ORAL AND MAXILLOFACIAL SURGERY REVIEW

RAHAF Y. ALHABBAB, BDS, MsD, DABOMS

QUINTESSENCE PUBLISHING

One book, one tree: In support of reforestation worldwide and to address the climate crisis, for every book sold Quintessence Publishing will plant a tree (https://onetreeplanted.org/).

Library of Congress Control Number: 2024936067

A CIP record for this book is available from the British Library.
ISBN: 978-1-64724-190-2

QUINTESSENCE PUBLISHING USA

Quintessence Publishing Co, Inc
411 N Raddant Road
Batavia, IL 60510
www.quintessence-publishing.com

5 4 3 2 1

Editor: Leah Huffman
Assistant editor: Savanna DiCostanzo
Production: Angelina Schmelter
Design: Sue Zubek

Printed in Korea

ORAL AND MAXILLOFACIAL SURGERY REVIEW

RAHAF Y. ALHABBAB, BDS, MsD, DABOMS
Oral and Maxillofacial Surgery Consultant
Head of Orthognathic Surgery Unit
King Fahad Hospital General
Jeddah, Saudi Arabia

QUINTESSENCE PUBLISHING

Berlin | Chicago | Tokyo
Barcelona | London | Milan | Mexico City | Paris | Prague | Seoul | Warsaw
Beijing | Istanbul | Sao Paulo | Zagreb

About the Author

Rahaf Y. Alhabbab, BDS, MsD, DABOMS, is currently an oral and maxillofacial surgery consultant at King Fahad Hospital General in Jeddah, Saudi Arabia. She is the founder and head of the orthognathic surgery unit there as well as the residency program director of the Saudi boards. She received her advanced oral and maxillofacial training at McGill University in Montreal after finishing her education at King Abdulaziz University in Saudi Arabia, the University of Connecticut, and New York University. In the United States, she is a diplomate of the American boards of oral and maxillofacial surgery, including three subspecialties (cosmetics, orthognathics, and facial trauma reconstruction). In addition to her academic affiliations, Dr Alhabbab is currently the chairman of the Saudi Board Western Region, the head of the Western Region Examination Committee, and the head of the scientific program of the Saudi Board Western Region in the Saudi Commission for Health Specialties.

Contents

Preface

As a senior consultant, educator, and long-time residency program director, I constantly observe the struggle that residents, trainees, specialists, and even researchers have in accessing the necessary and relevant information regarding oral and maxillofacial surgery (OMFS). The most frequently asked questions I get are "what should I read?" and "where should I study from?" I wrote this book because there wasn't a comprehensive resource I could point to.

The aim of this book is to cover basic and advanced knowledge related to the specialty of OMFS. It is structured as multiple-choice questions and some free-response questions organized by topic into chapters. The 14 chapters include anatomy, anesthesia, cleft lip and palate, cosmetics, craniofacial deformities, dental implants, dentoalveolar surgery, distraction osteogenesis, infection and oral pathology, medicine, orthognathics, soft tissue reconstructive surgery, temporomandibular joint, and trauma.

Each multiple-choice question is followed by the correct answer choice and a detailed explanation with up-to-date information from the latest literature or basic books recognized worldwide as the best in the specialty. Illustrations and tables are part of some answers as well, providing visual description and clarity.

As a comprehensive deep dive into OMFS, the book is based on knowledge taught at American, Canadian, and other international residency programs and includes common and important questions collected from board exam banks, ensuring that all knowledge needed to pass any board exam in the specialty is covered. The book can also be used as a reference for quick access to pertinent and relevant information.

The primary goal of this book is to answer the call for **one** source that covers all things OMFS. I hope it will be useful to you on your OMFS journey.

1 Anatomy

Multiple-Choice Questions

1. The modiolus of the face plays a major role in the formation of which of the following?

a. Nasolabial fold
b. Deep transverse forehead
c. Infraorbital fold
d. Upper eyelid fold

a: The modiolus is a fibromuscular structure located 10 to 12 mm lateral and slightly superior to both angles of the mouth, where both extrinsic and intrinsic muscles meet. Muscle fibers diverge and others converge from this point of decussation, making it easy to palpate.

