Coma and Unconsciousness

Abstract: Basics : Coma (or unconsciousness) is a state in which a patient is totally unaware of both self and external surroundings, and unable to respond meaningfully to external stimuli.
Coma results from gross impairment of both cerebral hemispheres, and/or the ascending reticular activating system.

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Aetiology

Focal brain dysfunction

- brain tumour
- vascular events (CVA)
- demyelination
- infection, such as cerebral abscess
- focal head injury

Diffuse brain dysfunction

- infection, such as meningitis or encephalitis
- epilepsy
- hypoxia and hypercarbia
- drugs, poisoning and overdoses (including alcohol)
- metabolic/endocrine causes, such as diabetic coma, hepatic or renal failure, hypothyroidism, severe electrolyte disturbances
- hypotension, or hypertensive crisis
- diffuse head injury
- subarachnoid haemorrhage
- hypothermia, hyperthermia

Level Of Consciousness

A truly comatose patient is deeply unconscious, with no response to pain. However, it is often found that patients are not completely unconscious, and so can be categorised onto a point on a "coma scale".

1 = fully awake
2 = conscious but drowsy
3 = unconscious but responsive to pain with purposeful movement eg flexion/withdrawal
4 = unconscious but responding to pain by extension
5 = unconscious and unresponsive to pain

Glasgow Coma Score, looks at eye activity, verbal and motor responses, and assigns points for each to give a composite score, 3 being deeply unconscious and 15 being fully conscious:

SCORING

Best motor response

- Movement in response to command 6
- Localizes pain 5
- Withdraws from pain 4
- Flexes in response to pain 3
- Extends in response to pain 2
- No response 1

Best verbal response

- Fully orientated 5
- Confused 4
- Inappropriate words 3
- Incomprehensible sounds 2
- No response 1

Best eye response

- Eyes open spontaneously 4
- Eyes open to command 3
- Eyes open in response to pain 2
- Eyes remain closed 1

These scales and scores are most useful in allowing the assessment of changing levels of consciousness, either improvement or deterioration. A worsening of the GCS in a head injured patient indicates the need for urgent neurosurgical intervention.

COMA, IN HEPATIC FAILURE

- Stage 1: impaired personality or thinking. EEG usually normal
- Stage 2: confusion, abnormal sleep and drowsiness. Asterixis and increased reflexes, with plantar responses up or down. EEG abnormal.
- Stage 3: marked confusion, with inability to perform fine movement. Responds to painful stimuli
- Stage 4: comatose with depressed reflexes

MANAGEMENT OF THE UNCONSCIOUS PATIENT

Basic Life Support – AIRWAY, BREATHING, CIRCULATION.

- Endotracheal tube placement, preferably by an anaesthetist.
- All unconscious patients should be given supplemental oxygen therapy at a high concentration.
- The circulation in the unconscious patient often requires support, and so early good intravenous access is required, with measuring of the pulse and blood pressure and appropriate treatment.
- Once the ABC is sorted out, you can move onto
- D (diagnosis), E (evaluation) and F (further management).

APPROACH TO THE PATIENT

- After securing the vital functions, one should quickly proceed to discover the cause of unconsciousness. The history is very important; do not allow family members or other witnesses to leave before all available information has been obtained.
  - o Was the loss of consciousness sudden? Were there any convulsions, trauma, pre-existing symptoms?
  - o Has the patient suffered from any major disease (epilepsy, diabetes, etc) and did they receive medication?
- Always bear in mind the potentially treatable causes of unconsciousness. Remember the MIDAS rule:
  - o Meningitis
  - o Intoxication
  - o Diabetes
  - o Anoxia
  - o Subdural haematoma.
- There is no time to waste when
  - o A treatable infection is suspected. Treatment of bacterial meningitis must be started immediately after the lumbar puncture without waiting for the laboratory test results, if the cerebrospinal fluid is cloudy or there is otherwise very strong suspicion of bacterial meningitis.
  - o The unconsciousness is deepening and there are progressive signs, eg a dilatating, non-reactive pupil. This can mean an expansion needing quick neurosurgical intervention.
- Treating and examining an unconscious patient usually requires the resources of a regional hospital. If there are inadequate resources, immediately refer the patient further to an appropriate unit, provided it is certain that the patient can withstand the transfer.

