Calderdale and Huddersfield NHS Foundation Trust

ED Case of the week 3

Learning points

- Paediatric seizure management
- Management of cerebral oedema

The Case:

- 9 year old boy with a PMH of autism and being non verbal. Functionally good - went to school. Only regular medication was melatonin.
- Pre alert due to collapse at 12:20 at school. He had been well that morning.
- YAS arrived at 13:20 and found him 'unconscious' but then when assessed he was 'combative' suggestive of a fluctuating GCS.
- On arrival to ED resus at 13:40 he had persistent bilateral nystagmus and increased tone bilaterally in keeping with seizure activity. Unclear how long he had been seizing but potentially for over 1 hour.

Initial priorities:

- **A - E assessment**
- **Stop the seizure!**
- **Then think about causes…**

- A - Maintaining
- B - Own respiration but shallow breaths, sats 98% on 15L O2
- C - HR 120-130, CRT <2s, perfusing peripherally, BP 140/80 (High)
- D - Pupils size 2-3mm, non reactive bilaterally. Persistent nystagmus. Increased tone to all limbs consistent with ongoing seizure activity
- Glucose 6 - Don't forget it!!
- E - Apyrexial, no signs of injury

Back to our case:

- We gave buccal midazolam, obtained IV access
- Addressed reversible causes e.g. glucose
- Blood gas showed a pH 7.08 and pCO2 of 13. Lactate 0.8
- Suggesting he was not ventilating well… and it was only going to get worse with benzos
- Therefore second benzo skipped, keppra given and anaesthetist called! (Always plan ahead)

Status Epilepticus Guideline

In a nutshell:

1) Benzo → 5 minutes → benzo
   - Remember you can administer buccal midazolam if no IV access
   - And remember IO access is an option
2) Keppra
3) Phenytoin / phenobarbitone
4) OR - if the team is ready at step 3 then RSI and intubate

- At every step prepare for the next step
- So from the pre alert have buccal midazolam available
- Once given have lorazepam drawn up and ready to go
- Then call an anaesthetist, prepare for RSI and have phenytoin available for if they aren't there quickly!

Resuscitation Council UK

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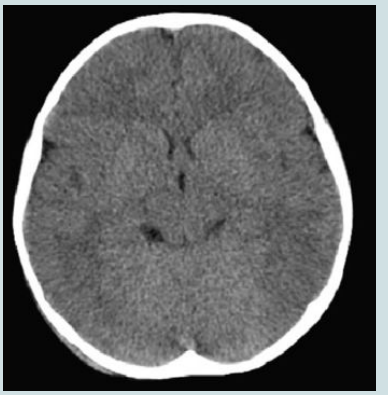
Back to our case:

- Anaesthetics and Paediatrics arrived to help (Thank you)
- My opinion was to intubate the child immediately but the anaesthetist was reluctant to initially, so they escorted round to CT with an OPA
- CT was reported as '**diffuse cerebral oedema'**
- Subsequent gas was worse so a plan was made for intubation
- Proceeded uneventfully
- EMBRACE transfer arranged to PICU

Cerebral oedema (Brain swelling)



- A sign of a problem, not a diagnosis. So what caused it?
- Potential causes:
  - Bleeds / trauma / stroke
  - Tumour
  - Hyponatraemia
  - Infection - cover with abx and aciclovir
  - Hepatic encephalopathy
- He didn't seem to have any of those… and currently remains a mystery.
- But similar to not fixating on the cause of seizures, in the acute stage treat the oedema and then go hunting for causes later.

So how do we treat it?

Neuroprotective measures:

- Head up 30 degrees with head in the midline
- Intubate and ventilate to CO2 4.5 - 6 (not 13 as his was!!)
- Maintain normal sodium, normal glucose
- Cautious fluid management (often restricted by ⅓ to ½ of maintenance requirements)
- Maintain normal BP
- Specific treatments:
  - Hypertonic saline 2.7% 3-5mls / Kg
  - Mannitol 20% 0.5-1g / Kg
  - Dexamethasone
  - Catheterise to maintain accurate fluid balance following this
- Transfer to PICU (when / wherever there is a bed available!) - Co-ordinated via EMBRACE

Human factors:

- We must remember that part of our job in ED is to ensure that all team members can perform at the best of their ability, for the patient to have the best outcome.
- Specialties can feel uncomfortable in the unfamiliar environment of the ED
- This can be heightened with critically unwell patients, particularly children due to the emotional stress
- There was an initial reluctance to intubate the child despite the feeling that it was required - probably due to underconfidence. We are all human and can put off doing things that make us uncomfortable, even if we know we need to do it, hoping things will 'magically' get better.
- As a team member in ED part of our role is asking - do you need help? Ensuring the right people are present, all on the same page (Shared Mental Model - obstetrics video but the principles are the same), and have the same idea of what needs to happen next.