It plays a significant part in facial expressions and lower face cosmetics due to its role in nasolabial fold formation. The modiolus has a direct relationship with the shape of the fold and is therefore central to the youthful appearance of the lower face.

Ref: Çalışkan S, Çelebioglu EC, Akkaşoğlu S, Beşer CG, Sargon MF. Anatomical and radiological evaluation of modiolus anguli oris in facial anatomy. J Surg Med 2019;3:694–697.

2. The modiolus results from the intersection of which of the following muscles?

a. Levator labii superioris, zygomaticus major, zygomaticus minor, risorius, and platysma
b. Levator anguli oris, zygomaticus minor, buccinator, platysma, and levator anguli oris
c. Levator labii superioris, zygomaticus minor, buccinator, platysma, and depressor anguli oris
d. Levator anguli oris, zygomaticus major, risorius, buccinator, and depressor anguli oris

d: Both extrinsic and intrinsic muscles of the face meet at the lateral corner of the mouth, forming the modiolus. These muscles include the orbicularis oris, buccinators, levator labii superioris, levator anguli oris, depressor labii inferioris, depressor anguli oris, zygomaticus major, and risorius.

Contraction of these muscles results in facial expressions of the lower face, emphasizing the importance of the modiolus, where these muscles intersect.

Ref: Yu SK, Lee MH, Kim HS, Park JT, Kim HJ, Kim HJ. Histomorphologic approach for the modiolus with reference to reconstructive and aesthetic surgery. J Craniofac Surg 2013;24:1414–1417.

3. Which of the following statements is correct regarding the modiolus?

a. The facial dynamics must be active to evaluate the relationship between the modiolus and nasolabial fold.
b. A short, concave nasolabial fold appears in cases with a weak trophic modiolus.
c. Cheek mass descends medial to the nasolabial fold with aging.
d. The modiolus is supplied by the buccal artery.

c: The modiolus is important to the formation of the nasolabial fold (NLF). Cheek mass lateral to the nasolabial fold can descend medially with age if laterally unopposed. The superficial musculoaponeurotic system is believed to be responsible for this occurrence, whereas the superficial fascia of the face extends medial to the NLF, converging at the modiolus.

To evaluate the relationship of the modiolus to the nasolabial fold, the facial dynamics must be at rest. A weak trophic modiolus results in a long and concave NLF, whereas a strong modiolus results in a short and concave NLF. The modiolus is supplied by the facial artery, terminating laterally as the angular artery.

Ref: Yu SK, Lee MH, Kim HS, Park JT, Kim HJ, Kim HJ. Histomorphologic approach for the modiolus with reference to reconstructive and aesthetic surgery. J Craniofac Surg 2013;24:1414–1417.

4. Which of the following nerves innervates the posterior digastric muscle?

a. Vestibulocochlear (VIII) nerve
b. Facial (VII) nerve
c. Abducent (VI) nerve
d. Glossopharyngeal (IX) nerve

b: The posterior belly of the digastric muscle is derived from the second pharyngeal arch; therefore, it is innervated by the facial nerve (CN VII) through the digastric branch. The blood supply to the posterior digastric muscle flows through the occipital artery, arising from the external carotid artery.

Ref: Kohan EJ, Wirth GA. Anatomy of the neck. Clin Plastic Surg 2014;41:1–6.

5. Which of the following nerves innervates the anterior digastric muscle?

a. Facial (VII) nerve
b. Hypoglossal nerve
c. Mylohyoid nerve
d. Ansa cervicalis (C1–C3) nerve

c: The anterior belly of the digastric muscle is derived from a depression in the inner surface of the mandible, known as the *digastric fossa*. It is innervated by the mylohyoid nerve, a branch of the mandibular division (VIII) of the trigeminal nerve (V). The blood supply to the anterior digastric muscle flows through the submental branch of the facial artery.

Ref: Kohan EJ, Wirth GA. Anatomy of the neck. Clin Plastic Surg 2014;41:1–6.

