Neurologic Assessment and Examination in Patients with Altered Consciousness

Although patients with altered consciousness/coma cannot understand and follow commands, the neurologic examination can still be performed but must be modified. Key information can often be obtained to aid in localization and

If the patient is in coma the lesion must be in 1 of 3 possible locations:

1. Diffuse hemisphere involvement
2. Reticular activating system (pons)
3. Bilateral thalami

Etiology can be either metabolic (usually causing involvement of the hemispheres diffusely), structural, or both. Structural lesions usually cause asymmetry or focal lesions on exam. Metabolic causes are usually “non focal”

History

Determine the temporal course of events-onset, progression, fluctuation, etc.

Medications: Note medications that cause sedation and when they were last given. Document this in your note. If the patient is sedated with IV medications, if at all possible have sedation stopped for the necessary period of time to allow wash out and allow a more accurate exam

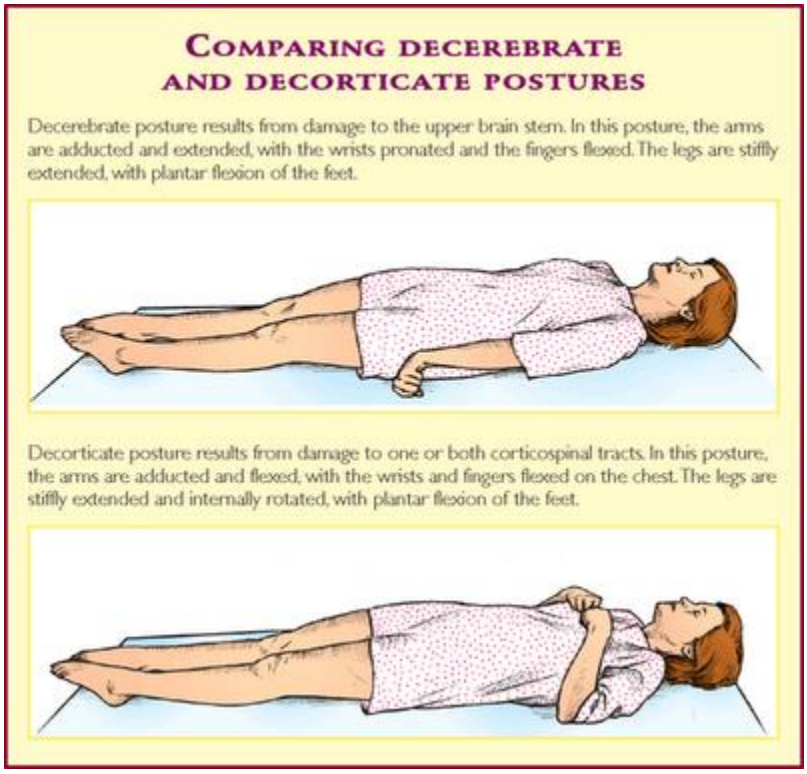
Mental Status

Assess the level of arousal to the following:

1. Response to auditory stimuli (call the patients name in in a loud voice directly in both ears. Note in the chart any history of hearing loss, use of hearing aids, etc.)
2. Response to visual stimuli (assess if the patient can fix on your face and follow it; assess if they respond to visual threat-moving your hand quickly into the lateral visual field in both eyes and observing for any response).
3. Response to noxious stimuli (press very hard with your thumb on the bony superior ridge of the orbital cavity OR squeeze the patient's nipple very hard OR press a pen or your thumb nail hard on at the base of the patient's fingernails).

    Types of response can be:

a. Purposeful withdrawal (which can be hard sometimes to distinguish from reflexive withdrawal such as a triple flexion response)
b. Decorticate posturing consisting of adduction of the upper arms, flexion of the lower arms, wrists and fingers. The lower extremities extend. Suggests a lesion at the midbrain or higher
c. Decerebrate posturing consists of adduction of the upper arms, extension and pronation of the lower arms, along with extension of the lower extremities. Suggests a lesion at midbrain or lower



