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YOUTH DEVELOPMENTS AND INNOVATIONS IN REM HEAD TREPANATION. (THIS WORK IS DEDICATED TO THE DEVELOPMENT OF TREPANATION METHODS FOR STUDENTS USING THE EXAMPLE OF A RAM HEAD).

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Abstract

The subject of neurosurgery has been improved over the years and is provided with high-tech equipment, and therefore the number of students, residents and young scientists interested in the field of neurosurgery is growing. In the formation of practical skills, it is important to study them step by step; the role of simulation equipment and animal models is important in this. The choice of experimental animal in different countries depends on economic, geographical and religious worldviews.

Keywords: Analysis of the use of the ovis aries (sheep) head to develop neurosurgical skills of students and residents.

Materials and methods: For this work, we used 12 sheep, artiodactyl mammals from the ram family, the bovid family. Of these, 9 are males and 3 are females, ranging in age from 9 to 15 months. With permission from the Ethics Committee of the Republic of Uzbekistan KL1225939005. We chose this animal depending on the anatomical similarity of the structure of the skull, brain and nasal cavity with a person, which is extremely important for simulation actions.

The head was prepared for dissection several days before dissection. First, it is washed with running water and then placed in a three-liter container of water with the addition of 3 tablespoons of alcohol vinegar. Soak in this solution for 24 hours and dry for 30 minutes, then freeze at –18 °C until dissection and trepanation. The day before work, the head is defrosted, washed and dried. A special vice is used to secure the head. For trepanation, we divided the models into 3 groups: 1) for frontal craniotomy-4, 2) for access to the base of the skull-4, 3) for access to the posterior cranial fossa-4.

Research results: Trepanation of the skull. At the point of greatest dullness of percussion sound or softening of the bone, a semicircular skin incision is made so that the base of the skin flap faces during trepanation: a) in the frontal region - to the base of the horns; b) in the parietal and temporal regions—laterally; c) in the region of the occipital lobe of the cerebral hemispheres and the cerebellum - caudally.

After dissecting the soft tissue, the flap is separated from the periosteum and moved to the side. Bleeding vessels are twisted with hemostatic tweezers or bandaged. Stopping the bleeding must be thorough and final to prevent blood from flowing into the cranial cavity. The periosteum is dissected along a semicircular line, but in the direction opposite to the skin incision and, having been separated from the bone with a raspatory, is also turned away. The bone wall of the cranial cavity is opened, depending on the presence and degree of softening of the bone, with a trephine or scalpel. The diameter of the burr hole ranges from 6 to 12 mm. The exposed dura mater, lifted with thin tweezers, is cut crosswise with a pointed scalpel or the tip of an injection needle.

During osteoplastic trephination, an aponeurotic skin flap is cut out, then the section of the sawed bone is temporarily removed, and after the operation is completed, it is placed in place. General points of the operation:

1A skin incision in the corresponding area of the head to approach the area of interest in the brain (adequate hemostasis is important here);

2Detachment of the muscular aponeurotic helmet with the formation of a flap;

3Peeling of the periosteum using a rasp;

4Applying burr holes with a trephine-turner and sawing out the bone between the holes;

5Section of the dura mater (DRM).

In this case, we demonstrate the performance of osteoplastic trephination on a model of a ram's head. After opening the dura mater, the skills of dissection of the arachnoid membrane in the interhemispheric fissure were developed with access to the corpus callosum and lateral ventricle under an operating microscope. When training as a neurosurgeon, working with brain tissue is an invaluable experience!