6. The parasympathetic fibers to the globe follow the course of which of the following nerves?

a. II
b. III
c. IX
d. VII

b: Pre- and postganglionic fibers of the parasympathetic nervous system synapse next to the target organ, unlike the sympathetic nervous system that synapses next to the spinal cord.

The parasympathetic fibers to the globe arise from the Edinger-Westphal nucleus, the most superior part of the oculomotor nucleus. These fibers follow the oculomotor nerve course, synapsing in the ciliary ganglion behind the globe. The fibers extend through the superior orbital fissure, joining the inferior division of the oculomotor nerve.

Parasympathetic fibers passing through cranial nerve IX (CN IX) synapse in the otic ganglion, where postganglionic fibers follow all mandibular nerve branches, providing secretomotor fibers to the parotid gland through the auriculotemporal nerve.

Parasympathetic fibers arising from cranial nerve VII (CN VII) synapse in the pterygopalatine ganglion, providing innervation to the nose and the minor salivary glands of the palate.

Parasympathetic fibers do not pass through the optic nerve (CN II) because it has no sympathetic components.

Ref: McDougal DH, Gamlin PD. Autonomic control of the eye. Compr Physiol 2015;5:439–473.

7. Where is the McGregor's patch located?

a. At the preauricular area where the fascial nerve crosses the zygomatic arch
b. At the retromolar area where the parotid tail intersects with the mandible
c. At the zygomatic area where a plexus of vessels is found
d. At the inferior border of the mandible where the facial artery crosses

c: The McGregor's patch, also known as the "bloody gulch," retains zygomatic ligaments that stabilize the skin of the cheek to the inferior border of the zygomatic bone. It arises from the periosteum, penetrating the superficial fascia and inserting into the skin dermis.

Cutting through this patch to obtain ample skin coverage can result in parotid fascia injury. Both facial nerve branches and the parotid duct pass underneath this layer. A plexus of vessels by the facial artery and perforating off the transverse facial artery are also superficially located in this region.

Ref: Seo YS, Song JK, Oh TS, Kwon SI, Tansatit T, Lee JH. Review of the nomenclature of the retaining ligaments of the cheek: Frequently confused terminology. Arch Plast Surg 2017;44:266–275.

8. The main sensory innervation to the auricle is via which of the following?

a. Auriculotemporal nerve
b. Cervical plexus branches
c. Lesser occipital nerves and vagus branches
d. Greater auricular nerve

d: The external ear consists of the following: the auricle (pinna), which comprises the helix, lobule, and antihelix; the external auditory canal; the antitragus; the tragus; and the concha.

Sensory innervation to the external ear is mainly from the following: the greater auricular nerve (branch of second and third cervical plexus C2 and C3); the lesser occipital nerve (branch of second and third cervical plexus C2 and C3); the auriculotemporal nerve (branch of mandibular division of the trigeminal nerve); and the auricular branch of the vagus nerve (Alderman's or Arnold's nerve).

The main sensory innervation to the auricle is from the greater auricular nerve, which originates from C2 and C3 and courses around the sternocleidomastoid muscle of the neck posteriorly, becoming superficial 6 to 7 cm below the external auditory meatus.

The helix, lobule, and concha are innervated by the greater auricular nerve. The antihelix, antitragus, tragus, and concha are also innervated by the greater auricular nerve and to a lesser extent by the auricular branch of the vagus nerve.

The crus and the spine (superomedial helix) are mainly innervated by the auriculotemporal nerve.

The auricle's posterior surface is innervated by the greater auricular nerve, auricular branch of the vagus nerve, and the lesser occipital nerves.

Ref: Peuker ET, Filler TJ. The nerve supply of the human auricle. Clin Anat 2002;15:35–37.

9. Where is the greater auricular nerve located?

a. Immediately superficial to the platysma
b. Immediately deep to the platysma
c. Deep to the sternocleidomastoid muscle
d. 1 cm below the origin of the sternocleidomastoid muscle

b: The greater auricular nerve originates from the cervical plexus branches C2 and C3; it runs immediately beneath the platysma muscle and courses over the sternocleidomastoid (SCM) muscle, dividing into anterior and posterior branches.

