Pietro Mazzoni, MD PhD
July 1998

The Coma Exam

Introduction

"Coma" is used here as shorthand for "decreased alertness". The coma exam is a modification of the standard neurologic exam that can be useful whenever cooperation is reduced. This can occur when consciousness is removed, as in stupor or coma, but can also occur when a person is intoxicated or agitated for other reasons.

The examination of a patient with decreased alertness or cooperation gathers the same categories of information as the regular neurologic exam. Information is obtained concerning mental status, cranial nerves, motor and sensory systems, and reflexes. Coordination and gait are usually left out. The main difference is in the techniques used to gather this information. For example, applying brief pain to a comatose person's hand simultaneously serves as a sensory and motor exam. Withdrawal of the hand implies roughly preserved sensation and strength, while facial grimacing without any limb movement suggests hemiparesis with preserved sensation (the patient feels the pain but cannot move the hand in response to it).

The most important aspect of the coma exam is flexibility: examination techniques are adapted according to what is feasible, in order to obtain information about a person's neurologic status.

Mental Status

Level of alertness

Establish this by approaching patient with progressively more intense stimulation, as needed: Call pt's name, then touch pt, then tickle, then apply sternal rub or pressure in supraorbital notch.
Supraorbital notch pressure causes pain through the highest available brainstem level, and is thus more sensitive than sternal rub and trapezium pinch because immune to brainstem or spinal cord dysfunction. It also does not leave a bruise.

From highest to lowest functional level:

- Alert = alert
- Lethargic = sleepy, arousable to voice or touch, speaks several sentences without needing further stimulation
- Stuporous = sleepy, needs vigorous stimulation (shaking or pain) to be aroused and falls back asleep very soon if stimulation stops
- Comatose = looks just like someone asleep, except pt cannot be aroused enough to communicate or exhibit purposeful behavior

Report MSE as one of the above adjectives followed by a description of the best behavior the pt is capable of. E.g.: stuporous: localizes sternal rub.

Cranial Nerves

Eye movements

From highest to lowest level:

- Makes saccades to verbal command
- Looks to source of sound
- Only spontaneous movements: saccades
- Only spontaneous movements: roving
- Oculocephalics present (i.e. midbrain and brainstem pathways intact)
- Oculocephalics absent (and voluntary movements absent) (i.e. hemisphere and midbrain-brainstem pathways both damaged)

- Cold calorics present (COWS; nystagmus direction refers to fast phase)
- Cold calorics absent

For any of the above levels of function, record the level of function and any focal findings (e.g. impaired R eye abduction)

Pupils
- Shape (round, ovoid, irregular), size (in mm or large, midposition, small), reactivity
- Watch for APD (swinging flash light test)
- If they seem unreactive, try shutting eyes manually, then opening them & immediately shining light on them. Still unreactive? Try a MagLite.

Corneals
- Eye lash stimulation is not a reliable substitute
- Avoid using a gauze pad (risk of corneal abrasion)
- In comatose patient, may use drops from a saline flush (readily available in ICU)

Gag
- If pt is intubated, take care not to dislodge the endotracheal tube.

Respirations
- Compare the set respiratory rate to the actual rate on the ventilator. If they are not equal, it usually means the pt is breathing spontaneously.

Sensory-motor exam
Check tone. Then apply tickle (or, if necessary, apply pain) to each extremity and watch any movement of that extremity, any grimacing, and any obvious change in heart rate or BP (signifying pain and thus preserved pain sensation in that extremity).
Limb responses, from highest to lowest functional level:
- Full withdrawal
- Partial withdrawal
- Aimless movements (Thrashing)
- Flexor posturing (= decorticate, = lesion above the red nucleus; this distinction is not usually clinically useful)
- Extensor posturing (= decerebrate, = lesion below the red nucleus; this distinction is not usually clinically useful)

It can be hard to tell withdrawal from posturing. 3 clues:
- If limb makes the same stereotyped movement when placed in different positions or when location of applied pain is changed, think posturing.
- If you see internal rotation of the soulder, think posturing.
- If you see contraction of the tensor fasciae latae during lower extremity withdrawal, think posturing.

Reflexes
Deep tendon reflexes as in normal exam.
Babinski is only part of the full triple flexion response (= toe up, ankle dorsiflexion, knee flexion, hip flexion). You may see triple flexion with severe brain injury when testing for withdrawal or when testing for Babinski.