

GUIDELINES

Students' independent work during preparation to practical lesson

Academic discipline	HUMAN ANATOMY
Topic	INTERNAL CAROTID AND SUBCLAVIAN ARTERY

1. The relevance of the topic

Pathology of the internal carotid and the subclavian artery influences firstly on the blood supply and functioning of the brain. In the presence of any systemic diseases (atherosclerosis, vascular complications of tuberculosis and syphilis, fibromuscular dysplasia, etc) the lumen of these vessels narrows that causes cerebral ischemia (stroke). So, having knowledge about the anatomy of these vessels is important for determination of the precise localization of the inflammation and further treatment of these diseases.

2. Specific objectives:

- define the beginning and demonstrate the course of the internal carotid artery.
- determine and demonstrate parts of the internal carotid artery.
- determine and demonstrate branches of the internal carotid artery.
- determine and demonstrate topography of the left and right subclavian arteries.
- determine three parts of subclavian artery, demonstrate branches of each of it and areas, which they carry the blood to.

3. Basic level of knowledge.

1. Demonstrate structural features of cervical vertebrae and chest.
2. Demonstrate the anatomical structures of the external and internal basis of the cranium.
3. Demonstrate muscles of the head, neck, chest, diaphragm and abdomen.
4. Demonstrate parts of the brain.
5. Demonstrate structure of the eye.
6. Demonstrate the location of the internal ear.
7. Demonstrate internal organs of the neck and thoracic cavity.
8. Demonstrate aortic arch and its branches.

4. Task for independent work during preparation to practical classes

4.1. A list of the main terms, parameters, characteristics that need to be learned by student during the preparation for the lesson.

Term	Definition
INTERNAL CAROTID ARTERY	The artery is located in the inner side of the neck in contrast to the external carotid artery. It arises from the common carotid artery at cervical vertebral level 3 or 4; the internal carotid artery supplies the brain including eyes, while the external carotid takes the blood to other portions of the head, such as face, scalp, skull, and meninges.
CERVICAL SEGMENT	Or C1. This part of the internal carotid, extends from the carotid bifurcation until it enters the carotid canal in the skull anteriorly to the jugular foramen.
PETROUS SEGMENT	Or C2, petrous part of the internal carotid is inside the petrous part of the temporal bone. This segment extends until the foramen lacerum.

	The petrous portion classically has three sections: an ascending, or vertical portion; the genu, or bend (knee); and the horizontal portion.
LACERUM SEGMENT	Or C3, is a short segment that begins above the foramen lacerum and ends at the petrolingual ligament, a reflection of periosteum between the lingula and petrous apex (or petrosal process) of the sphenoid bone.
CAVERNOUS SEGMENT	Or C4, of the internal carotid artery begins at the petrolingual ligament and extends to the proximal dural ring, which is formed by the medial and inferior periosteum of the anterior clinoid process. The cavernous segment is surrounded by the cavernous sinus.
CLINOID SEGMENT	Or C5, is another short segment of the internal carotid artery that begins when the artery exits the cavernous sinus at the proximal dural ring and extends distally to the distal dural ring, after which the carotid artery is considered "intra-dural" and enters the subarachnoid space.
OPHTHALMIC SEGMENT	The ophthalmic segment, or C6, extends from the distal dural ring, which is continuous with the falx cerebri, to the origin of the posterior communicating artery. The ophthalmic segment courses roughly horizontally, parallel to the optic nerve, which runs supramedially to the artery at this point.
COMMUNICATING SEGMENT	Or terminal segment, or C7, of the internal carotid artery passes between the optic and oculomotor nerves to the anterior perforated substance at the medial extremity of the lateral cerebral fissure. Angiographically, this segment extends from the origin of the posterior communicating artery to the bifurcation of the internal carotid artery.
SUBCLAVIAN ARTERIES	Paired arteries of the upper thorax, below the clavicle. They receive blood from the aortic arch.
LEFT SUBCLAVIAN ARTERY	It supplies blood to the left arm.
RIGHT SUBCLAVIAN ARTERY	It supplies blood to the right arm, with some branches supplying the head and thorax.
VERTEBRAL ARTERY	Runs cranially in the transverse foramina of the cervical vertebrae, joins the vertebral artery on the contralateral side, forming the basilar artery and joins the circle of Willis.
INTERNAL THORACIC ARTERY	Runs caudally behind the ribs, giving off anterior intercostal branches, perforating vessels to the breast and terminating in the superior epigastric artery and the musculophrenic artery
THYROCERVICAL TRUNK	Very short. Divides into inferior thyroid artery, suprascapular artery and transverse cervical artery (also called cervicodorsal trunk)
COSTOCERVICAL TRUNK	Splits into superior intercostal artery and deep

	cervical artery.
DORSAL SCAPULAR ARTERY	Passes backwards to supply levator scapulae and rhomboids.