The site of the greater auricular nerve can be marked clinically at one-third the distance from the mastoid process or the external auditory canal to the SCM muscle site of origin at the clavicle.

Ref: Hoerter JE, Patel BC. Anatomy, Head and Neck, Platysma. https://www.ncbi.nlm.nih.gov/books/NBK545294/ Accessed 2 October 2023.

10. What is the relationship of the marginal mandibular nerve to the corner of the mouth?

a. Deep to the platysma until about 0.5 cm lateral to the corner of the mouth
b. Superficial to the platysma until about 0.5 cm lateral to the corner of the mouth
c. Deep to the platysma until about 2 cm lateral to the corner of the mouth
d. Superficial to the platysma until about 2 cm lateral to the corner of the mouth

c: The marginal mandibular nerve (MMN) can be identified in an area described as a "danger zone." This area is best drawn by first marking a point 2 cm posterior to the corner of the mouth at the middle of the mandibular body; a circle with a radius of 2 cm is then drawn around the marked point. This area is identified as *facial danger zone* 3, where the MMN, facial artery, and facial vein can be easily injured.

Ref: Seckel BR. Facial danger zones: Avoiding nerve injury in facial plastic surgery. Can J Plast Surg 1994;2:59–66.

11. All of the following lines are drawn to identify the facial danger zone 2 EXCEPT:

a. A point 0.5 cm below the tragus to a point 2 cm above the lateral eyebrow
b. A line through the zygoma to the lateral orbital rim
c. A line from the external auditory canal to the inferior orbital rim
d. A point above the eyebrow to the zygoma

c: Danger zone 2 is a triangular area marked as follows: the first line is lateral and marked 0.5 cm inferior to the tragus to a point 2 cm superior to the eyebrow; the second line is inferior and marked along the zygoma, extending to the lateral orbital rim; and the third line connects the point lateral to the orbital rim to the point above the eyebrow.

Danger zone 2 helps identify the temporal branch of the facial nerve, which emerges beneath the parotid gland to the frontalis muscle, just underneath the temporoparietal fascia–superficial musculoaponeurotic system (SMAS) layer.

Ref: Seckel BR. Facial danger zones: Avoiding nerve injury in facial plastic surgery. Can J Plast Surg 1994;2:59–66.

12. Which of the following statements is true regarding Erb's point?

a. It is located 6 to 8 cm above the clavicle.
b. It describes a point on the anterior border of the sternocleidomastoid muscle.
c. The spinal accessory nerve can often be found 1 cm above Erb's point.
d. Three superficial branches of the cervical plexus emerge from behind the muscle.

c: Erb's point is located 2 to 3 cm above the clavicle at the upper brachial plexus trunk, formed by C5 and C6 nerve roots. The spinal accessory nerve is often located around 1 cm above this point.

There are six nerves that can be identified at this point. Erb's point is used in head and neck surgery, representing a point located between the upper and middle thirds of the posterior border of the sternocleidomastoid (SCM) muscle.

Four superficial branches of the cervical plexus emerge from the posterior surface of the SCM muscle, covering the skin of the head and neck: the greater auricular nerve, lesser occipital nerve, transverse cervical nerve, and supraclavicular nerve.

The accessory nerve arises from this point, passing through the posterior triangle of the neck to then enter the trapezius muscle at a point between the middle and lower thirds of the anterior border of this muscle.

Ref: Flint PW, Haughey BH, Lund VJ, et al (eds). Cummings Otolaryngology Head & Neck Surgery, ed 5. Mosby/Elsevier, 2010.

13. Which of the following statements is correct regarding the frontal sinus?

a. It drains through the nasofrontal duct, located at the posterior-medial portion of the sinus floor, into the middle meatus.
b. It drains through the nasofrontal duct, located at the anterior-medial portion of the sinus floor, into the middle meatus.
c. It drains through the nasofrontal duct, located at the posterior-medial portion of the sinus floor, into the inferior meatus.
d. It drains through the nasofrontal duct, located at the anterior-medial portion of the sinus floor, into the inferior meatus.

a: The frontal sinus is a paranasal sinus of the cranium, located bilaterally in the frontal bone posterior to the supraorbital ridge; it is lined by pseudostratified ciliated epithelium, with mucus-producing cells and seromucous glands.

