

A 23-year-old man is found at the scene of a motor vehicle accident with lower extremity fractures, abdominal bruising, and scalp lacerations. He complains of pain and some shortness of breath. Initially, his blood pressure is 95/60 mm Hg and pulse is 120/min and regular. His spine is immobilized, and peripheral intravenous access is obtained. He is given 1 L of intravenous fluids. On the way to the hospital, he becomes progressively drowsy and develops progressive weakness on the right side of his body. His blood pressure is 160/90 mm Hg and pulse is 50/min. Which of the following nerve functions is most likely to be compromised on physical examination?

- ☐ A. Abducens
- ☐ B. Accessory
- ☐ C. Facial
- ☐ D. Glossopharyngeal
- ☐ E. Oculomotor

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- ☐ A. Abducens [14%]
- ☐ B. Accessory [16%]
- ☐ C. Facial [14%]
- ☐ D. Glossopharyngeal [14%]
- ☒ E. Oculomotor [42%]

Proceed to Next Item

Explanation:

User Id: [REDACTED]

Transtentorial (Uncal) Herniation	
Lesion	Neurologic Signs
Compression of the contralateral crus cerebri against the tentorial edge	Ipsilateral hemiparesis
Compression of the ipsilateral oculomotor nerve (i.e., CN III) by the herniated uncus	Loss of parasympathetic innervation causes mydriasis (occurs early); loss of motor innervation causes ptosis and a down-and-out gaze of the ipsilateral pupil due to unopposed trochlear (i.e., CN IV) and abducent (i.e., CN VI) action (occurs late)
Compression of the ipsilateral posterior	



✓ E. Oculomotor [42%]

Proceed to Next Item

Explanation:

User Id: [REDACTED]

Transtentorial (Uncal) Herniation	
Lesion	Neurologic Signs
Compression of the contralateral crus cerebri against the tentorial edge	Ipsilateral hemiparesis
Compression of the ipsilateral oculomotor nerve (i.e., CN III) by the herniated uncus	Loss of parasympathetic innervation causes mydriasis (occurs early); loss of motor innervation causes ptosis and a down-and-out gaze of the ipsilateral pupil due to unopposed trochlear (i.e., CN IV) and abducent (i.e., CN VI) action (occurs late)
Compression of the ipsilateral posterior cerebral artery (i.e., ischemia of visual cortex)	Contralateral homonymous hemianopsia
Compression of the reticular formation	Altered level of consciousness; coma

This patient presents after blunt head trauma with signs/symptoms worrisome for **transtentorial (uncal) herniation** secondary to a right-sided epidural hematoma. Epidural hematomas result from rupture of the middle meningeal artery, and this higher arterial pressure can rapidly expand the hematoma and compress the temporal lobe. The fluid resuscitation in this patient likely increased the rate at which the epidural hematoma expanded. The presence of hypertension, bradycardia, and respiratory depression (Cushing's reflex) indicates elevated intracranial pressure. The uncus is the innermost part of the temporal lobe and herniates through the tentorium to cause pressure on the ipsilateral oculomotor nerve, ipsilateral posterior cerebral artery, and



of visual cortex)	
Compression of the reticular formation	Altered level of consciousness; coma

This patient presents after blunt head trauma with signs/symptoms worrisome for **transtentorial (uncal) herniation** secondary to a right-sided epidural hematoma. Epidural hematomas result from rupture of the middle meningeal artery, and this higher arterial pressure can rapidly expand the hematoma and compress the temporal lobe. The fluid resuscitation in this patient likely increased the rate at which the epidural hematoma expanded. The presence of hypertension, bradycardia, and respiratory depression (Cushing's reflex) indicates elevated intracranial pressure. The uncus is the innermost part of the temporal lobe and herniates through the tentorium to cause pressure on the ipsilateral oculomotor nerve, ipsilateral posterior cerebral artery, and contralateral cerebral peduncle against the edge of the tentorium. Patients typically present with the focal neurologic signs shown in the table above.

**(Choice A)** Abducens nerve (i.e., CN VI) injury from uncal herniation usually occurs later in the clinical presentation, with a symptom of inability to abduct the eye.

**(Choice B)** Accessory nerve (i.e., CN XI) dysfunction can be due to lesions in the medulla, such as occlusion of the posterior inferior cerebellar artery. The accessory nerve can also be injured during surgical procedures involving the anterolateral neck. Injuries present with paralysis of the ipsilateral sternocleidomastoid and trapezius muscles.

**(Choice C)** The facial nerve originates between the pons and medulla, and lesions at that level can cause an upper motor neuron lesion, resulting in contralateral lower facial droop.

