Questions

1. The buccinator has two nerves entering its external surface. They are the buccal branch of the facial n. (VII) and the (long) buccal nerve of V³. Only one of these is motor. (a) Damage to which nerve (VII or V³) causes paralysis of the buccinator? (b) Which branchial arch mesoderm gives rise to the buccinator muscle?

2. Examination of the external ear (auricle) can reveal the integrity of the brainstem and spinal cord from the level of the C2 vertebra to the midpons region of the brainstem within the posterior cranial fossa. Which 3 major nerves innervate the skin covering the auricle?

3. The muscles of the upper and lower eyelid have different nerve supplies. Which eyelid would be affected most in a facial nerve (VII) palsy?

4. On a Sunday afternoon, a young boy had a severe fall from his bicycle that resulted in a scalp laceration over the parietal bone. When he went to school on Tuesday morning, he had two severely blackened eyes. Suspecting that he had been abused, his teacher sent him to the school nurse who called his doctor. Having seen the child earlier, he explained that a scalp injury could produce the blackened eye signs. How would you explain this accumulation of blood in the orbital region?

5. Why would a physician put a local anesthetic into the subcutaneous tissue above the right supraorbital notch if he wishes to suture a scalp laceration over the right parietal bone just anterior to the vertex of the skull?

6. A 46-year-old man was seen in the emergency room after being knocked down in a street brawl. He had received a blow on the head with an empty bottle. On examination, the patient was found to be conscious and had a large doughlike swelling over the back of the head. The skin was intact, and the swelling fluctuated on palpation. No other abnormal signs were present. A diagnosis of hematoma of the scalp was made. The patient was sent to the radiology department for routine anteroposterior and lateral radiographs of the skull. Name the layer of the scalp in which the blood clot was situated (a) if the swelling were extensive, but did not pass inferiorly beyond the temporal lines laterally, the orbital margin in front, and the nuchal lines behind; (b) if the swelling were limited to the area occupied by an underlying skull bone; and (c) if the swelling were small, superficial, and with no fluctuation. Why was it necessary to X-ray the skull?

7. A 26-year-old man was admitted to the hospital as an emergency case. He had a severe infection of the scalp. Why are such infections potentially dangerous?

8. A 16-year-old boy fell off his bicycle and cut his scalp. The wound was less than ½ inch (1.3 cm) long, and within a few moments he was sitting in a pool of blood. Why does the scalp bleed so profusely from a small wound? Why does a deep wound of the scalp always require sutures?

9. A 17-year-old girl visited her dermatologist because of severe acne of the face. On examination, it was found that a small abscess was present on the side of the nose. The patient was given antibiotics and warned not to press the abscess. Why is it dangerous to squeeze, prick, or incise a boil in the area between the eye and the upper lip or between the eye and the side of the nose?

10. A 7-year-old boy was suffering from a severe infection of the right middle ear (otitis media). Within the course of a week, the infection had spread to the mastoid antrum and the mastoid air cells (mastoiditis). The organisms did not respond to antibiotics, so the surgeon decided to perform a radical mastoid operation. Following the operation it was noticed that
the boy's face was distorted, and he was unable to close his right eye. Saliva tended to accumulate in his right cheek and dribble from the corner of his mouth. What structure had been damaged during the operation?

11. A 43-year-old woman complaining of severe intermittent pain of short duration on the right side of her face visited her physician. The pain was precipitated by brushing the teeth or drinking cold fluids. On examination, no abnormal physical signs were found. When asked to point out on her face the area where the pain was experienced, the patient mapped out the skin area innervated by the mandibular division of the trigeminal nerve. A diagnosis of trigeminal neuralgia was made. Which area of facial skin is innervated by the mandibular division of the trigeminal nerve? Which area of facial skin is not innervated by the trigeminal nerve?

12. A 6-month-old infant is suspected of having a raised intracranial pressure. What simple method of physical examination would verify this?

13. A 29-year-old woman was struck in the face with a baseball while playing with her son. X-ray examination revealed multiple fractures of the bones around the orbit. Name the bones that form the orbital margin.

14. The wife of a 45-year-old commercial traveler was awakened by the unusual nature of his snoring and was puzzled when she noticed that he was sleeping with his left eye open. In the morning she observed that the left side of his face was drooping. When he tried to examine his teeth, he found that his lips were also paralyzed on that side. He was unable to whistle or to puff out his cheek because the air blew out through his paralyzed lips on the left side. He also found that he was unable to raise his eyebrow or to frown on that side. During breakfast he had trouble chewing his food because it dribbled out of the left side of his mouth. Fearing that he may have had a mild stroke during the night, he made an appointment to see his physician. During her examination, the physician made the following observations: at rest, the left side of his face appeared flattened and expressionless; there were no lines on the left side of his forehead; there was sagging in the left lower half of his face, and saliva drooled from the left corner of his mouth. In addition, there was a loss of taste sensation on the anterior two-thirds of the left side of his tongue, and an absence of voluntary control of left facial and platysma muscles. When the patient smiled, the lower portion of his face was pulled to the normal side and the right corner of his mouth was raised, but the left corner was not. During questioning the patient related how he had driven home late the night before and, because of drowsiness, had rolled the window down part way. He also recalled that he had had a severe head cold and an ear infection a few days previously. He recalled that the physician who treated him said that his illness resulted from a viral infection. 

