

Case Report 5

Persistent Vegetative State secondary to a motor vehicle accident

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Case Summary:

The case presents a young girl who was involved in a road traffic accident. Despite being alive at present, her body cannot perform any basic functions since she is in a persistent vegetative state. Numerous examinations and investigations showed several lesions in the head, neck and thorax, the most striking of which being an avulsion injury at the junction of the spinal cord with the medulla.

Aim:

The purpose of this writing is to shed light on a rare condition brought about by one of the most common mechanisms of injury. Considering the extent of the injury that this girl presented with, her survival rate was low, yet somehow she managed to cheat death. The frequency of such cases taking place in Malta is exceptionally rare, making this episode worth publishing.

Case Presentation:

In 2008, a 15 year old girl was involved in a motor vehicle accident. She was a passenger in the front seat of a car. She did not suffer from any known disease at the time. Following impact, the driver did not experience any major trauma. On the other hand, the ambulance crew found the girl unconscious on the road with absent pulses and with no respiratory movements. Her pupils were fixed and dilated. Cardio-pulmonary resuscitation (CPR) was started in casualty and the patient was intubated. Since then, she had been in a vegetative state in the intensive care unit, relying on daily physiotherapy and dedicated nursing care to keep her systems functioning.

Investigations:

Computed Tomography (CT) scan

An emergency CT scan of the whole body was performed on admission. The following findings were made:

- Small intracranial haemorrhage measuring 1.1cm in diameter lying in the temporal horn of the left lateral ventricle.
- Fracture of the base of the skull located on the left side and passing obliquely through the posterior part of the mastoid process. The cervical spine appeared intact.
- In the chest, there were several lung contusions in the right middle lobe, as well as in the apical and basal segments of the right lower lobe. Contusions were also identified in the left lower lobe. No pneumothorax was seen. The mediastinum and chest wall were intact.
- In the abdomen, there were signs of total gastrointestinal distension (including the stomach).
- On the right side of the pelvis, a small amount of free fluid could be seen, but was not indicative of blood.

Subsequently, another four CT scans were carried out within the following two months.

Magnetic Resonance Imaging (MRI)

Subsequently, a MRI scan was performed, with the following results.

- Evidence of extensive trauma at the junction of the medulla oblongata and the spinal cord at the level of the foramen magnum. There was a soft tissue swelling, 7 millimetres in diameter, immediately behind the odontoid peg in keeping with extra-axial haematoma.
- In addition, there was evidence of haemorrhage around the cranio-cervical junction, within the spinal canal and foramen magnum. The spinal cord at this level was largely destroyed and atrophic in keeping with severe avulsion injury at the junction of the spinal cord and medulla oblongata. There was no obvious fracture but the spinous process of C2 and posterior arch of C1 were separated, again in keeping with soft tissue injury.

Neurological Examination

The patient was noted to have twitching of her eyelids and eyebrows, suggestive of convulsions. The neurologist performed an electroencephalogram (EEG). Initial EEG results confirmed status epilepticus. Close monitoring of EEG was carried out by taking serial EEGs. In addition, she was kept constantly monitored using the bispectral index (BIS) monitor.

It took several weeks to establish antiepileptic treatment to sufficiently control her seizures.

Patient was unresponsive to name calling and did not obey verbal commands. She opened her eyes spontaneously as soon as she was off sedation and muscle relaxants. Cough reflex was present but swallowing reflex was in-existent. Fits were no longer noticed.

No reaction to deep pain stimuli on all four limbs.

Cardiovascular

Vital observations were monitored and recorded hourly when the patient was in intensive therapy unit (ITU). Initial records following the incident showed the following:

Heart rate: sinus tachycardia (94 beats per minute).

Blood pressure: normo- to hypotensive ranging from 100-120mmHg systolic and 50-70mmHg diastolic. Heart sounds: S1 and S2 were normal.

Treatment

Ventilation

Permanent tracheostomy was performed six days after admission. The patient had been fully dependent on ventilator support since then.