**(Choice D)** The glossopharyngeal nerve (i.e., CN IX) is most commonly injured by compression from a nearby tumor, as in jugular foramen syndrome (posterior fossa tumor). A glossopharyngeal nerve lesion would cause loss of the gag reflex, loss of taste and sensation on the posterior one-third of the tongue, loss of pharyngeal sensation, and dysfunction of the carotid sinus reflex leading to an increased risk of syncope.

#### Educational objective:

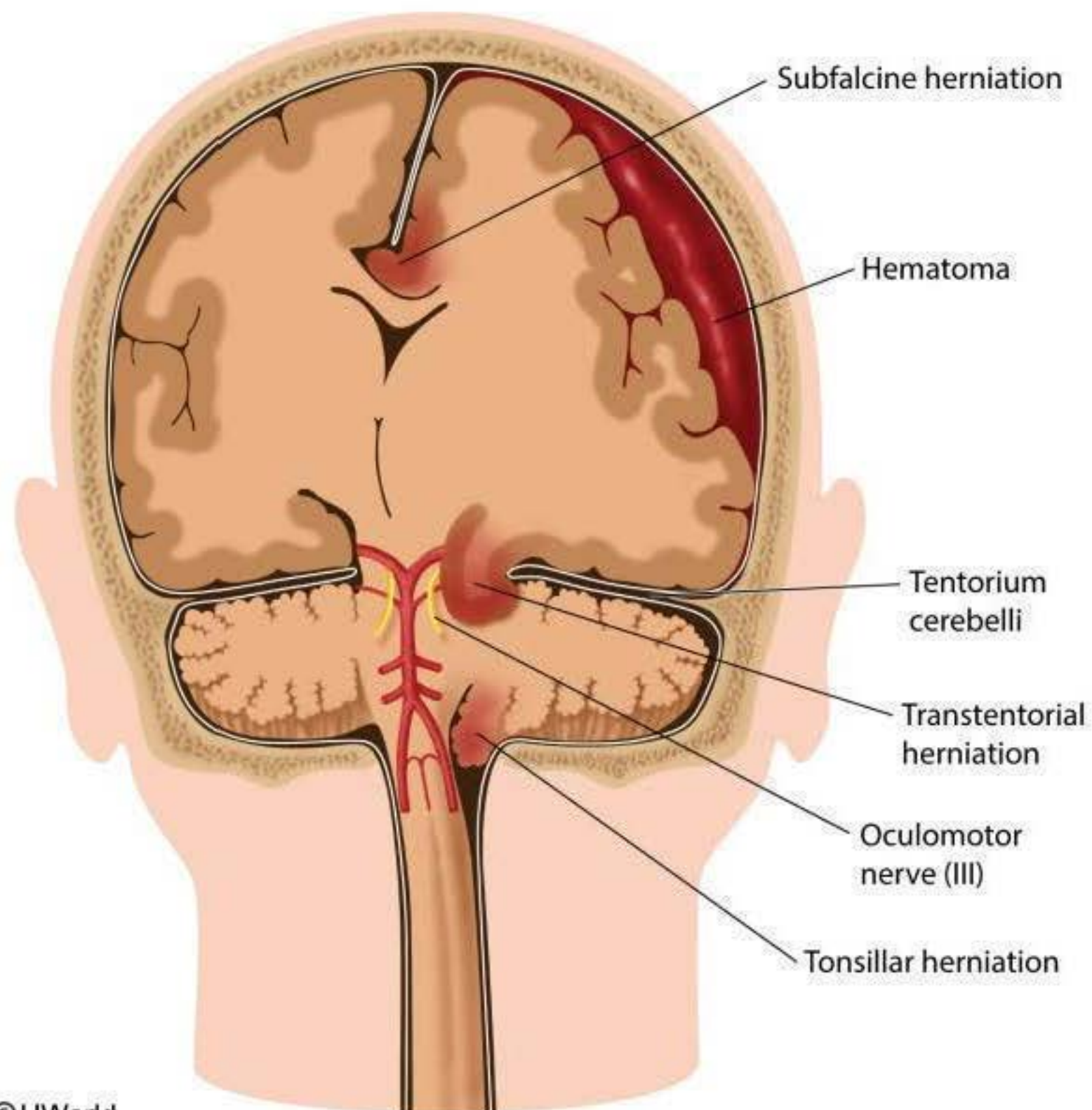
Transtentorial herniation of the parahippocampal uncus can occur during significant head trauma and leads to ipsilateral hemiparesis, ipsilateral mydriasis and strabismus, contralateral hemianopsia, and altered mentation.



Media Exhibit

erniations of the brain

### Major herniations of the brain



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