**Diagnosis. Bell's Palsy.** 

**Problems.** Paralysis of what nerve would produce the signs exhibited by this patient? Why did his left eye remain open, even when he was sleeping? Why was there loss of taste sensation on the anterior two-thirds of the left side of his tongue? Where would the lesion of the nerve probably be located?

**Answers**

1. (a) VII (facial palsy)
   (b) 2nd arch (hyoid arch)
2. Great auricular nerve (C2,3), vagus (X), and auriculotemporal nerve (V3)
3. Lower eyelid—(the muscles of upper eyelid are innervated in part by III).
4. Bleeding into the “areolar space” of the scalp under the parietal region and subsequent accumulation inferior to frontalis insertion. Gravity will assist this accumulation of blood in the periorbital region.
5. To “numb” the right supraorbital nerve (V1), which supplies the scalp from the vertex to the supraorbital margin. There is also more subcutaneous tissue to receive the anesthetic in the supraorbital notch region, and the displacement of tissues by the injected anesthetic does not interfere with the site of tissue repair.

6. (a) If the swelling is very extensive, the hematoma is situated beneath the epicranial aponeurosis and is limited only by the attachment of the aponeurosis to the skull. (b) If the swelling is large but restricted to one bone, the hematoma is situated beneath the periosteum of the skull bone and is limited by the attachment of the periosteum to the sutural ligaments. (c) If the swelling is small, superficial, and tense, it probably lies in the subcutaneous tissue and is limited by the fibrous tissue that binds the skin to the epicranial aponeurosis. In all injuries to the head there should be a complete radiological examination; severe fractures of the skull are sometimes missed on clinical examination.

7. The veins of the scalp are connected to the diploic veins of the skull bones, and to the intracranial venous sinuses, by valveless veins, called emissary veins. Thrombosis of the scalp veins secondary to infection could easily result in the spread of pathogenic organisms from the scalp to the skull bones, producing an osteomyelitis, or thrombosis of the venous sinuses, resulting in cerebral edema and possibly death.

8. The tunica adventitia of the numerous arteries supplying the scalp is anchored to the fibrous septa that bind the skin to the epicranial aponeurosis. A sectioned artery is therefore unable to contract or retract to slow the circulation so that clotting can take place. Bleeding can be stopped by applying firm pressure to the wound. A deep wound of the scalp involving the section of the epicranial aponeurosis always gapes open due to the pull of the occipitofrontalis muscles. For this reason the aponeurosis should be sutured.

9. The “danger area” of the face is drained by the facial vein. Interference with a boil can lead to spread of infection and thrombosis of the facial vein. The pathogenic organisms can then spread via the superior and inferior ophthalmic veins to the cavernous sinus and cause thrombosis there. Cavernous sinus thrombosis is a serious condition, resulting in cerebral edema, and in the days before antibiotics it was always fatal.

10. The right facial nerve had been damaged as it lay in the facial nerve canal in the medial wall of the aditus of the tympanic antrum. The right orbicularis oculi was paralyzed; hence the boy could not close his right eye. The right buccinator was paralyzed, resulting in ballooning of the cheek and accumulation of saliva.

11. The anterior and posterior fontanelles of the skull can be easily palpated in the infant. The anterior fontanelle remains open until 18 months, and the posterior fontanelle closes by the end of the first year. In cases of raised intracranial pressure, the fontanelles bulge upward.

12. The mandibular division of the trigeminal nerve supplies a strip of skin that extends from the temporal region of the scalp in front of the ear (including the anterior part of the auricle) and it also supplies the skin over the lower jaw, including the lower lip. The skin over the parotid gland and a small area over the angle of the mandible is supplied by the great auricular nerve (C2 and 3).

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14. Sudden facial paralysis may follow exposure to the cold; thus, Bell's palsy was the most probable diagnosis in this case. The characteristic facial appearance results from a lesion of the facial nerve (CN VII). In the present patient, the motor supply to the muscles of the left face, forehead, and eyelids were most severely affected. Paralysis of the muscles of facial expression on the left side explains the expressionless look on that side of his face and his inability to whistle, puff his cheek, or close his left eye. When the facial nerve is paralyzed, the levator palpebrae superioris (acting unopposed) causes the eye to remain open, even
during sleep. The drooling and difficulty in chewing result from paralysis of the orbicularis oris and buccinator muscles. Loss of taste sensation on the anterior two-thirds of the left side of his tongue is understandable anatomically because this region of the tongue receives taste fibers through the chorda tympani branch of CN VII. This symptom also indicates that the nerve lesion is proximal to the origin of this nerve in the facial canal. Because of paralysis of the orbicularis oculi muscle, the lacrimal puncta are no longer in contact with the cornea. As a result, tears tend to flow over the left lower eyelid onto the cheek. In addition, the cornea may dry out during sleep (if an ointment isn’t used) because the eyelids on the affected side remain open. Drying of the cornea can also occur during the day owing to the inability to blink; this dryness could result in corneal ulceration. The site of the lesion was most likely in the facial canal in the petrous part of the temporal bone. The paralysis of the facial muscles is thought to be caused by inflammation of the facial nerve superior to the stylomastoid foramen. The cause is generally thought to be a viral infection, which causes edema of the facial nerve and compression of its fibers in the facial canal or at the stylomastoid foramen. If the lesion is complete, all the facial muscles on that side are affected equally. Voluntary, emotional, and associated movements are all affected. In most cases the nerve fibers are not permanently damaged and nerve degeneration is incomplete. As a result, recovery is very slow but generally good. Some facial asymmetry may persist (e.g., slight sagging of the left corner of the mouth).