Modern concepts of sphincter of Oddi pancreatic dysfunction

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Clinical medicine is not a fixed or stable discipline. The clinics allows both variants of forms and variants of thought.

M.P. Konchalovsky [4]

The concepts of functional disorders of the sphincter of Oddi (SO) of the pancreatic type are very fuzzy and contradictory. Suffice it to say that even in modern Rome IV recommendations on the diagnosis and treatment of functional gastroenterological disorders are not defined and information on the epidemiology of functional disorders of pancreatic SO are not presented [12].

We assume that in practice in the past years it was precisely this disorder that was designated by the terms “dyspancreatism” and/or “reactive pancreatitis.” Now these terms have rightly disappeared from gastroenterological practice, giving way to a more modern one. Doctors made such diagnoses when there was a clinic of more or less pronounced pancreatitis, which did not find objective laboratory and instrumental confirmation. By the way, neither the former nor the modern terms are included in ICD-10, where only a spasm of SO with the code K 83.4 is mentioned.

Turn to anatomy and history. In the terminal parts of the common bile duct, the main pancreatic and in the area of their confluence (hepato-pancreatic ampoule) there is a complex smooth muscle structure consisting of numerous thin fibers that are arranged in different directions relative to the axis of the ducts — in a circular,

longitudinal and oblique — its structure, function and its regulation, since the seventeenth century, are carefully studied, and yet they are not fully understood. Such close attention to this small in size structure is due to its truly “Napoleonic” role in ensuring a coordinated, coordinated, timely outflow of bile and pancreatic secretion. Impaired SO function can and often does lead to truly catastrophic consequences for the pancreas, the digestive processes, and less often for the gall bladder.

Although the first description of the common bile duct sphincter was made by Francis Glissen in 1681 in Oxford, the sphincter is named Ruggero Oddi [16]. In 1887, as a fourth-year medical student at the University of Perugia, he described in detail the structure of the sphincter and defined its role in the regulation of bile secretion. Since then, considerable intellectual effort has been expended to achieve a more detailed understanding of the role of SO in the pathogenesis of pancreatitis and biliary dysfunction. Langenbuch (Berlin) suggested that biliary pathology may be associated with sphincter stenosis and suggested dissecting its muscle fibers as a treatment method. In 1901, E.L. Opie published his famous theory of the common duct, which explains the pathogenesis of pancreatitis, which develops a second time as a result of biliary diseases, primarily gallstone disease [17]. In 1913, E. Archibald conducted convincing experiments that confirmed a clear connection between SO tone and pancreatitis [10]. Later he showed a significant clinical effect of sphincterotomy in a patient with recurrent pancreatitis [9]. The further course of scientific thought prepared the basis for the development in 1973 of K. Kawai and M. Classen of a technique for endoscopic papillosphincterotomy, which revolutionized pancreatology, providing a "breakthrough" in the treatment of, above all, biliary and obstructive pancreatitis [11, 15].

SO consists of a number of muscular structures (Fig. 1) [2, 7]:

1. m. complexus papillae duodeni which, in its turn, consists of
   - m. sphincter basis papillae;
   - m. dilatator papillae;
   - m. sphincter pori papillae.
2. m. sphincter choledochi proprius.

3. m. sphincter ductus pancreaticus proprius.

There is a sphincter of the common bile duct in all cases, and the sphincter of the mouth of the main pancreatic duct exists approximately in a quarter of cases — when there is an additional pancreatic duct [2, 8]. Single muscle fibers branching from the longitudinal muscular layer of the duodenum are also involved in the formation of SO primarily in its supraduodenal part, that is, before the confluence of the main pancreatic duct and the common bile duct. The three main variants of the choledoch and the Wirsung's duct connection are described (Fig. 1): V-shaped joint (20–30% of cases — variant A); U-shaped joint, when 2 channels are completely separated and not communicating with each other (10–20% of cases — option B); Y-shaped joint, when Wirsung's and common bile duct open into the ampulla of the major duodenal papilla (60–70% of cases — option C). This ampoule usually has a width of 2–4 mm and a length of 2–4 mm to 6–10 mm [3]. This is the very "common duct" that E. L. Opie. had in mind in his theory. Throughout, the circular muscular layer of SO does not depend on the muscles of the duodenal wall [2, 7]

