

GUIDELINES

Students' independent work during preparation to practical lesson

Academic discipline	HUMAN ANATOMY
Topic	BRACHIAL PLEXUS

1. The relevance of the topic

The brachial plexus is one of the largest and most important plexuses, because the axons of it take part in innervation of all muscles of upper extremity, muscles of back and chest. Acquired knowledge is the basis for various fields of practical medicine, such as neurology, surgery, traumatology.

2. Specific objectives

The student should know and be able to:

- define spinal nerves
- classify the rami of spinal nerve
- draw a scheme of spinal nerve in cervical and thoracic region of spinal cord
- define the concept of plexus of somatic nerves
- understand the formation of brachial plexus
- name and demonstrate the brachial plexus: roots, trunks, divisions, cords
- assess the information about state of nerves of upper extremity in terms of malfunctions, be able to localize the pathological process.
- draw the scheme of peripheral innervation of skin of neck, trunk and upper extremity.

3. Basic level of student's knowledge includes:

- Anatomy of the vertebrae and their specific features of structure according to the location.
- Structure of upper extremity, joints, muscles, topography and fascia of upper limb.
- Structures of muscles of neck, chest and back.
- General information about the structure of spinal cord.
- Be able to describe the formation of muscles of back, chest and upper limbs.
- Know the embryonic classification of muscles of neck, back, chest and upper limbs.

4. Task for independent work during preparation to practical classes

4.1. List of basic terms, options, features, that student must know when preparing to the lesson.

Term	Definition
BRACHIAL PLEXUS	The brachial plexus is a network (plexus) of nerves (formed by the anterior rami of the lower four cervical nerves and first thoracic nerve (C5, C6, C7, C8, and T1). This plexus extends from the spinal cord, through the cervicoaxillary canal in the neck, over the first rib, and into the armpit. It supplies afferent and efferent nerve fibers to the chest, shoulder, arm, forearm, and hand.
SUPERIOR TRUNK	The upper (superior) trunk is part of the brachial plexus. It is formed by joining of

	<p>the ventral rami of the fifth (C5) and sixth (C6) cervical nerves. The upper trunk divides into an anterior and posterior division.</p> <p>The branches of the upper trunk from proximal to distal are:</p> <ul style="list-style-type: none"> -subclavian nerve (C5-C6) -suprascapular nerve (C5-C6) -anterior division of upper trunk (C5-C6, forms part of lateral cord) -posterior division of upper trunk (C5-C6, forms part of posterior cord) <p>The axillary, radial, musculocutaneous and median nerves all contain axons derived from the upper trunk.</p>
MIDDLE TRUNK	Continuation of C7
INFERIOR TRUNK	Combination of C8 and T1 roots
DORSAL SCAPULAR NERVE	It arises from the brachial plexus, usually from the plexus root (anterior/ventral ramus) of the cervical nerve C5. Once the nerve leaves C5 it commonly pierces the middle scalene muscle, and continues deep to levator scapulae and the rhomboids (minor superior to major).
SUBCLAVIAN NERVE	The subclavian nerve or nerve to the subclavius is small branch of the upper trunk of the brachial plexus where C5 and C6 join. It contains axons derived from the ventral rami of the fifth (C5) and sixth (C6) cervical nerves. The subclavian nerve provides motor innervation to the subclavius muscle.
THORACODORSAL NERVE	The thoracodorsal nerve is a nerve present in humans and other animals, also known as the middle subscapular nerve or the long subscapular nerve. It supplies the latissimus dorsi muscle.
LONG THORACIC NERVE	The long thoracic nerve is the motor nerve to the serratus anterior muscle, which functions to pull the scapula forward around the thorax, allowing for anteversion of the arm, and to lift the ribs, assisting in respiration.
MEDIAL PECTORAL NERVE	The medial pectoral nerve (also known as the medial anterior thoracic nerve) arises from the medial cord (sometimes directly from the anterior division of the inferior trunk) of the brachial plexus and through it from the eighth cervical and first thoracic roots.

