

OBJECTIVES:

1. Understand the definition of coma, and the terms used to describe the continuum of level of consciousness.
2. Understand the pathophysiological mechanisms underlying coma, including general principles and specific etiologies.
3. Be able to generate an appropriate GCS for a coma patient.
4. Be able to utilize localization principles regarding breathing, brainstem reflexes, motor exam and posturing, and DTRs.
5. Understand work-up and management of the comatose patient.

Definitions:

Coma- a state of unresponsiveness or unconsciousness characterized by a lack of self- and environmental awareness.

Physical Exam of the comatose patient:

The physical exam of the comatose patient can be challenging because the patient cannot follow commands. However, it is actually quite easy to do a methodical and thorough general exam and tailored neuro exam on these patients. A general exam should always be performed, as it may provide insight into pathophysiology. In addition to Gen, Heent, Lungs, CV, Abd, and Ext- always include a thorough skin examination for signs of trauma, track marks, or rashes. Breathing patterns also can facilitate localization, and should be observed and noted.

Just as with a cooperative patient, the comatose patient should be evaluated systematically, including eval of mental status (level of consciousness), CN- esp pupils, Motor, and DTRs. Evaluation of Coordination is not possible.

BREATHING PATTERNS AND LOCALIZATION:

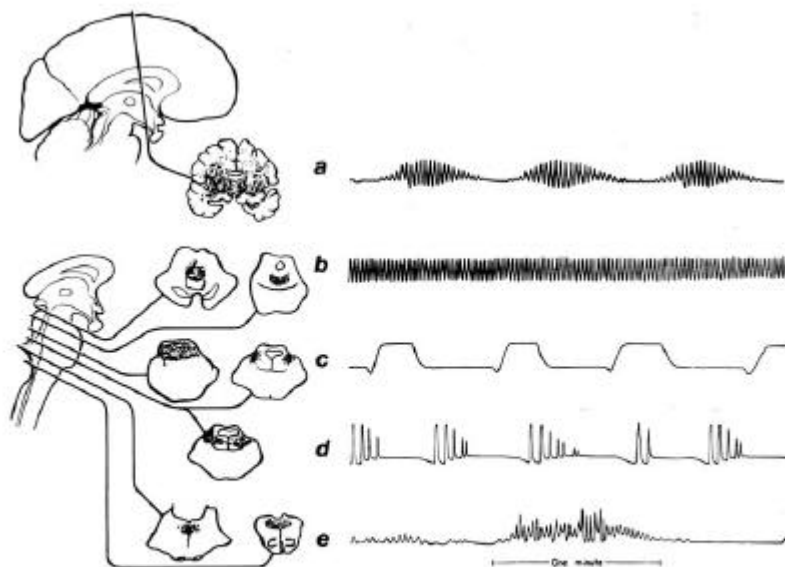


Figure 6. Abnormal respiratory patterns associated with pathologic lesions (shaded areas) at various levels of the brain. Tracings by chest-abdomen pneumograph, inspiration reads up. **a**, Cheyne-Stokes respiration. **b**, Central neurogenic hyperventilation. **c**, Apneusis. **d**, Cluster breathing. **e**, Ataxic breathing.

NEUROLOGIC EXAMINATION:

LEVELS OF CONSCIOUSNESS:

Alert normal awake and responsive state

Lethargic easily aroused with mild stim. Can maintain arousal.

Somnolent easily aroused by voice or touch; awakens and follows commands; req stim to maintain arousal

Obtunded/Stuporous arousable only with repeated and painful stim; verbal output is unintelligible or nil; some purposeful movement to noxious stim

Comatose no arousal despite vigorous stim, no purposeful movement- only posturing, brainstem reflexes often absent

CRANIAL NERVES AND BRAINSTEM REFLEXES:

Examination of the cranial nerves and brainstem reflexes has localizing value. Localization can provide insight into pathophysiology as there are regional differences in susceptibility to various pathologies.

PUPILS: CN II afferent, CN III efferent. Tests level of the midbrain as well as autonomic integrity. Some patterns:

Hypothalamus: Horner's (miosis, ptosis, and anhidrosis)

Midbrain: midposition, fixed

Peripheral III: usually unilateral, more dilated, fixed

Pons: pin point pupils

Medulla (lat): Horner's- preserved response to light

Metabolic: in general met derangements do not affect pupils. The major

exceptions are sympathomimetics and anti-cholinergics which dilate, and opiates which cause pin point pupils.

CORNEALS: V afferent, VII efferent. -pons

OCULOCEPHALIC: requires levels intact from III- VIII

GAG: IX, X -medulla

MOTOR:

As with the regular neuro exam, the motor exam should start with observation for asymmetric or adventitious movements. Tone and bulk should be evaluated before strength testing. If the patient cannot follow commands, motor strength is evaluated in response to noxious stimulation in the form of nail bed compression in each of the four extremities. Check for asymmetric response as well as movement that localizes to pain, withdraws from pain, or represents posturing. See GCS below.

Posturing: **Decorticate:** extension LE, flexion at elbows/wrists
Better prognosis than decerebrate
Often without concomitant loss neuro-optho reflexes
Usually lesion is above the midbrain

Decerebrate: extension LE, extension/pronation/adduction UE
Often with neuro-optho changes
Most commonly lesion at level of midbrain or b diencephalon

DTRs:

DTRs are helpful in the same manner as in the non-comatose patient in that lateralized findings imply a focal lesion or etiology. Upgoing toes (+Babinski) represent corticospinal involvement, but may be seen bilaterally in diffuse processes.



Glasgow Coma Scale

VERBAL

- V5** oriented
- V4** confused
- V3** inappropriate words
- V2** incomprehensible sounds
- V1** nil

EYE

- E4** spontaneous opening
- E3** opens eyes to speech
- E2** opens eyes to noxious stim
- E1** nil

MOTOR

- M6** obeys motor requests
- M5** localizes to noxious stim
- M4** withdrawal from noxious stim
- M3** abnormal flexion response (decorticate posturing)
- M2** abnormal extension (decerebrate posturing)
- M1** nil