On the duodenal mucosa, the common bile duct and main pancreatic duct usually open at the top of the major duodenal papilla, which was described in 1720. Abraham Vater. This nipple, which is now often called the Vater papilla, is a conical protrusion of the duodenal mucosa and in 90% of cases it is located in the middle or lower third of the vertical (descending) branch of the intestine at a distance of 8-12 cm from the pylorus of the stomach. More rarely, the papilla is located in the upper or in the lower horizontal branches of the duodenum [3]. Directly in the ampoule of the Vater papilla is a valve apparatus, represented by longitudinal and transverse folds of the mucous membrane. This valve plays a role in inhibiting the reflux of pancreatic juice and intestinal contents into the bile ducts [2]. As a rule, a large longitudinal fold of the mucous membrane departs from the Vater papilla.

A large number of nerve ganglia and plexuses are found in the thickness of the gonadal membrane and the colds. It has been established that they originate not only from the vagus nerves, the semilunar nodes of the celiac plexus, from the superior mesenteric node, the nerve fibers of the posterior roots of spinal nerves VII–XII

thoracic segments, but also from the Auerbach plexus of the duodenum; around the Vater papilla, numerous nerve fibers and microganglia form among the muscular elements [2, 3, 7].

We give a brief historical background of dyspancreatism.

Dyspancreatism (the term suggested by M. M. Gubergrits, 1932 [1]) is the dissociation of pancreatic enzyme separation, when the form, parallelism, and unidirectionality of curved enzymes in the duodenal contents are disturbed during the secretin-pancreozyme test. At the same time, the production of one (two) enzymes is preserved, the other (the other) is reduced. It was assumed that this variant of functional disorders of the pancreas may occur in chronic gastritis, peptic ulcer disease, enteritis, colitis, hepatitis, liver cirrhosis, cholecystitis, many diseases of the respiratory system, blood circulation, kidney, blood, poisoning, intoxication, infectious diseases [1, 5]. It was believed that dyspancreatism is often not clinically manifested, but sometimes nausea and discomfort in the epi-, mesogastrium, left hypochondrium, and loosening of the stool join the clinic of the underlying disease. These symptoms disappear as the clinics of the disease causing dyspancreatism subside.

Periods of dyspancreatism develop during episodes of excessive food load, especially accompanied by alcohol intake. A pronounced stimulation of the exocrine function of the pancreas, sometimes requiring more than what it can do, can lead to discoordination of the production of enzymes. At the same time short transient periods of latency and steatorrhea after a food load are possible. If such episodes occur frequently, then real pancreatitis can develop. Dyspancreatism leads to duodenoartral discoordination, duodenogastric reflux, duodenostasis. From here pathogenetic connection of a dyspancreatism with other functional disturbances, especially with a functional dyspepsia.

Reactive pancreatitis was understood as the addition of the clinical symptoms of pancreatitis, in particular pancreatic pain, in patients with biliary pathology, gastroduodenal ulcer, but in the absence, as mentioned above, of hyperfermentemia and structural changes in the pancreas.

The authors of the Rome Consensus IV believe that pancreatic dysfunction of SO can actually cause pancreatic pain and pancreatitis [6, 12]. The following arguments are presented as proof:

- sphincter obstruction leads to pancreatitis in an animal experiment;

- sphincter obstruction leads to pancreatitis in several clinical situations: tumors of the Vater nipple, duct stones and mucus plugs in intrapancreatic mucinous tumors;

- sphincter pressure increase under the influence of opiates and their connection with attacks of pancreatitis;

- frequent cases of increased pressure of the pancreatic sphincter in patients with idiopathic pancreatitis;

- repetition of episodes of pancreatitis while maintaining increased sphincter pressure, and without treatment, the probability of recurrence of pancreatitis is 3.5 times greater.