- At a health centre or health post, always measure the blood sugar. Other tests may be performed, if their results will be ready before or during the transfer.
- Pulse oximetry is useful in assessing hypoxia.
- When bacterial meningitis is suspected and the transfer time will be long, a lumbar puncture should be taken and the treatment started immediately. The CSF sample can be sent to the hospital with the patient, and it must be preserved at body temperature (eg, in an inside pocket). Part of the CSF sample can be put directly into a blood culture bottle.
- Intravenous infusion should usually be started before the transfer, especially if there are signs of shock.

On Examination

Skin

- Signs of trauma (bruises, scratches): intracranial trauma
- Pallid, sweaty: hypoglycaemia, hypovolaemic shock
- Dry, red: diabetic coma
- Cyanotic: retention of carbon dioxide
- Spider naevi: alcohol intoxication, hepatic coma
- Scarlet: carbon monoxide intoxication

Tongue

- Signs of biting: epilepsy

Smell Of Breath

- Ethanol: alcohol intoxication
- Acetone: diabetic coma
- Urine: uraemia

Body Temperature

- Hypothermia: freezing, severe brain damage or intoxication
- Hyperthermia: infection (meningitis, sepsis), severe brain damage

Heart Rate

- Atrial fibrillation: stroke caused by an embolism
- Bradycardia: atrioventricular block, digitalis intoxication
- Tachycardia: infection, shock, arrhythmia

Blood Pressure

- Hypertension: intracerebral haemorrhage, subarachnoid haemorrhage, anoxia, hypertonic crisis
- Hypotension: shock (bleeding, myocardial infarction), intoxication, severe brain damage, diabetic coma

Respiration

- Superficial, fast: intoxication
- Cheyne - Stokes respiration: severe brain damage

Incontinence

- Faecal: epileptic seizure

CNS examination The eyes do give useful information – pupil size and equality, and direction of gaze.

Investigations

- A full blood count
- simple biochemistry
- blood sugar
- Computerised tomogram of the head, MRI
- Lumbar puncture is often undertaken, and will give information about infection or bleeding (the CSF becomes xanthochromic – yellow).
- The EEG may give useful information, especially if epilepsy is suspected.

Further Management Of The Comatose Patient

This care will often be delivered in a specialist unit, usually an intensive care/therapy unit. Long term management involves consideration of the problems suffered by a patient lying still for very prolonged periods with no protective reflexes. These include

- pressure area care
- care of the mouth, eyes and skin
- physiotherapy to protect muscles and joints
- risks of deep vein thrombosis
- risks of stress ulceration of the stomach
- nutrition and fluid balance
- urinary catheterization
- monitoring of the CVS
- infection control
- maintenance of adequate oxygenation, with the assistance of artificial ventilation

When is Coma not Coma?

Often, if the causes of coma are not treated, or cannot be treated, then it will progress to the point of irreversible brain damage and then brain death.

Brain death is more correctly described as brain stem death. What we look for is the absence of the activity in the brain stem that is required for the survival of the body, most importantly breathing. The tests we do for brain death are looking at the integrity of brain stem reflexes.

Before we can commence the tests we must have a patient with a known irreversible cause of coma, and we must exclude:

- o any drugs which may be causing CNS depression, or paralysis
- o any endocrine or metabolic disturbances causing CNS depression
- o hypothermia (temperature of less than 35 degrees C)

Then, what we look for are:

- absent pupillary response to light
- absent corneal reflex
- absent oculovestibular reflex (nystagmus in response to cold water in the ear)
- absent motor responses to pain
- absent cough and gag reflexes

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