

Section IV. Medicine

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PARTICULAR QUALITIES OF THE VOMER ANATOMIC DEVELOPMENT AND FORMATION IN THE EARLY ONTOGENESIS OF THE HUMAN *ОСОБЕННОСТИ АНАТОМИЧЕСКОГО РАЗВИТИЯ И СТАНОВЛЕНИЯ СОШНИКА В РАННЕМ ПЕРИОДЕ ОНТОГЕНЕЗА ЧЕЛОВЕКА*

Abstract: The aim of the surgery of the nasal septum is to restore respiration, improve the drainage and ventilate the paranasal sinuses. A lot of scientific researches on the given problem prove its topicality. At the same time the analysis of the scientific literature shows that the given data on the age-specific and anatomic peculiarities of the nasal septum and its blood supply characteristics are still fragmentary and incomplete.

Keywords: prenatal period, bone tissue, nasal cavity, vomer.

Ключевые слова: пренатальный период, костная ткань, носовая полость, сошник.

Аннотация. Целью хирургических вмешательств на носовой перегородке является восстановление носового дыхания, улучшение дренажа и вентиляции околоносовых пазух. Большое количество научных публикаций по данной проблеме свидетельствует об ее актуальности. В то же время анализ научной литературы показывает, что имеющиеся данные относительно возрастных анатомических особенностей составляющих носовой перегородки и характера ее кровоснабжения фрагментарны и неполны.

Investigating the dynamics of the organ development in the prenatal period of the ontogenesis with the aim to find out the interrelation and inter-influence of the morphogenic process on the space-time organization of the anatomic structures is one of the most important scientific tendencies in the anatomic researches [1,2]. One of the conditions of the given tasks' successful solution should be a deep investigation of the anatomic peculiarities of the structural constituents of the nasal septum [3,4,5]. Due to N.R. Emelianenko, at the beginning of the prenatal period in the middle and back thirds of the nasal septum the immature vomer bone is distinguished. In the embryonic development period the bigger part

of the nasal septum is represented as a tunicated cartilaginous tissue. Its back lower part is represented with the vomer bone which is formed by two plates [6]. Recently, the otolaryngologists paid much attention to the increasing rates of the upper respiratory tract diseases, especially pathology of the nasal septum constituents. A great number of the scientific publications on the given topic prove its topicality with the scientists. Besides, there is no mutual opinion on the anatomic building, the formation process, the topographico-anatomic interrelation with the adjoining formations, functioning, age-specific and sexual changes of the nasal septum [7,8,9]. The question of the occurrence reasons of the nasal septum deviation evokes a lot of scientific disputes in many publications. The most interesting topic is the role of the vomer in the nasal septum deviation development.

Tools and methods. Biological objects of 60 preparations of the human nasal cavity were investigated by the successive steps of the histological shears, acute and common dissection with the help of the mbc-10 microscope, making the graphical and plastic reconstructions, radiography, computer and magnetic resonance tomography and morphometry.

Results and discussion. Till the end of the embryonic period the nasal septum is developed as a result of knitting of the nasal processes; the nasal septum symmetrically divides the nasal cavity into two parts. It freely hangs down in the primary nasal cavity. Vertically the size of the nasal septum is 664 mic, horizontally – 884 mic, the anteroposterior – 484 mic. At the early stage of the 7th week development the nasal septum is represented as a mesenchyme from the outside covered with the cylindrical epithelium. The epithelium thickness varies from 16 to 20 mic (in the lower section of the nasal septum) till 36-40 mic (in its upper section). In the central part of the embryo's nasal septum the mesenchyme's cells locate more compactly than in the other dimensions and build a conglomeration, which is character gradient at the front shears. At the stage of the 8th week of the embryonic development with the aid of the nasal septum the primary nasal cavity is divided into two symmetrical parts. In the central part of the septum as a result of the differentiation of the mesenchyme's cells a layer of the subcartilaginous tissue generates. At the same time in the back third of the nasal septum the cells of mesenchyme concentrate directly near its low edge as a pair formation in the form of the plates – embryonic vomers. On the front shears the mentioned plates are located angularly 45° open up to the top. Their upper edges are located in the interval 440 mic from each other and lower – 220 mic. Syntoptically the plates of the future vomer are located on the significant distance from the subcartilaginous tissue of the nasal septum.