However, compared to the previous Consensus, the Rome Consensus IV emphasizes the need for more convincing evidence of the role of pancreatic SO dysfunction in the origin of pancreatic pain. According to the authors, it is required to prove that the attack of pancreatitis actually develops at high SO pressure and undergoes reverse development after its decline. Attention is drawn to the difficulties of pressure control and, accordingly, the interpretation of the results in the absence of this control. Allowed patients to have anomalies of SO, the results of previous attacks of pancreatitis or its unrecognized causes, and their "mask" may be pancreatic dysfunction of SO [6, 12].

The diagnostic criteria for pancreatic type SO disorder are presented below [6, 12].

All of the following:

1. Registered repeated episodes of pancreatitis (typical pain with an amylase or lipase level of> 3 norms or evidence of acute pancreatitis during imaging).

2. Other etiology of pancreatitis is excluded.

3. Negative data of pancreatic endosonography.

4. Deviations of the results of SO manometry.

The authors believe that, given the lack of certainty, pancreatic dysfunction of SO can be considered in patients with documented acute recurrent pancreatitis after a comprehensive examination and the exclusion of known etiological factors, the search for structural abnormalities, with elevated SO pressure according to manometry.

Alternative diagnostic tests are similar to those for biliary dysfunction of SO: measuring the size of the pancreatic duct with magnetic resonance cholangiopancreatography or endosonography before and after intravenous administration of secretin, injection of botulinum toxin into the sphincter area and stenting of the pancreatic duct, which contributes to the relief of pain.

Regarding endoscopic retrograde cholangiopancreatography in Rome IV criteria, there are no references.

Treatment

Patients with episodes of acute idiopathic pancreatitis after detailed examination are advised to avoid factors that may contribute to new attacks (for example, alcohol, opiates). Although some drugs (for example, antispasmodics and calcium channel blockers) have an antispasmodic effect on SO according to experimental studies, but not a single study of their use in SO dysfunction has been conducted.

Earlier, after two attacks of idiopathic pancreatitis, cholecystectomy was recommended, since the likely cause of pancreatitis is small biliary calculi or microlithiasis. This approach is currently not used, because these factors are easy to eliminate using modern visualization techniques. With microlithiasis, there are other therapeutic approaches, such as biliary sphincterotomy or the appointment of ursodeoxycholic acid, although the available data are inconclusive [6, 12].

Experts believe that sphincterotomy is a pathogenetically substantiated treatment of SO dysfunction, if it is proved that it is dysfunction that causes pancreatitis. The sphincterotomy of both sphincters (biliary and pancreatic) in most cases leads to the termination of pancreatic attacks. Endoscopic sphincterotomy of pancreatic SO is performed much less frequently and, according to repeated

manometry, is often incomplete. Often after pancreatic sphincterotomy, stenosis of the pancreas duct is observed.

According to experts, endoscopic biliary sphincterotomy in many cases reduces the pressure of the pancreatic sphincter and additional pancreatic sphincterotomy is not beneficial. Biliary sphincterotomy is just as effective as double sphincterotomy, and probably reduces immediate and long-term risks [6, 12].

Experts believe that patients with a single episode of idiopathic acute pancreatitis should not undergo endoscopic retrograde cholangiopancreatography, because the second episode may never happen. Currently, it seems appropriate to consider the implementation of sphincterotomy in cases where the obtained pathological results of SO manometry.

The Rome Consensus IV discusses 3 fundamental practical issues [6, 12]:

1. Is it possible to consider the possibility of functional biliary disorder of SO with preserved GI?

Earlier in the Rome Consensus III, it was assumed that functional biliary disorder of SO can be observed in patients with intact GB, however, data on SO dysfunction were obtained mainly in patients after cholecystectomy. It was recommended not to consider an increase in SO pressure in patients with GB, although in practice the clinician was forced to assume SO dysfunction if the patient with retained GB had intense biliary attacks of attack [13].