The nasal septum does not have a vomer, which becomes clear during endoscopy of the posterior and deep parts of the nasal cavity. The inferior turbinate of the sheep's nasal cavity is very similar to the middle turbinate in humans. In veterinary terminology, it is called concha ventralis, which refers to the anterior nasal concha. According to the anatomical nomenclature of veterinarians, the middle turbinate (what in humans is called concha nasalis media) in a ram is localized deep in the posterior parts of the nasal cavity and can be clearly visible only with almost complete removal of the inferior turbinate. The inferior turbinate of a sheep consists of two parts: the upper (pars dorsalis) and the lower (pars ventralis). The nasal septum is straight, like in all four-legged animals. The maxillary sinus consists of two parts (subsinuses), divided by a cruciform plate emanating from the bottom of the sinus into a lateral section, called the maxillary sinus proper, and a medial section, called the palatine sinus. The upper free edge of the cruciate plate has a canal for the infraorbital nerve. Performing a median astrostomy is not difficult if you follow the instructions carefully. The posterior wall of both subsines of the maxillary sinus is also the anterior orbital wall, which makes it easy to perform endoscopic decompression of the orbit. The frontal sinus consists of clusters of small cavities located in a semicircle in the thickness of the frontal bone, as if forming a crown. Access to the frontal sinus is also easy if you focus on the superior nasal concha, moving the endoscope along it deep into the nose, as if through a pipe. Moving in this direction, the surgeon finds the so-called supraorbital cell of the frontal sinus located most anteriorly. The main sinus is absent in many tetrapods. Dissection consists of 10 classic stages: 1 - removal of the inferior turbinate; 2 - examination of the nasopharynx and the mouth of the auditory tubes on both sides; 3 - access to the middle turbinate, removal of the uncinate process and median antrostomy with visualization of the cruciate plate of the sinus, which divides it into two sections: lateral (maxillary sinus proper) and medial (palatinal sinus)); 4 - identification of the posterior wall of the palatinal sinus, which is also the medial half of the anterior orbital wall, the continuation of which is the lateral half or posterior wall of the maxillary sinus proper; 5 — performing endonasal endoscopic decompression of the orbit; 6 - ethmoidectomy; 7 - formation of an artificial defect at the base of the skull to expose the dura mater; 8 — placement of a flap to close fistulas with possible liquorrhea; 9 - removal of the so-called tubular formation, the dorsal concha, to approach the anterior part of the roof of the nasal cavity and along the dorsal concha to the supraorbital first cell of the frontal sinus. Following this cell, the surgeon has the opportunity to open the entire frontal sinus; 10 - removal of the uppermost part of the nasal septum in order to reach the bottom of the frontal sinus and open it bilaterally. These same steps can be repeated on the other side. Thus, the authors of the article conclude that since endoscopic dissection courses are quite expensive, and repeated training sessions are required to successfully acquire skills in functional endoscopic surgery, using the ram's head as a model can be a good help for novice surgeons.

The thickness of the frontal bone at the anterior surgical border reaches an average of 14 mm in rams and 7 mm in sheep; at the frontoparietal suture in the ram it is 10-12 mm, in the sheep it is 5-7 mm. The parietal bone is 5-7 mm thick in a ram, 4-5 mm in a sheep, and the parietal part of the squama of the occipital bone is 6-7 mm. Unlike the horse and dog, the parietal sections of the cranial vault in sheep are not covered with muscles (except for the thin ear muscle) and therefore, like the frontal sections, are good operational access to various parts of the brain. The internal vault of the skull consists of two sections: the anterior - for the cerebral hemispheres and the posterior - for the cerebellum and medulla oblongata. On the midsagittal line of the anterior fornix there is an internal sagittal ridge, which serves as the attachment point for the sagittal (crescent) fold of the dura mater. At the level of the interparietal bone there is a transverse ridge on which a transverse fold of the dura mater (cerebellar tentorium) is fixed. Lymphatic spaces between the membranes of the brain. The dura mater is closely adjacent to the inner surface of the skull, and at the protrusion of the bones it is firmly connected to the latter. '/ It fuses with the inner periosteum of the skull, which is why there is no epidural space between the wall of the skull and the hard shell.

Between the hard and arachnoid membranes there is a slit-like subdural space filled with lymphatic fluid (CSF).

Ventricles of the brain. Inside the cerebral hemispheres are the lateral cerebral ventricles. The third cerebral ventricle lies in the optic thalamus, and the fourth lies between the cerebellum and medulla oblongata. All of them are connected to each other, and the fourth ventricle, in addition, is connected to the central spinal canal and to the cavities of the subarachnoid space. The topography of the cerebral ventricles is taken into account when searching for the coenurus vesicles.

Dorsal venous sinuses. Through these sinuses, as well as through the dorsal cerebral and other veins, blood flows from the brain and its membranes. In the area of the temporal fossa, part of the blood from the sinuses enters the deep temporal veins through the zmissariae in the wall of the skull. At the base of the falciform fold lies the sagittal sinus; caudally it connects with the right and left interconnected transverse sinuses, located at the base of the cerebellar tentorium. Each of them goes to the temporal canal on its side and, upon exiting it, becomes the dorsal cerebral vein. The projection of the dorsal venous sinuses onto the cranial vault is shown in Figure 133, p. Operational access. 1) To expose the frontal lobe of the cerebral hemispheres, a burr hole is made behind the anterior surgical border, 3-5 mm to the side of the midline; 2) access to the parietal lobe is possible along the entire area of the dorsal plate of the parietal bone, 2-3 mm lateral to the midline; 3) the temporal lobe can be penetrated by craniotomy along the temporal crest; 4) to the occipital lobe—in the area located directly in front of the occipital-parietal suture, 2-3 mm laterally from the midline; 5) to provide access to both hemispheres of the cerebellum, a hole is punched along the midline, directly in front of the occipital crest and behind the occipital-parietal suture. The listed surgical approaches are developed taking into account the topography of the dorsal venous sinuses.

Conclusion: Using a ram's head as a model for functional endoscopic surgery is much cheaper; in the future, when developing skills, it is possible to use the head of a human corpse.

Literature review.

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