

MORPHOLOGICAL BASIS OF THE "GAME" OF THE PHATERNAL PAPILLA

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Abstract. This article provides information on the morphological basis of the "game" of the paternal papilla.

Keywords: phater papilla, phater papilla ampulla, hepatic-pancreatic ampulla, large duodenal papilla ampulla

МОРФОЛОГИЧЕСКАЯ ОСНОВА «ИГРЫ» ОТЦОВСКОГО СОСОЧКА

Аннотация. В статье представлены сведения о морфологической основе «игры» отцовского сосочка.

Ключевые слова: фатерный сосочек, ампула фатерного сосочка, печеночно-поджелудочная ампула, ампула большого сосочка двенадцатиперстной кишки.

Purpose of the study. Morphological substantiation of the "game" of the phaternal papilla and the role of its muscular sheath in the secretion of pancreatic juice and bile into the duodenal cavity depending on the digestive activity of the latter.

Material and methods of research. The organocomplex of the area of the large papilla of the duodenum of 7 dogs and 11 rabbits was studied by serial histotopographic sections stained by the methods of haematoxylin-eosin, Van-Gizon and Mallory.

Results. It has been established that the muscular membranes of the duodenum and ampulla of the phaternal papilla are represented by a single morphofunctional system. The intrinsic sphincters of common bile and pancreatic ducts are formed by a longitudinal layer, and the mouth sphincters by a circular layer of duodenal muscular tissue. Separate bundles of smooth muscle tissue of the longitudinal layer pass into the wall of the ampulla of the phaternal papilla in a cosocircular direction.

Conclusion. "Play" of the phaternal papilla is represented by rhythmic contractions of the muscular membrane of the duodenal wall and the ampulla of the phaternal papilla in complex at the moment of digestion. It allows bile and pancreatic juice to be secreted into the duodenal cavity in portions and rhythmically, depending on the periodic activity of the latter, at the moment of digestion.

The functional significance of the rhythmic contraction of the muscle of the phater papilla (the large papilla of the duodenum), which is called by radiologists and surgeons as the "game" or dance of the phater papilla is important (1), for the evacuation of bile and pancreatic juice into the duodenal cavity, depending on the digestive activity of the latter.

According to the physiological literature, the release of these digestive juices into the duodenal cavity is a thousandth of a second ahead of the arrival of chyme (3). This process is highly regulated, and strictly co-ordinated. There are many sphincters in the wall of extrahepatic bile ducts and pancreatic duct (sphincters of Oddi, Lutkens, Boyden, Mirizzi and own sphincters of common bile and pancreatic ducts).

The co-ordinated and strictly interdependent work of these sphincters and its dependence on the digestive activity of the duodenum make the work of this part of the digestive tract very important and complex. Literature devoted to the study of comparative and surgical morphology of the phaternal papilla [2,4,7,9], as well as the ampulla of the phaternal papilla [4,6] is available.

Separate works are devoted to the study of the muscular sheath of the phaternal papilla [5]. However, there are questions concerning the morphology of this zone that require further clarification. This, first of all, concerns the question of studying the morphological basis of the mechanism of "play" of the phaternal papilla, on which the secretion of bile and pancreatic juice into the duodenal cavity depends. Also the questions of interrelation of the muscular sheath of the ampulla of the phaternal papilla with such sheath of the duodenal wall are not completely clarified.

There are different and sometimes opposite opinions (8-10) regarding the relationship of the muscular sheath of the phaternal papilla with such a sheath of the duodenal wall. Clarification of these questions is not only important for the physiology of biliary excretion, but it is of great importance for elucidation of pathogenesis of dyskinetic disorders of biliary excretion and dysfunction of sphincters of the terminal part of the common bile and pancreatic ducts. Taking into account the above-mentioned, we studied the morphology of the phaternal papilla and interrelations of its muscular sheath with such sheath of the duodenum.