4.1. Theoretical questions for the lesson:

1. Where does the internal carotid artery originate from common carotid artery?
2. Describe flexures which are formed by the internal carotid artery.
3. Name branch of the ophthalmic artery that carries blood to the dura mater encephali.
4. What are the branches that are going from ophthalmic artery to the nasal cavity?
5. Name branches of the internal carotid artery supplying to the brain.
6. Name the arteries that form the arterial circle of the brain (circle of Willis).
7. Name the topographic parts of the subclavian artery.
8. Name branches of the vertebral artery that go to the spinal cord.
9. Name branches of the subclavian artery, that take part in blood supply of the spinal cord.

4.2. The list of practical skills:

- Aortic arch
- Common carotid artery
- The bifurcation of the common carotid artery
- Parts of the internal carotid artery
- Ophthalmic artery
- Anterior cerebral artery
- Middle cerebral artery
- Posterior communicating artery
- Vertebral artery
- Posterior cerebral artery
- The arterial circle of the brain (of Willis)
- Branches of the subclavian artery

5. Sources:

Anatomy international nomenclature	http://anatom.ua/anatomical-terminology/
LECTURE	https://anatom.ua/basis/english/lectures/
Textbook 'Human anatomy'	PP. 292-301 http://anatom.ua/basis/english/online-book-in-english/
Work Book (Coloring book)	PP. 103-104
Atlas of human anatomy (Sobotta)	PP. 104, 112-114, 125-129
QUIZES	https://anatom.ua/basis/english/tests/
VIDEO	https://anatom.ua/basis/video/

6. Materials for self-control:

1. The internal carotid artery (a. carotis interna) enters the canalis caroticus. Where is canalis caroticus located?
 - A. in the base of the skull
 - B. in the temporal bone
 - C. in the occipital bone
 - D. in the parietal bone
 - E. in the maxilla

2. Where does internal carotid artery originate?
 - A. at the level of the superior edge of the thyroid cartilage
 - B. at the level of the inferior border of the thyroid cartilage
 - C. in the temporal bone
 - D. in the base of the skull
 - E. at the sternoclavicular joint

3. Choose branches of the internal carotid artery in the region of the neck.
 - A. superior thyroid artery, lingual artery, occipital artery, ophthalmic artery, anterior cerebral artery, middle cerebral artery
 - B. superior and inferior thyroid arteries, posterior auricular artery
 - C. superior thyroid artery, sternocleidomastoid artery, ophthalmic artery, anterior cerebral artery, middle cerebral artery, choroid artery
 - D. ophthalmic artery, anterior cerebral artery, middle cerebral artery, choroid artery, posterior communicating artery
 - E. internal carotid artery does not give off branches in the region of the neck

4. Where does the internal carotid artery enter the cavity of the skull?
 - A. in the base of the skull
 - B. at the top of the pyramid of the temporal bone
 - C. in the sulcus caroticus of the sphenoid bone
 - D. in the cavernous sinus
 - E. at the canalis opticus

5. Where does the common carotid artery bifurcate into the internal and external carotid arteries?
 - A. at cervical vertebral level 2
 - B. at cervical vertebral level 3 or 4
 - C. at cervical vertebral level 5 or 6
 - D. at cervical vertebral level 6
 - E. at cervical vertebral level 6 or 7

6. Choose the correct statement about the cervical part of the internal carotid artery?
 - A. It passes between the optic and oculomotor nerves to the anterior perforated substance at the medial extremity of the lateral cerebral fissure
 - B. It extends from the distal dural ring, which is continuous with the falx cerebri, to the origin of the posterior communicating artery
 - C. It begins after the artery exits the cavernous sinus at the proximal dural ring and extends distally to the distal dural ring
 - D. It begins at the petrolingual ligament and extends to the proximal dural ring, which is formed by the medial and inferior periosteum of the anterior clinoid process
 - E. It extends from the carotid bifurcation until it enters the carotid canal in the temporal bone of the skull anteriorly to the jugular foramen

7. Choose the correct statement about the terminal segment of the internal carotid artery?

- A. It passes between the optic and oculomotor nerves to the anterior perforated substance at the medial extremity of the lateral cerebral fissure
- B. It extends from the distal dural ring, which is continuous with the falx cerebri, to the origin of the posterior communicating artery
- C. It begins after the artery exits the cavernous sinus at the proximal dural ring and extends distally to the distal dural ring
- D. It begins at the petrolingual ligament and extends to the proximal dural ring, which is formed by the medial and inferior periosteum of the anterior clinoid process
- E. It extends from the carotid bifurcation until it enters the carotid canal in the temporal bone of the skull anteriorly to the jugular foramen