SUPRASCAPULAR NERVE	The suprascapular nerve is a nerve that branches from the upper trunk of the brachial plexus. It is responsible for the innervation of two of the muscles that originate from the scapula, namely the supraspinatus and infraspinatus muscles.
SUBSCAPULAR NERVES	The subscapular nerves are innervated by the posterior division of the brachial plexus. These nerves are part of a group of nerves that innervate the muscles that move the scapula. The upper subscapular nerve inserts directly into the upper portion of the subscapularis muscle, thus innervating it.
AXILLARY NERVE	The axillary nerve or the circumflex nerve is a nerve of the human body, that originates from the brachial plexus (upper trunk, posterior division, posterior cord) at the level of the axilla (armpit) and carries nerve fibers from C5 and C6.
MEDIAN NERVE	The median nerve is the main nerve of the front of the forearm. It supplies the muscles of the front of the forearm and muscles of the thenar eminence, thus controlling the coarse movements of the hand. Therefore, it is also called "labourer's nerve".
ULNAR NERVE	The ulnar nerve is a nerve that runs near the ulna. The ulnar collateral ligament of elbow joint is in relation with the ulnar nerve. The nerve is the largest in the human body unprotected by muscle or bone, so injury is common. This nerve is directly connected to the little finger, and the adjacent half of the ring finger, innervating the palmar aspect of these fingers, including both front and back of the tips, perhaps as far back as the fingernail beds.
RADIAL NERVE	The radial nerve is a nerve in the human body that supplies the posterior portion of the upper limb. It innervates the medial and lateral heads of the triceps brachii muscle of the arm, as well as all 12 muscles in the posterior osteofascial compartment of the forearm and the associated joints and overlying skin.

4.2. Theoretical questions for the lesson

1. Demonstrate on the skeleton all anatomical structures of vertebral column on cervical and thoracic sections.
3. What are the components of spinal ganglion?
4. Where is the spinal ganglion located?
5. Define the spinal ganglion and its location.
6. Name rami of spinal nerve.
8. Name all trunks, roots and divisions and cords of brachial plexus.
9. Describe the localization of supraclavicular part of brachial plexus, its components.
10. Describe the localization of subclavicular part of brachial plexus, its components.
11. Name short roots of brachial plexus, define their topography.
12. Name long roots of brachial plexus, define their topography.
13. What are core components of brachial plexus? Define the localization, parts and roots of brachial plexus.
14. Describe and demonstrate the trunks and cords of brachial plexus.
15. Localization of supraclavicular part of brachial plexus, their components, and demonstrate it on preparation.
16. Localization of subclavicular part of brachial plexus, their components, and demonstrate it on preparation.
17. Name short rami of brachial plexus, areas of innervation, describe and demonstrate on preparation.
18. Name long rami of brachial plexus, areas of innervation, describe and demonstrate on preparation.
19. Demonstrate on preparation the musculocutaneous nerve, define its formation, areas of innervation and describe its rami.
20. Demonstrate on preparation median nerves, define their formation, areas of innervation and describe their rami.
21. Demonstrate on preparation the radial nerves, define their formation, areas of innervation and describe their rami.
22. Demonstrate on preparation the ulnar nerves, define their formation, areas of innervation and describe their rami.
23. Describe the innervation of muscles of shoulder girdle and demonstrate them on preparation.
24. Describe the innervation of muscles of arm and demonstrate them on preparation.
25. Describe the innervation of forearm muscles and demonstrate them on preparation.
26. Describe the innervation of muscles of the hand and demonstrate them on preparation.
27. Name the joints of shoulder girdle, describe their innervation and demonstrate on preparation.
28. Describe the innervation of shoulder joint and demonstrate it on preparation.
29. Describe the innervation of elbow and demonstrate it on preparation.
30. Describe the innervation of wrist and demonstrate it on preparation.
31. Describe the innervation of fingers.
32. Describe the innervation of first finger (all surfaces).
33. Describe the innervation of the skin of shoulder girdle.
34. Describe the innervation of the skin of forearm.
35. Describe the innervation of the skin of wrist (all surfaces).