The authors of the Rome Consensus IV also state that the role of SO dysfunction in patients with biliary pain in the presence of GB has been very little studied and additional information is needed on how to lead these patients. Two small retrospective series of cases showed less chance of a clinical response to sphincterotomy in patients with GB than in patients after cholecystectomy. The response was more pronounced if the bile ducts were dilated. However, research in this area is faced with an ethical problem: for patients with intact GB (without concrements), in the framework of clinical studies, performing endoscopic retrograde cholangiopancreatography, manometry and sphincterotomy is unacceptable.

2. Can dysfunction of pancreatic SO cause pain without pancreatitis?

The authors of the Rome Consensus IV note: "Historically, there is an assumption of SO dysfunction as the cause of pancreatic pain without convincing evidence of pancreatitis." Indeed, instrumental methods (manometry) have shown that in many patients with abdominal pain of unknown etiology (including in the EPISOD study [14]), the SO tone is higher than the generally accepted norm. Many such patients underwent sphincterotomy, but there is no evidence of its benefit. According to the authors, there is no convincing evidence of the possibility of pancreatic pain without pancreatitis according to the results of endoscopic retrograde cholangiopancreatography and manometry.

3. Is SO pancreatic dysfunction the etiological factor of chronic pancreatitis?

The authors of the Rome Consensus IV report data on the increased pressure of pancreatic SO in 50–87% of patients with chronic pancreatitis of different etiology, but whether the increased SO tone plays a role in the pathogenesis or progression of chronic pancreatitis is unknown. In short-term uncontrolled studies, endoscopic pancreatic sphincterotomy reportedly reduced pain intensity in 60–65% of patients with chronic pancreatitis and pancreatic dysfunction, but long-term results were not studied. The role of endoscopic treatment in the absence of strictures and stones remains unclear. Expert opinion: at present, the role of SO dysfunction in patients with chronic pancreatitis is not clearly defined.

The authors of the Rome Consensus IV believe that, in view of the available data, practitioners and patients should exercise considerable caution with respect to invasive treatment methods, take into account existing short-term and long-term risks and evidence of benefit [6, 12].

So, at present, the problem of the pancreatic type of SO dysfunction has not been resolved. That is why, in the hope that soon we will come closer to a solution, we cite the words of I. P. Pavlov: “It comes and will come, the natural convergence and, finally, the merging of the psychological with the physiological, the subjective with the objective will be realized. The question that has disturbed human thought for so long will be solved” [4].

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History of study of the sphincter of Oddi (SO) is presented in a detail in the article, attention is paid to the anatomical and functional relationships of SO with the gallbladder, duodenum and pancreas. The role of SO dysfunction in the pathogenesis of pancreatitis and biliary dysfunction is described in detail, previous and modern ideas about SO pancreatic disfunction are considered. The historical features of the introduction of the term “dyspancreatism” are given, the clinical peculiarities and periods of its occurrence are listed, the pathogenetic relationship of dyspancreatism with other functional disorders, including functional dyspepsia, is described. Provisions of the IV Rome consensus are considered, confirming the relationship of pancreatic dysfunction with the occurrence of pancreatic pain and pancreatitis itself. The criteria for the diagnostics of pancreatic type SO dysfunction, formulated in the modern Rome recommendations for the diagnosis and treatment of functional gastroenterological disorders, are presented. Standard and alternative diagnostic tests are listed, which conduction will confirm the SO dysfunction. Modern approaches to the treatment of SO dysfunction are analyzed, focusing on the use of invasive treatment methods, the advantages and disadvantages of biliary and pancreatic sphincterotomy are revealed, the inexpediency of performing the endoscopic retrograde cholangiopancreatography in patients with single episode of idiopathic acute pancreatitis is proved. The need for a balanced and cautious approach to the use of invasive methods for the treatment of SO dysfunction is emphasized; prospects for further study of the pathology of this sphincter are described.