Several attempts to wean the patient off the ventilator proved unsuccessful because breathing rate dropped down to 5 to 6 breaths per minute when withholding ventilator support. Attempts were also done to support the patient's breathing using a pressure controlled positive pressure ventilator (Nippy 3®), but yet again she was developing high endotracheal tube carbon dioxide (CO₂) levels and periods of apnoea.

Instead, the patient was ventilated using the synchronized intermittent mandatory ventilation (SIMV) mode, with respiratory rate of 15 breaths/min, tidal volume of 400 liters, pressure support of 20, positive end-expiratory pressure (PEEP) of 2 aided by 30% oxygen via tracheostomy. Pre-oxygenation prior to suctioning the airway and changing of position was recommended.

It was advised to maintain tracheostomy cuff pressure at around 25-30cm of water, and avoid overinflation. Air leak was noted at times, depending on patient's position. Endotracheal CO₂ and oxygen levels were monitored closely and any leaks were compensated for by slightly increasing the tidal volume.

Swabs and foam dressings were placed underneath the tracheostomy flanges in order to slightly protrude the tracheostomy tube. If tracheostomy tube is not secured accordingly, it may result in one lung ventilation.

Medications

In ITU, phenytoin (antiepileptic), sodium valproate (anticonvulsant) and sodium thiopentone (barbiturate general anaesthetic) were given intravenously. Levels of anti-epileptics in blood were taken regularly and the doses adjusted according to the neurologist's advice.

When the patient was about to be transferred to a ward, a percutaneous endoscopic gastrostomy (PEG) tube size FR9 was inserted under local anaesthesia in the ITU and that became the primary route of drug administration. Such drugs included:

Levetiracetam (Keppra®) – to treat epilepsy with partial seizures

Phenytoin

Lactulose – osmotic laxative

Paracetamol – analgesia on a p.r.n. basis

In addition, hypromellose (an ophthalmic lubricant) was included in the regime.

Intake

On admission, the patient was fed via a nasogastric tube size 12. This was subsequently changed to PEG tube feeding. Instructions on usage and care of the PEG tube were provided by the nutrition team. The patient is taking full strength Nutrison® at 80ml/hr. In addition, 60 millilitres of water are given every 3 hours. Bowel sounds are currently present and absorption is good.

Output

Via tracheostomy: moderate loose yellowish to white secretions.

Via mouth: profuse salivation.

Via urinary catheter: good diuresis. At present, the patient is not catheterised due to a progressive loss of urethral tone which made it impossible to fix a urinary catheter inside the bladder. Instead, adult diapers are used.

The patient opens bowels regularly. Lactulose syrup is taken as required.

Follow-up:

- The patient is nursed on an anti-cubitus air mattress. She has no pressure sores.
- Turning 3 hourly on both sides using pillows in between thighs and knees supported from the back.
- Chest physiotherapy and passive movements of all limbs being three times daily.
- Paddings placed under pressure areas (ear, buttocks, heels).
- Foot splints are applied to prevent footdrop. Despite this, signs of footdrop are present.
- Protective cream applied on pressure areas.
- Mouth and eye care as required.
- Tracheostomy care and mouth toilet as necessary.
- The patient is also followed by a speech therapist.
- Her mother is still in denial. She is being followed regularly by a psychologist.

Learning Points:

- There is an ever growing need for CPR training for lay people because the earlier this is started, the better.
- Since the patient has no perception of pain, clinical examination is very important to exclude conditions which are normally painful. On one occasion the patient developed a perforated peptic ulcer and needed emergency laparotomy. This would have been missed if it was not for routine examination.
- Every aspect of life of a patient in a vegetative state has to be catered for. For example, at a point the girl was becoming overweight due to excess calories administered via PEG. The consultant ordered a reduction in daily calories, in spite of protests by her mother. The patient is now nearer to her ideal weight. So constant monitoring, even of weight, is important.
- Psychological support should also be available to the nursing staff. It is not easy to care for young patients in similar states.
- The reality of the situation might not be understood by relatives. For example, the patient's mother has not yet given up hope that her daughter will eventually survive and walk out of hospital. At times, this also causes some friction between her and the nurses.