5. Sources

Anatomy nomenclature	international http://anatom.ua/anatomical-terminology/
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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. Brachial plexus is formed by _____
 - A. posterior rami of C5, C6, C7, C8, and T1
 - B. anterior rami of C5, C6, C7, C8, and T1
 - C. posterior rami of C5, C6, C7
 - B. anterior rami of C6, C7, C8, and T1
 - E. anterior rami of C4 - C8

2. How many roots does brachial plexus have?
 - A. 1
 - B. 2
 - C. 3
 - D. 4
 - E. 5

3. How many divisions does brachial plexus have?
 - A. 3
 - B. 4
 - C. 5
 - D. 6
 - E. 7

4. How many trunks does brachial plexus have?
 - A. 1
 - B. 2
 - C. 3
 - D. 4
 - E. 5

5. How many branches does brachial plexus have?
 - A. 1
 - B. 2
 - C. 3
 - D. 4
 - E. 5

6. How many cords does brachial plexus have?
 - A. 1
 - B. 2

- C. 3
- D. 4
- E. 5

7. Which of the following is not a nerve of brachial plexus?

- A. Median nerve
- B. Ulnar nerve
- C. Lateral pectoral nerve
- D. Phrenic nerve
- E. Axillary nerve

8. Latissimus dorsi is innervated by

- A. median nerve
- B. thoracodorsal nerve
- C. axillary nerve
- D. lateral pectoral nerve
- E. long thoracic nerve

9. Lateral pectoral nerve innervates

- A. pectoralis minor, pectoralis major and latissimus dorsi
- B. pectoralis major and latissimus dorsi
- C. pectoralis major and pectoralis minor
- D. pectoralis minor, pectoralis major and pectoralis media
- E. pectoralis minor, pectoralis major and external intercostals

10. What types of branches does brachial plexus have?

- A. Muscular and parasympathetic
- B. Parasympathetic only
- C. Sympathetic only
- D. Sympathetic and cutaneous
- E. Cutaneous and muscular

11. The cords of brachial plexus are:

- A. posterior, lateral and medial
- B. inferior, lateral and medial
- C. superior, inferior and lateral
- D. medial and inferior
- E. lateral and medial

12. Dorsal scapular nerve arises from root of _____

- A. C3
- B. C5
- C. C6
- D. C1
- E. C2

13. Thoracodorsal nerve arises from _____

- A. Subscapular nerve
- B. Medial cord of brachial plexus
- C. Ulnar nerve
- D. Posterior cord of brachial plexus

E. Axillary nerve

14. Serratus anterior is innervated by _____

- A. long thoracic nerve
- B. short thoracic nerve
- C. medial thoracic nerve
- D. greater thoracic nerve
- E. lateral thoracic nerve

15. Teres major is innervated by _____

- A. upper subscapular nerve
- B. lower subscapular nerve
- C. medial thoracic nerve
- D. greater thoracic nerve
- E. axillary nerve

16. Triceps brachii is innervated by _____

- A. brachial nerve
- B. ulnar nerve
- C. radial nerve
- D. median nerve
- E. tricephalic nerve

17. The external half of the skin of the palm is innervated by _____

- A. Vidian nerve
- B. Median nerve
- C. Radial nerve
- D. Ulnar nerve
- E. Musculocutaneous nerve

18. The internal half of the skin of the palm is innervated by _____

- A. Vidian nerve
- B. Median nerve
- C. Radial nerve
- D. Ulnar nerve
- E. Musculocutaneous nerve

19. The external half of the skin of the forearm is innervated by _____

- A. Vidian nerve
- B. Median nerve
- C. Radial nerve
- D. Ulnar nerve
- E. Musculocutaneous nerve

20. The internal half of the skin of the forearm is innervated by _____

- A. Vidian nerve
- B. Median nerve
- C. Radial nerve
- D. Ulnar nerve
- E. Medial cutaneous nerve of the forearm

ANSWERS:

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