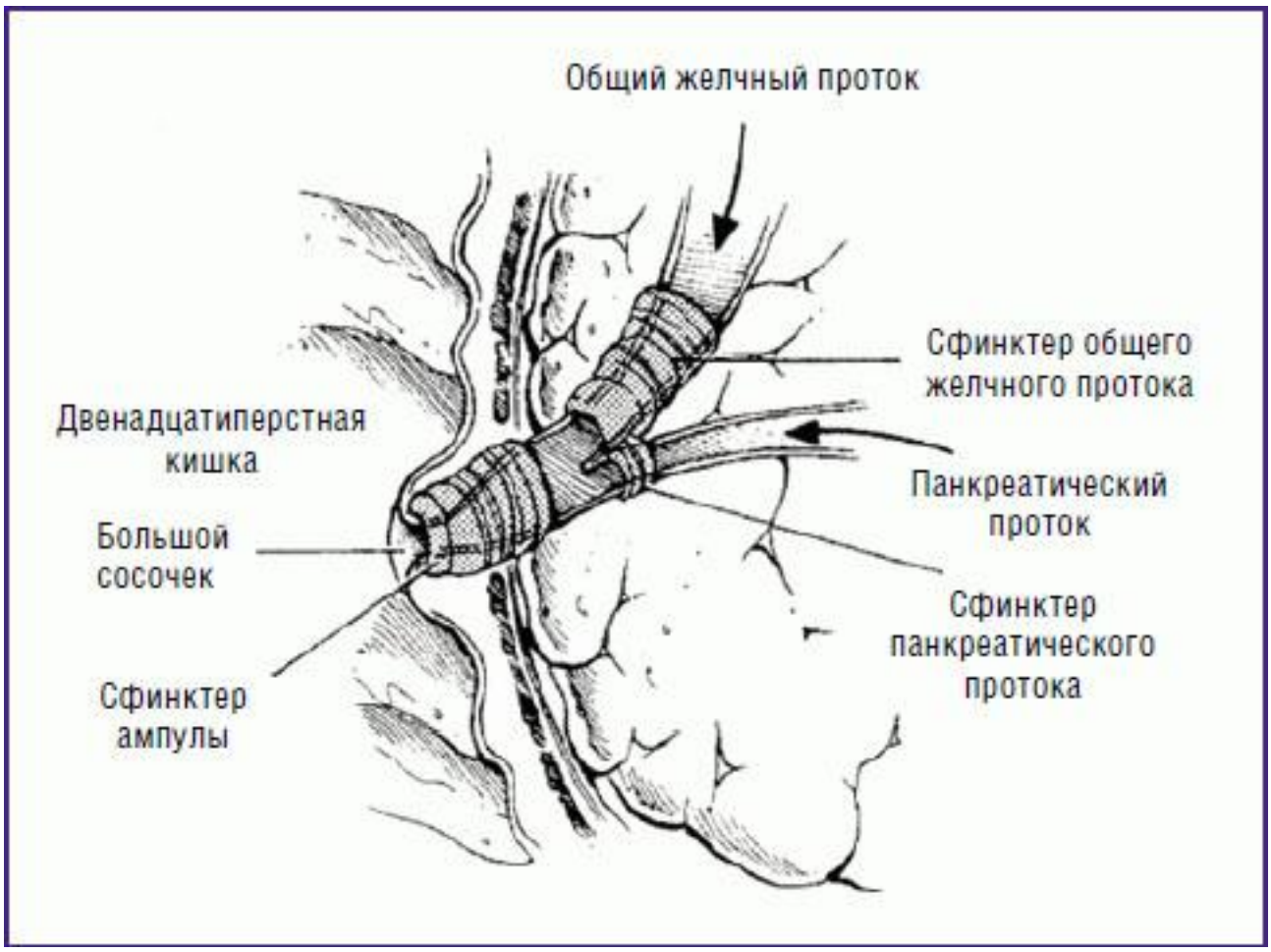

Fig. 1. Anatomy of sphincter of Oddi.