8. Choose the correct statement about the ophthalmic segment of the internal carotid artery?

- A. It passes between the optic and oculomotor nerves to the anterior perforated substance at the medial extremity of the lateral cerebral fissure
- B. It extends from the distal dural ring, which is continuous with the falx cerebri, to the origin of the posterior communicating artery
- C. It begins after the artery exits the cavernous sinus at the proximal dural ring and extends distally to the distal dural ring
- D. It begins at the petrolingual ligament and extends to the proximal dural ring, which is formed by the medial and inferior periosteum of the anterior clinoid process
- E. It extends from the carotid bifurcation until it enters the carotid canal in the temporal bone of the skull anteriorly to the jugular foramen

9. Choose the correct statement about the cavernous segment of the internal carotid artery?

- A. It passes between the optic and oculomotor nerves to the anterior perforated substance at the medial extremity of the lateral cerebral fissure
- B. It extends from the distal dural ring, which is continuous with the falx cerebri, to the origin of the posterior communicating artery
- C. It begins after the artery exits the cavernous sinus at the proximal dural ring and extends distally to the distal dural ring
- D. It begins at the petrolingual ligament and extends to the proximal dural ring, which is formed by the medial and inferior periosteum of the anterior clinoid process
- E. It extends from the carotid bifurcation until it enters the carotid canal in the temporal bone of the skull anteriorly to the jugular foramen

10. Choose the correct statement about the clinoid segment of the internal carotid artery?

- A. It passes between the optic and oculomotor nerves to the anterior perforated substance at the medial extremity of the lateral cerebral fissure
- B. It extends from the distal dural ring, which is continuous with the falx cerebri, to the origin of the posterior communicating artery
- C. It begins after the artery exits the cavernous sinus at the proximal dural ring and extends distally to the distal dural ring
- D. It begins at the petrolingual ligament and extends to the proximal dural ring, which is formed by the medial and inferior periosteum of the anterior clinoid process
- E. It extends from the carotid bifurcation until it enters the carotid canal in the temporal bone of the skull anteriorly to the jugular foramen

11. What segment of the internal carotid artery passes inside the petrous part of the temporal bone and extends reaching the foramen lacerum?

- A. clinoid segment
- B. cavernous segment
- C. ophthalmic segment

- D. communicating segment (terminal segment)
- E. petrous segment

12. What segment of the internal carotid artery begins above the foramen lacerum and ends at the petrolingual ligament, a reflection of periosteum between the lingula and petrous apex (or petrosal process) of the sphenoid bone?

- A. lacerum segment
- B. cavernous segment
- C. ophthalmic segment
- D. petrous segment
- E. terminal segment

13. What branch of internal carotid artery drains to the a. cerebri posterior?

- A. ophthalmic artery
- B. anterior cerebral artery
- C. middle cerebral artery
- D. choroid artery
- E. posterior communicating artery

14. What branch of the internal carotid artery passes laterally into the depth of the lateral cerebral sulcus?

- A. ophthalmic artery
- B. anterior cerebral artery
- C. middle cerebral artery
- D. choroid artery
- E. posterior communicating artery

15. What branch of the internal carotid artery stretches forward medially to the beginning of the longitudinal sulcus of the brain?

- A. ophthalmic artery
- B. anterior cerebral artery
- C. middle cerebral artery
- D. choroid artery
- E. posterior communicating artery

16. What branch of the internal carotid artery penetrates the canalis opticus reaching the orbital cavity?

- A. ophthalmic artery
- B. anterior cerebral artery
- C. middle cerebral artery
- D. choroid artery
- E. posterior communicating artery

17. Choose the branch of the first segment of the subclavian artery.

- A. vertebral artery
- B. choroid artery
- C. occipital artery
- D. carotid artery
- E. middle cerebral artery

18. What artery is formed by the fusion of both (right and left) vertebral arteries?

- A. axillary artery
- B. ophthalmic artery

- C. choroid artery
- D. basilar artery
- E. posterior communicating artery

19. Where does internal thoracic artery pass?

- A. in the transverse foramina of the cervical vertebrae
- B. below the clavicle
- C. backwards the scapula
- D. caudally behind the ribs
- E. under the clavicle

20. What is the continuation of the subclavian artery?

- A. basilar artery
- B. axillary artery
- C. internal thoracic artery
- D. thyrocervical trunk
- E. costocervical trunk

ANSWERS:

1	B
2	A
3	E
4	B
5	B
6	E
7	A
8	B
9	D
10	C
11	E
12	A
13	E
14	C
15	B
16	A
17	A
18	D
19	D
20	B