Cranial Nerve Exam

II: Response to visual threat as above; check pupillary light response

III, IV, VI

1. Observe any spontaneous eye movements
    - As above- will the patient look at your face and track and follow it. This would be the best response
    - Roving conjugate (eyes move together from side to side). Non localizing and the next best response prognostically
    - Midposition and fixed-no spontaneous movements, but eyes conjugate
    - Dysconjugate eye movements

2. If no spontaneous eye movements are seen check for response to a “Dolls Eye Maneuver” which tests the integrity of the oculocephalic reflex
    - An alert patient does not have the Doll's Eyes Reflex because it is suppressed by the intact cortex
    - If a comatose patient does not have a Doll's Eyes Reflex-when the head is laterally moved suddenly to one side, the eyes remain fixed in the head (documented as Dolls Eye Reflex “impaired”), then a lesion may be present in one of 3 locations:
        i. The afferent loop of the reflex which consists of the labyrinth, vestibular nerve, and neck proprioceptors.
        ii. The efferent loop of the reflex which consists of cranial nerves III, IV and VI and the muscles they innervate.
        iii. The pathways that connect the afferent and efferent limbs in the pons and medulla

        Make sure to document if there are any dysconjugate movements.
    - The Dolls Eye Reflex is documented as “intact” if with the sudden movement of the head laterally the eyes remain conjugate and move to the side along with the head, but then slowly move back to mid position.
    - If no response is seen with the Dolls Eye Maneuver, ice water cold caloric testing can be done and provides a stronger stimulus. You must first ensure there are no concerns about increased intracranial pressure and check for the integrity of the tympanic membranes. This tests the vestibulo-ocular reflex
        - Place the patient's upper body and head at 30 degrees off horizontal, and irrigate the external canal with 50-100cc of cold water.
        - If the brainstem is intact, the patient's eyes will tonically deviate towards the side of irrigation
        - This is an excellent maneuver to assess extra-ocular muscles in the comatose patient.
        - If there is no response (eyes do not move) a lesion is present in the pons, medulla, or less commonly the III, IV, IV or VIII nerves
        - Unlike the oculocephalic reflex (Dolls Eyes Maneuver), the oculovestibular reflex is present in awake patients. In alert patients, this reflex not only induces the ipsilateral eye deviation, but due to the intact cortex there is compensatory nystagmus in the opposite direction i.e. the slow phase is towards the injected ear and the fast phase is away

V

Test for the integrity of the corneal reflex

VII

Note any facial asymmetry especially if when checking for a grimace to pain

VIII

Note any response to voice

IX, X

If intubated ask the nurse about any response to suctioning

If not intubated check for gag reflex

XI and XII

Cannot be tested

Motor Exam

Observe and ask the nurse about any spontaneous movements of the arms and legs

Ask the patient to squeeze either hand and then release. Ask the patient to move the toes on each foot individually to command

Assess tone in all four limbs

Check response to noxious stimuli as above

Sensory Exam

Assessed as part of the response to noxious stimuli. Best response would be to “localize” the pain, i.e. withdrawal the appropriate limb, or nonlocalizing such as a grimace only

Reflexes

Done as in an awake patient

Also check for a Babinski response

A common prognostic assessment tool is the Glascow Coma Scale. It is often used to measure the depth of coma. Serial measures are a means to follow a comatose patient clinically.

It has 3 sections: I Best Motor Response, II Best Verbal Response, and III Eye Opening

Glascow Coma Scale:

I. Motor Response
- 6 - Obeys commands fully
- 5 - Localizes to noxious stimuli
- 4 - Withdraws from noxious stimuli
- 3 - Abnormal flexion, i.e. decorticate posturing
- 2 - Extensor response, i.e. decerebrate posturing
- 1 - No response

II. Verbal Response
- 5 - Alert and Oriented
- 4 - Confused, yet coherent, speech
- 3 - Inappropriate words, and jarbled phrases consisting of words
- 2 - Incomprehensible sounds
- 1 - No sounds

III. Eye Opening
- 4 - Spontaneous eye opening
- 3 - Eyes open to speech
- 2 - Eyes open to pain
- 1 - No eye opening

Glascow Coma Scale = I + II + III.
A lower score indicates a deeper coma and a poorer prognosis.

Patients with a Glascow Coma Scale of 3-8 are considered comatose