Each sinus drains through the nasofrontal ostia into the middle meatus of the corresponding side through the nasofrontal duct. The ostia are located at the posterior-medial portion of the sinus floor. Only around 15% of people will have a true duct, as most people have only a draining recess.

Ref: MacLeod SR, Cunningham LL. Management of frontal sinus and naso-orbitoethmoid complex fractures. In: Miloro M, Ghali GE, Larsen PE, Waite PD. Peterson's Principles of Oral and Maxillofacial Surgery, ed 3. Springer, 2011:519–537.

14. Which of the following statements is true regarding the annulus of Zinn?

a. It is attached to the lacrimal, ethmoid, and sphenoid bones.
b. It contains the ophthalmic artery and its branches.
c. It is the origin of the rectus and oblique muscles.
d. It contains the maxillary and ophthalmic divisions of the trigeminal nerve.

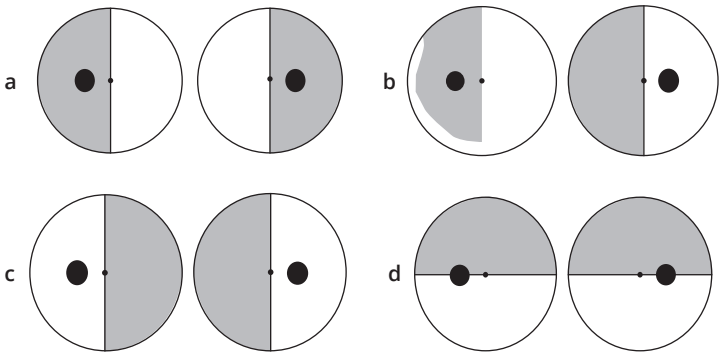
b: The annulus of Zinn (annular tendon or common tendinous ring) is a fibrous tissue ring that surrounds the optic nerve at the orbital apex.

It is the origin of six out of seven extraocular muscles: the medial, lateral, superior, and inferior rectus muscles, the levator palpebrae superioris, and the superior oblique muscle, excluding the inferior oblique muscle.

The annulus of Zinn contains the ophthalmic artery and its branches, the optic nerve, both oculomotor superior and inferior divisions, the nasociliary nerve, and the abducens nerve. The oblique muscles originate outside of that annulus. The annulus is distant from the lacrimal bone and does not contain the maxillary division of the trigeminal nerve.

Ref: Badakere A, Patil-Chhablani P. Orbital apex syndrome: A review. Eye Brain 2019;11:63–72.

15. A 22-year-old man presents with a tumor compressing his optic chiasm. Upon physical examination, which of the following visual field defects would you expect to find? Note: Shaded areas indicate visual field deficit.



a: The optic chiasm is located in the forebrain, where the right and left optic nerves cross. Nasal axons from the nasal half of both retinas cross to the contralateral side of origin, presenting the temporal half of the visual field.

The temporal axon from the temporal half of both retinas remains uncrossed. Destruction of crossing fibers at the optic chiasm will result in bitemporal hemianopia, with the visual field deficit illustrated in *a*. Answer *b* represents homonymous hemianopia and is associated with severe contralateral optic tract defects or hemispheric lesions. Answer *c* represents a binasal hemifield defect, which is associated with lesions lateral to the chiasm. Answer *d* represents altitudinal hemianopia and is associated with ischemia of the optical cortex and posterior occipital circulation defect.

Ref: Spector RH. Visual fields. In: Walker HK, Hall WD, Hurst JW (eds). Clinical Methods: The History, Physical, and Laboratory Examinations, ed 3. Butterworths, 1990.

16. In the case of an isolated lesion on the right oculomotor nerve, which of the following statements is true?

a. The right globe rotates upward and outward.
b. The left eye consensual light reflex is preserved.
c. Motor nerves alone are affected, resulting in ptosis and miosis.
d. Light stimulation of the left eye results in a consensual reflex in the right eye.

b: The oculomotor nerve is the third cranial nerve (CN III) and provides the motor function for adjusting eye position. It has both somatic (voluntary) and parasympathetic (involuntary) functions.

