marcoux KK, Management of increased intracranial pressure in critically ill child with an acute neurological injury. *AACN Clin Issues* 2005;16:212 – 31
- Warren KB, Elevated intracranial pressure in children. *UptoDate*