On the 9th week the secondary (final) nasal and mouth cavity develop as a result of the knitting of the palatine outgrowths. The central part of the nasal septum is in the form of the plate of the immature cartilaginous tissue. Between the epithelium layer of the nasal septum and its cartilaginous plate there is a mesenchyme layer from 80 to 180 mic thick. In the middle and back thirds of the mesenchyme of the nasal septum the embryonic vomer is quite significant, which is represented by two plates, top ends of which take in the distal end of the cartilage of the nasal septum, and the lower join together. Their vertical size varies from 332 to 360 mic, and they are more than 88 mic thick.

On the 10th and 11th weeks of the embryonic life the cartilaginous plate of the nasal septum is covered by a perichondrium. Between the epithelium and the cartilaginous plate there is a layer of the connective tissue. In the middle and back thirds of the nasal septum in the vomer plates loci of the immature bone tissue of the vomer with distinct borders appear. The vomer's size grows bigger. Its height amounts to 660 – 1100 mic, and its thickness is not more than 132 mic.

The 4-month embryo of the 81,0 – 134,0 mm vertex-to-coccyx length (VC length) the nasal cavity is divided by the nasal septum into two symmetrical halves. The bigger part of the nasal septum is represented with the cartilaginous tissue and only the back lower section with the bone tissue. Its bone part is the vomer, which like on the previous stages is represented by two plates. They are knitted together near the low edge of the nasal septum, up-directed, gradually dispersing laterally. On the sagittal shears their upper edges have the bow-shaped form with the up-directed venter. The biggest vertical size of the vomer's plates grows bigger from 2,5 mm (embryo 81,0 mm VC length) to 3,0 mm (embryos 130,0 mm VC length), the front back size – from 10,0 to 12,0 mm accordingly. The plates' back ends almost join the lower side of the wedge-shaped bone.

While investigating the preparations on the 5-month embryo development (135,0 – 185,0 mm VC length) it has been revealed that the hard backbone of the nasal septum is represented by the cartilaginous tissue of the cartilage of the nasal septum and the perpendicular plate of the ethmoid bone, and also the vomer's bone tissue. It is still represented by two plates which are joined together at the lower edge of the nasal septum. They are divided by the insignificant layer of the conjunctive tissue. The vertical size of the vomer's plates grows from 3,2 to 3,4 mm, and the front back – from 12,0 to 15,0 mm. They are no more than 2,0 mm thick.

On the 6th month of the embryonic life (embryos 186,0 – 230,0 mm VC length) the vomer according to its form, structure topographico-anatomical interrelation to the adjoining formations doesn't differ from the previous stage of development. It only grows in its size: the front back – from 14,0 to 16,0 mm, and vertical from 3,3 to 3,5 mm. Its thickness doesn't change.

The embryos of the 7-8th month development (231,0 – 310,0 mm VC length) have a vomer which is represented by two bone plates with the venter in the cranial direction. Its back end is already joined with the lower side of the sphenoid bone. In general the nasal septum is covered with the mucous coat, covered with the high multiserial cylindrical epithelium, containing cilia. The vomer grows bigger in the front back direction from 17,0 to 22,0 mm. Its biggest vertical size is not more than 5,0 mm.

By the end of the embryonic period (embryos 311,0 – 378,0 mm VC length) the bone part of the nasal section is formed by a vomer, the front back size of which is 29,0 mm, and vertical – 8,0 mm.

While investigating the preparations of the nasal cavity of the newborn children it was cleared up that the nasal septum is formed by the homogeneous cartilaginous tissue of the nasal septum, perpendicular plate of the ethmoid bone and bone vomer. The front back size of the vomer is 31,0 – 32,0 mm, and vertical – 9,0 – 9,4 mm.

Conclusions. At the beginning of the 8th week of the development as a result of the mesenchyme's cells concentration in the back low third of the nasal septum there appears an embryonic vomer, which on the frontal shears is represented as two plates. On the 10-11th weeks the vomer's plates join with their lower ends. On the 4th month the upper ends of the vomer's plates become bow-shaped with the upward venter. On the 5th month the venter is represented with the bone tissue. On the 8th month of the development the back end of the vomer's plate joins with the low side of the sphenoid bone. Till the end of the embryonic period the vomer's form doesn't change, but it only grows bigger.

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