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ANATOMICAL TRANSFORMATIONS OF THE HUMAN NASAL SEPTUM AT JUVENILE AGE

Abstract. 20 biological specimens taken from the nasal part of the juvenile human ontogenesis were examined by means of morphological methods. Peculiarities of the nasal septum structure at this period were studied. Structural transformations of the nasal septum occur at the juvenile age. Small crests are found in the point of connection of the osseous part with the cartilaginous one. When the nasal septum is curved to the left the crests are located on the side of the curvature (2 specimens), and on the opposite from the curvature side (3 specimens). A small depression (rudiment of Jacobson's organ) is found in the anterior-inferior part of the nasal septum on two specimens (10%). Most of the glands are located in the submucous layer of the nasal septum. The mucous membrane of the nasal septum is lined with the high cylindrical ciliated epithelium. The highest concentration of the blood vessels is found in the anterior-inferior part of the nasal septum.

Key words: nasal septum, juvenile age, human ontogenesis.

Introduction. The study of development and formation of syntopogenous interrelations between the organs of the nasal part at different age periods is one of the leading ones in the approach to investigate the human body, as well as a topical task of embryologists, anatomists, traumatologists and surgeons. Examination of the nasal septum is especially reasonable when the effect of unfavourable environmental factors has grown considerably (ecological, chemical, physical) [1-3]. To study the dynamics of changes is appropriate with the purpose to clarify interrelations and mutual effect of the formative processes on the spatial-temporal orientation of anatomical structures, and determination of the time and morphological preconditions of possible occurrence of variants in their structure and congenital defects. The study of etiology, pathogenesis and treatment of congenital and acquired diseases of the nasal septum, chronic tonsillitis, elimination of polyp growth in its mucous membrane, treatment of chronic bleeding, post-traumatic injuries and surgical treatment of the nasal septum perforation are topical nowadays [4-6].

ENT specialists emphasize increasing sickness rate of diseases of the upper respiratory tract, and pathology of the nasal cavity and paranasal sinuses, chronic tonsillitis and dental-facial

defects in particular. It is the nasal septum that is an important structure controlling aerodynamics of air flow, providing warming, moistening and purifying of air, and regulating hormonal balance of the whole body to some extent [7].

Objective: to study peculiarities of the nasal septum structure at the juvenile age, to determine the character of anatomical changes, age individual variability, progressive and regressive reformations.

Materials and methods. The study was conducted on 20 specimens of the nasal part removed from dead bodies of people at the juvenile age. The skulls, head specimens, separate complexes of organs, series of histological and topographic-anatomical sections of the nasal part were used. 5 X-rays and 7 computed tomograms of the head were used.

Results and discussion.

The middle wall of the nasal cavity (nasal septum) is formed by the cartilaginous and osseous parts. The cartilaginous part is formed by clearly seen cartilage of the nasal septum having the shape of an irregular tetragonal lamina.

Anterior-posterior size of the cartilage is $27,0 \pm 1,0$ mm, vertical – $24,0 \pm 0,9$ mm, and thickness – $3,0 \pm 0,05$ mm. Its posterior-inferior border in the form of a small process wedges itself between the anterior edge of the ethmoid bone

perpendicular lamina and the vomer anterior edge. The osseous part is formed by the perpendicular lamina of the ethmoid bone.

Its anterior-posterior size is $32,0 \pm 2,7$ mm. Its vertical size near the anterior extremity of the lamina is $21,0 \pm 1,0$ mm, and near the posterior end – $16,0 \pm 0,24$ mm. The thickness of its osseous walls is $2,5 \pm 0,07$ mm. The perpendicular lamina forms anterior-superior part of the osseous portion of the nasal septum. It adjoins the nasal spine of the frontal bone upwards, and the nasal bones – downwards. It is connected with its anterior extremity with the posterior extremity of the nasal septum cartilage, and downwards – with the anterior edge of the vomer.

A small process is found on the anterior-inferior end of the lamina on 5 specimens (33%), which is directed forward and downward. It wedges itself into the posterior border of the nasal septum cartilage, where the similar depression is found. The posterior-inferior portion of the nasal septum osseous part is supplemented by the vomer. Its anterior extremity is connected with the perpendicular lamina and the nasal septum cartilage. The superior extremity of the vomer passes into the wings embracing the sphenoid rostrum and adjoining the inferior surface of the sphenoid bone body. The longitudinal size of the vomer lamina is $36,0 \pm 0,8$ mm, the biggest vertical one – $22,0 \pm 0,5$ mm. The thickness of the osseous wall is no bigger than 1,5 mm. The wall thickens to 2,3-2,7 mm in the point of origin of its wings. The anterior-posterior size of the wings is 1,0-2,0 mm, the width – 3,0-5,0 mm.