Material and Methods. We have studied the large nipple of duodenum in 7 dogs and 11 rabbits by the method of preparation of serial histotopographic sections. Eighteen organ complexes fixed in 12% neutral formalin were studied. A flap of the duodenal wall was cut from the place of the common bile and pancreatic ducts penetration into its wall to the lower border of the mouth of the ampulla of the phaternal papilla. Conducting of the material and pouring into paraffin was carried out according to the generally accepted technique. The weight of the material was "planted" in one block and serial histotopographic sections were obtained.

The whole material was cut and through every tenth four slices in a row were mounted on 4 slides. Depending on the volume of the material under study, 300 to 400 or more slices were obtained from each block. Slices were stained by the methods of haematoxylin-eosin, Van Gieson and Mallory. Sequentially studying serial slices and by mounting reconstruction of their computer printouts, the pharyngeal nipple from the place of its formation to its mouth was studied.

The consecutive study of serial histotopographic slices gave us an opportunity to trace the course and topography, as well as the relationship of the muscular sheath of the phaternal papilla, in particular its ampulla with such a sheath of the duodenum. We also studied the morphology of the muscular sheath of the phaternal papilla by means of montage reconstruction of computer-generated tomography.

printouts of these serial slices.

Results and their discussion. As the common bile and pancreatic ducts sink into the wall of the duodenum, the muscular sheath of the latter gradually passes into their wall and in the intramural part of these ducts a muscular ring in the form of a figure of eight is formed around them. Further the course of the muscular sheath is complex and several sphincters are formed (own sphincter of the common bile duct, own sphincter of the pancreatic duct, sphincter of Oddi). These

sphincters are formed at the expense of the outer longitudinal layer of the muscular coat of the duodenum. The bundles of smooth muscle tissue, winding the ducts, reach to the apex of the

phaternal papilla, that is, to the very orifice. The arrangement of muscle bundles in the wall of the ampulla is not the same throughout its circumference. Up to the proximal border of the orifice, the ampulla is surrounded by a complete ring of longitudinal layer of muscle tissue.

Some bundles of muscle tissue pass obliquely to the wall of the ampulla. The thickness of this muscle layer is almost the same around the entire circumference of the ampulla. Further, the amount of the muscle layer gradually decreases. The decrease in the thickness of the muscle layer is more pronounced in the inner wall of the ampulla, i.e. on the side of the intestinal cavity.

At the proximal end of the orifice (the ampulla opens into the intestinal cavity with a slit-shaped opening), the inner part of the muscular ring gradually breaks off, but this unclosed muscular ring accompanies the ampulla to the distal border of the orifice. The free ends of the muscular ring are wedge-shaped, which broadly adjoin the wall of the ampulla on the side of the outer wall of the intestine.

At the same time, the muscular sheath of this wall is inseparably connected with such a sheath of the intestinal wall. In the area of the ampulla, the circular and longitudinal layers of the duodenal muscular wall are not clearly distinguished. Complex intertransitions of smooth muscle bundles from the intestinal wall to the ampulla wall and vice versa often obscure this picture.

Conclusions. Thus, the results of our studies indicate that the muscular layers of the duodenum and the ampulla of the phaternal papilla are inseparably interconnected in the game or gantz of the phaternal papilla. The results of our studies allow us to join the opinion of those researchers who consider the muscular layers of the duodenal wall and the ampulla of the phaternal papilla as a single whole (8). It can be assumed that when the longitudinal layer of the muscular layer of the intestinal wall is relaxed, the ampulla fills with digestive juices, and when the longitudinal layer, with which the muscular tissues of the intramural sphincters of the ducts are connected, is contracted, their intramural part closes.

At this moment, due to relaxation of the circular layer of the muscular sheath, the mouth sphincters open. The oblique bundles of the longitudinal layer, encircling the ampullae also contract, as a result of which the pharyngeal nipple is tensed (raised) and the contents of the ampullae are literally "injected" into the intestinal cavity, where at this moment comes chyme from the stomach. This ensures a portioned and rhythmic release of pancreatic juice and bile each time chyme from the stomach enters the duodenum. This process is rhythmically repeated and forms the morphological basis of the "play" or "dance" of the phaternal papilla at the time of digestion.

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