Somatic functions include upper eyelid elevation by innervating the levator palpebrae superioris muscle as well as gaze fixation and eye tracking via innervation of the eye muscles (superior rectus, medial rectus, inferior rectus, and inferior oblique muscles).

Autonomic parasympathetic functions include pupil constriction (miosis) and lens contractions to allow focus on near objects.

In this case, light stimulation in the left eye produces no consensual reflex in the right eye because the oculomotor nerve carries parasympathetic branches that allow consensual pupillary constriction.

Ref: Fite JD, Walker HK. Cranial nerves III, IV, and VI: The oculomotor, trochlear, and abducens nerves. In: Walker HK, Hall WD, Hurst JW (eds). Clinical Methods: The History, Physical, and Laboratory Examinations, ed 3. Butterworths, 1990.

17. At which parasympathetic ganglion do ocular preganglionic fibers synapse with postganglionic fibers?

a. Superior cervical
b. Pterygopalatine
c. Otic ganglion
d. Ciliary ganglion

d: The parasympathetic ganglia are close to the target organ, whereas sympathetic ganglia are close to the spinal cord. The parasympathetic ganglion to the globe arises from the oculomotor nerve (CN III), synapsing posterior to the globe at the ciliary ganglion. The parasympathetic ganglion to the parotid gland arises from the glossopharyngeal nerve (CN IX), synapsing at the otic ganglion.

Presynaptic parasympathetic nervous system (PSNS) fibers that arise from the facial nerve (CN VII) synapse at the pterygopalatine ganglion, supplying the secretory glands of the nasal cavity and palate. The superior cervical ganglion is sympathetic.

Ref: Moore KL, Agur AR. Essential Clinical Anatomy. Lippincott Williams & Wilkins, 2007.

18. The neurosensory innervation and vascular supply to the nose are derived from which of the following?

a. Maxillary division of the trigeminal nerve, internal and external carotid system
b. Ophthalmic division of the trigeminal nerve, external carotid only
c. Maxillary and ophthalmic division of the trigeminal nerve, internal and external carotid system
d. Maxillary and ophthalmic division of the trigeminal nerve, internal carotid only

c: Neurosensory innervation to the nose is provided by both ophthalmic (V1) and maxillary (V2) divisions of the trigeminal nerve. The ophthalmic nerve gives three branches: lacrimal, frontal, and nasociliary. The nasociliary nerve innervates the superior aspect of the external nose through the infratrochlear nerve. It also innervates the skin of the nasal tip, the medial aspect of the nasal alae, and the dorsum of the nose via the external nasal nerve. The lateral dorsum and alae of the nose are innervated bilaterally via the maxillary division (V2).

Intranasally, the anterosuperior aspect of the internal nose and the anterior nasal septal mucosa are innervated by the anterior ethmoidal nerve (branch of the nasociliary nerve), whereas the nasal septum is innervated by the nasopalatine nerve. The lateral nasal wall mucosa is innervated by both the greater palatine nerve and the anterior ethmoidal nerve. The facial nerve (CN VII) innervates the nasal musculature, and the olfactory nerve (CN I) is responsible for the sense of smell.

The nose is highly vascular, receiving its arterial supply from the internal and external carotid arteries. The ophthalmic artery supplies the external nose via the dorsal nasal artery, which supplies the superior aspect of the nose. The lateral nose, nasal ala, and columella are supplied by the facial artery via the angular and superior labial branches. The nasal floor is supplied by the superior labial artery.

The nasal septum is supplied superiorly through the internal carotid artery via the anterior and posterior ethmoidal branches of the ophthalmic and sphenopalatine arteries; it is supplied anteriorly through the superior labial artery and gets its blood supply via the superior labial, anterior ethmoidal, greater palatine, and sphenopalatine arteries (Kiesselbach's plexus).