On 10 specimens (50%) the nasal septum occupies relatively middle position and is regular. On 4 specimens (20%) it deviates to the left, and on 6 specimens (25%) – to the right.

Moreover, small crests are found in the point of connection of the osseous part with the cartilaginous one. When the nasal septum is curved to the left the crests are located on the side of the curvature (2 specimens), and on the opposite from the curvature side (3 specimens) (Fig. 5, 6). The anterior-posterior size of the nasal septum is $67,0 \pm 1,3$ mm. Its biggest vertical size is $40,0 \pm 0,8$ mm.

The mucous membrane of the nasal septum is lined with the multinuclear cylindrical ciliated epithelium located on the basal membrane. The

thickness of the mucous membrane is 0,7-0,9 mm. The thickness of the epithelial lining is 40 μ m respectively. Thickening of the mucous membrane is found in the anterior-inferior portion of the nasal septum. It is presented by the erectile tissue and salivary glands. The erectile bodies are presented by a thin network of blood vessels located superficially and larger vascular network located deeply. Smooth muscle and elastic fibers are found in their wall. Thickening of the anterior-superior part of the nasal septum mucous membrane is presented by aggregation of the glandular apparatus. Olfactory cells are located on the nasal septum. Their processes pass upwards and connect into thin threads, and close to the perforated lamina they join into larger trunks. A small depression (rudiment of Jacobson's organ) is found in the anterior-inferior part of the nasal septum on two specimens (10%).

Most of the glands are located in the submucous layer of the nasal septum. Their number decreases in the direction to the nasal vestibule and choanae.

Both anterior and posterior ethmoid arteries penetrate through the ethmoid openings into the upper wall of the nasal cavity. Then they divide dichotomically into the branches of the second order (lateral and middle).

The lateral branch passes downwards along the lateral wall closer to the hard frame. The middle branch reaches the nasal septum practically horizontally. Each of the above branches divides into 5-8 smaller branches of the third order in the portion of the nasal septum in the shape of a fan. In their turn they divide into branches of the following orders.

The sphenoid-palatine artery enters the posterior part of the nose through the sphenoid-palatine opening, where it passes the posterior artery of the nasal septum to it.

The posterior artery of the nasal septum is of horizontal direction, it enters the posterior portion of the nasal septum where it divides dichotomically into the branches of the second order: upper and lower. The upper one passes forward, divides into the tertiary branches which form anastomosis with the posterior ethmoid arteries. The lower one is found closer to the inferior border of the nasal septum. It divides into the branches of the third order. They form

anastomosis between themselves and form loops of different shape and size. In addition, arterial branches divide into numerous thin small branches to the epithelial lining, which connect together and form rather thick vascular network.

The highest concentration of the arterial vessels network is found in the anterior-inferior part of the nasal septum, where the trunks of the anterior ethmoid artery are mostly divided and their anastomosis with the posterior ethmoid artery and the posterior artery of the nasal septum.

Topographically the fine network of the blood vessels is located most superficially, then the vessels of a middle size are located, and large vascular trunks are found most deeply.

The middle superior posterior nasal nerve branches enter the mucous membrane of the posterior portions of the nasal septum. They originate from the pterygoid-palatine node. They pass directly and are found in the mucous membrane of the nasal septum.

The nasal-palatine nerve passes downwards, divides into small branches in the mucous membrane of the nasal septum.

Conclusions. 1. Structural transformations of the nasal septum occur at the juvenile age. Small crests are found in the point of connection of the osseous part with the cartilaginous one. When the nasal septum is curved to the left the crests are located on the side of the curvature (2 specimens), and on the opposite from the curvature side (3 specimens). 2. A small depression (rudiment of Jacobson's organ) is found in the anterior-inferior part of the nasal septum on two specimens (10%). 3. Most of the glands are located in the submucous layer of the nasal septum. 4. The mucous membrane of the nasal septum is lined

with the high cylindrical ciliated epithelium. 5. The highest concentration of the blood vessels is found in the anterior-inferior part of the nasal septum.

Prospects of further studies. To study peculiarities of the nasal septum at the middle and elderly period of human life is considered to be reasonable.

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