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## **Development peculiarities of the upper side of the nasal septum in the embryonic period of the human ontogenesis**

**Abstract:** By means of the morphological investigation and statistical experimentation on 25 corpses of the human embryos the peculiarities of the upper side of the nasal cavity formation were investigated. It was ascertained that the upper side is formed of the surfaces of two nasal bones, nasal part of the frontal bone, partly frontal outgrowths of the upper jaws, perforated plate of the ethmoid bone and frontal and upper sides of the wedge-shaped bone. At the early stage of the embryonic period some series of the upper side structures have cartilaginous structure, and at the end –there are ossification zones in the separate constituents.

**Keywords:** upper side of the nasal cavity, embryo, anatomy, human.

Taking into account much care of the premature infants after the appropriate edict of the WHO much attention should be paid to the vital functions, especially the respiratory system. That is why it is necessary to study and elaborate the formations' structure, which support the permeability of the upper respiratory tract [1]. WHO pays special attention to the structure and functioning of the systems and organs of the infants that were born with low weight and on the 22<sup>nd</sup> and more weeks after the gestation period [2, 3]. As the weakest part of the newborn immature infant is the respiratory system, methods supporting the permeability of the upper respiratory tract are quite important. The first step on this stage is supporting the permeability of the upper respiratory tract – needs defining the exact organ and structures' characteristics, which build these tracts [4, 5].

The immature infants don't only have weak respiratory system but also sensory system, especially the visual organ and the olfactory analyzer, which is placed on the upper side of the nasal cavity. The olfactory system phylogenetically is one of the oldest systems of the organisms and for most mammals is the main analyzer. The sense of smell in humans is not as good as in some animals, though the cerebral mechanisms of the human's sense of smell are connected to the fundamental mechanisms of the motivation and emotion formation [6, 8]. Thus, in our opinion the investigation of the upper side of the nasal septum structure is quite an important topic in the modern morphology.

**The aim** is to investigate the peculiarities of the development of the upper side of the nasal septum in the embryonic period in the human's ontogenesis.

**Tools and methods.** The investigation was carried out on 25 preparations of the embryo corpses by means of the micro-, macro-dissection, histological, plastic and graphic reconstruction, rontgenological, magnetic resonance tomography, making the 3D-constructural models, morphometry and statistical data-processing.

**The investigation results and discussion.** Investigating the development of the upper side of the nasal septum in the 4-month embryo 81,0134,0 mm of the vertebrae-coccine length (VC length) showed that the upper side of the nasal septum in the frontal section is formed from the inner surfaces of two nasal bones and nasal part of the pair frontal bone. Nasal bones have a form of the cut cone. Its size is 2,5 – 3,8 mm – length, 1,5 – 2,6 mm – diameter. They are connected together by a plain bone suture. Side edges of the nasal bone are connected by the plain suture with the frontal outgrowths of the upper jaws. The frontal part of the upper side partly completes the frontal outgrowths of the upper jaws. Nasal part of the frontal bone is placed between the ocular parts and encloses the ethmoid groove. From the nasal part in the middle down there is a small crest, which ends up with the nose barb. In the central part the upper side is formed of the perforated plate of the ethmoid bone, presented by the cartilaginous tissue. The frontal back size of the perforated plate grows from 5,0 mm (at the beginning of the fourth month) to 7,5 mm (at the end of the fourth month), and diametral – from 1,6 to 2,0 accordingly. In the back section the upper side of the nasal cavity is completed with the frontal and lower sides of the wedge-shaped bone. On the frontal side of the wedge-shaped bone there is a wedge-shaped crest, which ends up with a wedge-shaped beak. In 26% cases the frontal and upper sides of the wedge-shaped bone form a right angle, and in 74 % - an obtuse angle.

Having investigated the preparations of the embryo's nasal cavity 135,0 – 185,0 mm VC length (fifth month of the embryonic development) it is defined that the linear size of the nasal bones which form the inner surface of the upper side of the nasal cavity grows from 3,8 to 4,5 mm, diametral – from 2,6 to 2,8 mm. The nasal part of the frontal bone is connected to the nasal bones with the help of the plain suture, and with the perforated plate of the ethmoid bone by the dentate suture. The perforated plate forms the middle part of the upper side which had the cartilaginous structure before. Its frontal back size is 11,0 mm, and diametral – 2,6 mm. The back part of the upper side is completed with the frontal and upper sides of the wedge-shaped bone. In 17 % they form a right angle, and in 83% - an obtuse angle. While investigating the corpse embryos of the sixth month of the embryonic development 186,0 – 230,0 mm VC length we found out that the size of the nasal bones is bigger comparing to the 5<sup>th</sup> month to 4,5 – 5,0 mm – linear size, and diametral size – to 2,83,2. They have the cut cone form. The perforated plate still has the cartilaginous structure. Its frontal back size reaches 16,0 mm, the biggest diametral size – 3,0 mm. It is penetrated with the openings (from 10 to 15), which join the nasal cavity with the cranial hole. Trunks of the olfactory nerves of the second order go through them, and come into the hair bulbs. Over the perforated plate there is a cockscomb. In the back third the upper side of the nasal cavity is completed with the frontal and lower sides of the wedge-shaped bone, which in 15% cases form a right angle and in 85 % - an obtuse angle.

Having investigated the corpse embryos 231,031,0 mm VC length (seventh, eighth weeks of development) it was found out that the nasal bones comparing to the 6<sup>th</sup> month grow

bigger, linear size – from 5,5 to 7,0 mm, diametral – to 3,4 – 4,4 mm. The perforated plate of the ethmoid bone, like in the previous age period has a cartilaginous structure, its frontal back size reaches 17,0 mm, the biggest diametral – 5,0 mm. It is penetrated with the openings (12 – 18), which join the nasal cavity with the frontal cranial hole. The back third of the upper side of the nasal cavity complete the frontal and lower sides of the wedge-shaped bone. On the frontal side there is a wedge-shaped crest, which ends up with the wedge-shaped beak. From the sides there are small circular openings, which can be formations of the wedge-shaped sinus.

Investigation of the preparations of the embryos 311,0 – 378,0 mm VC length (ninth, tenth months of development) proves that at the end of the embryonic period of the ontogenesis the nasal bones which form the frontal section of the upper side of the nasal cavity have linear size – 7,5 – 8,0 mm, and diametral size – 4,5 – 5,0 mm. The frontal section of the nasal cavity upper side completes with the nasal part of the frontal bone. In the middle part the upper side forms a perforated plate of the ethmoid bone, where the bone tissue areas appear. The frontal back size grows from 17,0 to 18,0 mm, diametral – to 7,0 mm. It is penetrated with openings (diameter 0,2 – 0,38 mm, number 15 – 20), through which the olfactory nerves go joining the nasal cavity with the frontal cranial hole. The back section of the upper side completes the upper and lower sides of the wedge-shaped bone. Thus, due to the investigation results during the embryonic period of development the upper side of the nasal cavity forms. In the middle of the embryonic period (6-7 months) the upper side generally is close to definitive. Later on there are changes mostly of the quantitative character - thickness and size increases.

**Conclusions.** Nasal bones, partly frontal outgrowths of the upper jaws, nasal part of the frontal bone, penetrated plate of the ethmoid bone, frontal and lower sides of the wedge-shaped bone take part in the formation of the upper side of the nasal cavity in the embryonic period of the human development.

**Future research perspectives.** Investigation of the blood supply and morphological structure of the adjacent anatomic formations with the upper side of the nasal cavity.

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