Refs: Oneal RM, Beil Jr RJ, Schlesinger J. Surgical anatomy of the nose. Otolaryngol Clin North Am 1999;32:145–181.
Rohrich RJ, Gunter JP, Friedman RM. Nasal tip blood supply: An anatomic study validating the safety of the transcolumellar incision in rhinoplasty. Plast Reconstr Surg 1995;95:795–799.
Stevens MR, Emam HA. Applied surgical anatomy of the nose. Oral Maxillofac Surg Clin North Am 2012;24:25–38.

19. Which of the following is the pathophysiology of Horner's syndrome?

a. Interruption of preganglionic parasympathetic fibers
b. Interruption of postganglionic sympathetic fibers
c. Aberrant conduction between motor branches of cranial nerve V and cranial nerve III
d. Traumatic or pathologic changes in the ciliary ganglion

b: Horner's syndrome results from sympathetic innervation disruption to the orbit. It is clinically characterized by miosis as a result of the unopposed parasympathetic innervation leading to papillary constriction; ptosis of the upper lid resulting from sympathetic innervation loss to Muller's muscle; enophthalmos that can be evident by ptosis or as a result of long-standing atrophy of orbital contents; and anhidrosis (lack of sweating) of the affected side of the face (ipsilateral) as a result of sympathetic nerve supply loss.

Aberrant conduction between the motor branches of cranial nerve (CN) V to the terminal branches of CN III results in a rare congenital condition known as *Marcus Gunn syndrome*, clinically characterized by rapid eyelid movement on one side, or a "wink" with each jaw movement.

Parasympathetic innervation interruption of the ciliary ganglion will result in mydriasis (pupillary dilation).

Refs: Durham DG. Congenital hereditary Horner's syndrome. AMA Arch Ophthalmol 1958;60:939–940.
Horner JF. A form of ptosis. JAMA 1969;208:1899–1900.
Mitchell SW, Morehouse GR, Keen WW. Gunshot wounds and other injuries of nerves. 1864. Clin Orthop Relat Res 2007;458:35–39.
Thompson HS. Johann Friedrich Horner (1831–1886). Am J Ophthalmol 1986;102:792–795.

20. Where are the inferior alveolar artery and vein located in relation to the inferior alveolar nerve at the level of the lingula?

a. Anterior
b. Medial
c. Posterior
d. Superior

c: The inferior alveolar artery and inferior alveolar vein are both located posterior to the inferior alveolar nerve at the level of the lingula.

Ref: Khoury JN, Mihailidis S, Ghabriel M, Townsend G. Applied anatomy of the pterygomandibular space: Improving the success of inferior alveolar nerve blocks. Aust Dent J 2011;56:112–121.

21. Compared to adults, where is the mandibular foramen located in children?

a. Superior
b. Inferior
c. Anterior
d. Posterior

b: The mandibular foramen is located more superiorly in the adult ramus than in children; the foramen is usually identified below the occlusal plane level in young children and at the occlusal plane in older ones.

Ref: Hwang TJ, Hsu SC, Huang QF, Guo MK. Age changes in location of mandibular foramen. Zhonghua Ya Yi Xue Hui Za Zhi 1990;9:98–103.

22. Where is the accessory mandibular foramen located in relation to the mandibular foramen?

a. Anterior
b. Posterior
c. Superior
d. Inferior

d: The accessory mandibular foramen is an extra foramen that is usually located inferior to the mandibular foramen. It is found in individuals with bifid inferior alveolar nerves.

Refs: Lam M, Koong C, Kruger E, Tennant M. Prevalence of accessory mental foramina: A study of 4,000 CBCT scans. Clin Anat 2019;32:1048–1052.
Predoiu M, Rusu MC, Chiriţă AL. A rare anatomic variation: Triple mental foramina. Morphologie 2019;103:110–115.
Thangavelu K, Kannan R, Kumar NS, Rethish E, Sabitha S, Sayeeganesh N. Significance of localization of mandibular foramen in an inferior alveolar nerve block. J Nat Sci Biol Med 2012;3:156–160.

23. The mandibular foramen can be found in all of the following locations in the mandible EXCEPT:

a. Center of anterior-posterior width of the ramus
b. Anterior to the midpoint of the width of the ramus
c. Posterior to the midpoint of the width of the ramus
d. Above the midpoint from the sigmoid notch to the inferior border of the mandible

b: The location of the mandibular foramen has been studied widely in the anterior-posterior and superior-inferior dimensions in relation to the ramus and age-related changes, as well as its relation to the occlusal plane.

A study by Thangavelu et al showed that the mandibular foramen is located about 2.75 mm posterior to the midpoint of the ramus width and not in the center of the ramus in the anterior-posterior dimensions. They also showed that the foramen is located 19 mm from the coronoid notch at the level of the occlusal plane or below. The mandibular foramen was also found to be located 3 mm above the midpoint of an imaginary line drawn between the coronoid notch and the inferior border of the mandible.

Other studies on the location of the mandibular foramen in the anterior-posterior dimensions have shown that the mandibular foramen is located at the center of the ramus, 2.08 to 2.56 mm posterior to the midpoint of the ramus, or on the posterior third quarter of the ramus.

Refs: Khalil H. A basic review on the inferior alveolar nerve block techniques. Anesth Essays Res 2014;8:3–8.
Thangavelu K, Kannan R, Kumar NS, Rethish E, Sabitha S, Sayeeganesh N. Significance of localization of mandibular foramen in an inferior alveolar nerve block. J Nat Sci Biol Med 2012;3:156–160.

24. The carotid body and sinus are innervated by which of the following cranial nerves?

a. V
b. VII
c. IX
d. X

c: The carotid body is a chemoreceptor located at the bifurcation of the common carotid artery, measuring 3 to 5 mm in diameter with an average weight of 12 mg. The carotid body monitors the blood PO_2, PCO_2, and pH, modulating cardiovascular and respiratory functions through sympathetic effect.

The carotid body is innervated by Hering's nerve, a small branch of the glossopharyngeal nerve (CN IX) originating about 1.5 cm distal to the jugular foramen; it joins the vagus nerve (CN X) and sympathetic trunk, dividing at the level of the common carotid artery bifurcation to innervate both the carotid body and the carotid sinus.

The carotid sinus contains different baroreceptors, which help regulate blood pressure. Hering's nerve transfers impulses from the carotid sinus (baroreceptors) and carotid body (chemoreceptors) to the brainstem (vasomotor center).

Refs: Gray H, Lewis WH. Gray's Anatomy, ed 20. Lea & Febiger, 1918.
Pellerito J, Polak J. Introduction to Vascular Ultrasonography. Saunders/Elsevier, 2012.

25. All extrinsic muscles of the tongue have the same motor innervation EXCEPT:

a. Genioglossus
b. Hyoglossus
c. Palatoglossus
d. Styloglossus

c: The tongue consists of extrinsic and intrinsic muscles. For motor innervation, all intrinsic (superior longitudinal, inferior longitudinal, transverse, vertical) and extrinsic (genioglossus, styloglossus, hyoglossus) muscles are supplied by efferent motor nerve fibers from the hypoglossal nerve (CN XII), except for the palatoglossus muscle (extrinsic muscle), which is innervated by the pharyngeal plexus via the vagus nerve (CN X). The palatoglossus muscle is considered a muscle of the palate even though it is described as an extrinsic muscle of the tongue.

Ref: Drake RL, Vogl W, Mitchell AM. Gray's Anatomy for Students. Elsevier, 2005.

26. Retraction of the tongue is produced primarily by which two muscles?

a. Right and left genioglossus
b. Styloglossus and hyoglossus
c. Palatoglossus and genioglossus
d. Palatoglossus and stylopharyngeus

b: The four paired intrinsic muscles (superior longitudinal muscle, inferior longitudinal muscle, vertical muscle, and transverse muscle) originate and insert inside the tongue and are responsible for changing the shape of the tongue.

The extrinsic muscles (genioglossus, hyoglossus, styloglossus, and palatoglossus) originate from outside the tongue but insert into the tongue and are responsible for tongue movements.

The following table presents the action of each extrinsic tongue muscle: