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Research Article

The Role of Endovideosurgical Interventions in Correcting Intra-Abdominal Hypertension Syndrome in Patients with Severe Acute Pancreatitis

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Abstract

Introduction and Purpose of the Study: One of the leading pathogenetic mechanisms that complicate the course of acute pancreatitis (OP) is intra-abdominal hypertension (IHD) syndrome, which contributes to the development and progression of early organ dysfunctions in patients. At the same time, the possibilities of endovideosurgical interventions (EVHI) in the correction of IHD syndrome in the early phase of severe OP remain not fully understood, which greatly complicates the choice of the most rational surgical tactics. The aim of the present study is to assess the role and significance of EVHV in the correction of IHD syndrome in patients with severe AP.

Materials and Methods: The analysis of the results of examination and treatment of 65 patients with severe acute AP with IHD syndrome was carried out. All patients were divided into four groups depending on the severity of AP and the severity of organ dysfunctions. In addition to generally accepted studies, intra-abdominal pressure (IAP) was monitored and the severity of the condition was assessed according to the APACHE II scale within 1-7 days from the onset of the disease. Sixty-one patients underwent EVHV and 4 patients underwent wide laparotomy.

Results: It has been established that in patients with severe AP, the main predictor of persistent IHD and early organ failure is widespread retroperitonecrosis (RN). In 33 patients with OP with transient organ dysfunction and/or functional insufficiency of one organ, video laparoscopic sanitation (VLS) of the abdominal cavity was performed. Of 32 patients with AP with functional insufficiency of two or more organs, in 28 patients, VLS of the abdominal cavity was supplemented by laparoscopic decompression of the retroperitoneal tissue (PCA) by wide dissection of the peritoneum in the ROP zones. Of these patients, 8 (28.6%) in connection with the persistence of IHD in the future additionally required decompression interventions on the anterior abdominal wall by means of mini-laparotomy with the imposition of pancreatomomentoburstomy. Decompression laparotomy and nasointestinal intubation of the intestine were initially performed in 4 patients with severe AP with grade 4 IHD due to ineffectiveness of IHD correction by means of EVHV. Of 61 patients with severe AP, who underwent EVHV during the first 3 days from the onset of the disease, 46 (75.4%) achieved a positive clinical effect, manifested by a decrease in the IAP level and the APACHE II scale indicators. Out of 65 patients with severe AP, death occurred in 17 (26.1%). Within 14 days from the onset of the disease in patients with severe OP with grade 1 IHD, the lethality was 4.5%, with grade 2 IHD - 20.0%, with grade 3 IHD - 57.1%, with IVH grade 4 - 75.0%.

Conclusion: Persistent IHD, combined with organ failure and widespread ROP, is an absolute indication for early decompression interventions on the PBC and the abdominal wall in patients with severe AP. In the majority of patients with severe AP, early sanitation and decompression EVHV, supplemented, if necessary, with mini-laparotomy and decompression pancreatomomentobursostomy, is a fairly effective method of surgical correction of IHH and underestimation of the severity of organ dysfunctions. In patients with severe AP with grade 4 IHD, due to the insufficient effectiveness of the correction of IHV by means of EVHI, it is necessary to initially resort to early decompression laparotomy and nasointestinal intestinal intubation.

Keywords: *Severe Acute Pancreatitis; Intra-Abdominal Hypertension; Retroperitonecrosis; Endovideosurgical Interventions*

Introduction

Despite the success of complex multicomponent therapy and surgical methods in the treatment of acute pancreatitis (OP), mortality in severe forms of this disease is 55 - 69% [1]. The main risk factors for the development of death in the early phase of severe OP are: the volume and nature of pancreatic necrosis, the prevalence of retroperitoneal tissue damage (PCD), the severity of enzymatic peritonitis and endotoxicosis, the degree of intra-abdominal hypertension (IHD) and the severity of intestinal paresis, which causes massive inflow from it. the lumen of bacteria and toxins into the abdominal cavity, portal venous system and lymphatic bed [2].

The main reasons for the development of IBH syndrome in patients with severe AP include persistent intestinal paresis, compression of the duodenum, gastrostasis, edema of the parietal and visceral peritoneum, the presence of acute fluid accumulations in the abdominal cavity and retroperitoneal space, massive retroperitonecrosis (RN) (parapancreatitis) and muscles of the anterior abdominal wall due to inadequate analgesia [2-4].

IBH is accompanied by inhibition of hemodynamics (compression of the inferior vena cava, a decrease in venous blood flow to the heart, a decrease in cardiac output and impaired tissue perfusion), respiratory function (interstitial pulmonary edema, respiratory distress syndrome) and urinary excretion (compression of the renal veins and renal parenchyma decreased glomerular filtration pressure and filtration gradient). Increased intra-abdominal pressure (IAP) also leads to abdominal hypoperfusion and is one of the triggering mechanisms of microcirculation disorders in the abdominal organs and, above all, in the intestinal wall [2,7,10].

Severe IHD leads to the development of early progressive multiple organ failure (MOF) in 30 - 50% of patients with severe AP, which is the direct cause of death in 60-80% of patients [1,4].

Currently, in patients with severe AP in the early phase of the disease (the phase of pancreatogenic toxemia), the most common surgical intervention is video laparoscopic sanitation (VLS) of the abdominal cavity. In this case, the main therapeutic task of endovideosurgical intervention is the removal of toxic peritoneal exudate and drainage of the abdominal cavity [5]. At the same time, the possibilities of endovideosurgical interventions (EVHI) in the correction of IHD syndrome in the early phase of severe AP remain not fully understood, which is an essential factor affecting the course and outcome of the disease.

Purpose of the Study

To assess the role and significance of EVHV in the correction of intra-abdominal hypertension syndrome in patients with severe AP.

Materials and Methods

The study was conducted at the clinical base of the Department of General Surgery of the Rostov State Medical University (MBUZ "City Hospital No. 1 named after N.A. Semashko, Rostov-on-Don) for the period from 2013 to 2016. The study included 65 patients with severe AP who were admitted to the clinic within 1 - 4 days from the onset of the disease. The age of the patients ranged from 22 to 78 years. All patients underwent multicomponent complex treatment in the intensive care unit.

All patients were diagnosed with pancreatogenic enzymatic peritonitis at the time of hospitalization. Sanation laparoscopy was performed in 61 patients and laparotomy, sanitation and drainage of the abdominal cavity in 4 patients. Sanitation interventions on the abdominal cavity in case of enzymatic peritonitis in most cases were carried out in 1 - 3 days after the disease. When performing sanitation laparoscopy, fluid accumulations from the abdominal cavity and omental bursa were removed in patients, and the PCA was decompression by dissecting the peritoneum in the mesocolon and lateral canals. In all patients with severe AP who underwent laparotomy, nasointestinal intubation of the small intestine and the formation of a decompression pancreatomentomentoburostomy by suturing the sheets of the gastro-colonic ligament to the parietal peritoneum were performed during the operation.

The prevalence of PCD lesions was assessed by ultrasound, computed tomography with bolus contrast, information obtained during surgery, as well as the results of postmortem examination. When the PCB was damaged within one anatomical region of the retroperitoneal space, the ROP was considered limited, and when pancreatogenic destruction spreads to two or more anatomical areas, it was considered widespread [5].

All patients with severe AP were divided into 4 groups: in 16 (24.6%) patients, signs of organ dysfunction were not expressed and had a transient or persistent character (group 1), in 17 (26.1%) patients there was a persistent functional insufficiency of one organ (group 2), 15 (23.1%) - two organs (group 3) and 17 (26.1%) - three or more organs (group 4). Organ dysfunction was assessed according to the criteria of Baue., *et al* [6].

IAP was measured according to the method of I.L. Kron., *et al*. [8] with recalculation of readings in mm Hg. Art. The degree of IBH was determined in accordance with the gradation of M.L. Malbrain., *et al*. [9]. The severity of the patient's condition was assessed using the APACHE II scale. In a comparative aspect, the mortality rate was assessed in each of the groups of patients.

The research results were processed using the Statistica 6.1 for Windows software package and Microsoft Excel 2007 package.

Results and Discussion

In patients of groups 1 - 3 on the 1st day, IAP values ranged from 12.5 ± 0.6 - 15.3 ± 0.9 mm Hg. Art., which corresponded to the 1st degree of IHD. In patients of the 4th group during these periods, the IAP level was significantly higher and reached 18.7 ± 1.2 mm Hg. Art. (2nd degree MSH).

After IVL of the abdominal cavity in patients of the 1st group, the tendency to normalization of IAP was observed already by the 3rd day from the onset of the disease, in patients of the 2nd group - in terms closer to the 7th day.

In patients of the 3rd group, starting from the 2nd day, there was a distinct increase in IAP with the development of the 2nd degree of IHD. In these patients, by the 5th day, the IAP level increased to 17.6 ± 1.5 mm Hg. Art. and did not significantly decrease by the 7th day. In patients of the 4th group, the 2nd degree of IAP persisted for 2 - 4 days, and by the 7th day there was an increase in IAP up to 23.8 ± 1.9 mm Hg. Art. (3rd degree IHD). Moreover, in some patients, the IAP level exceeded 25 mm Hg. Art., which corresponded to the 4th degree of IHD.

Of 32 patients in groups 3 - 4, 28 (87.5%) in the early stages underwent VLS by wide dissection of the peritoneum along the lateral canals in the area of retroperitoneal pancreatogenic necrosis and fluid accumulations. In 4 (12.5%) patients, in connection with the progression of IHD, decompressive laparotomy and nasointestinal intestinal intubation were performed. Of the 28 patients who initially underwent EVHV, 8 (28.6%) in terms of 5 to 7 days, due to the persistence of IHD, additionally required decompression interventions on the anterior abdominal wall by means of mini-laparotomy and pancreatomomentobursostomy using a set of instruments "Mini-assistant".

It should be noted that the persistent development of IHD in patients with severe AP determined to a greater extent the widespread lesion of the PCD than the amount of effusion in the abdominal cavity (Table 1). Thus, in patients with grade 1 IHD, widespread ROP was observed in 45.4% of cases, with grade 2 IHD - in 68.0%, with grade 3 IHD - in 85.7%, and with IVH 4- 1st degree - in 100% of observations.

IHD degree	Total number of patients	Number of patients with limited ROP	Number of patients with advanced ROP	Effusion volume, ml (M ± m)	
				Limited PH	Common ROP
1st	22	12	10 (45,4%)	364,8±128,7	448,2 ± 151,3
2nd	25	8	17 (68,0%)	598,1±183,9*	722,0 ± 259,4*
3rd	14	2	12 (85,7%)	643,2±233,7*	680,4 ± 278,6*
4th	4	-	4 (100%)	-	862,5 ± 385,7*
Note: 1. Statistically insignificant differences: * - in comparison with the 1st degree of IHD. 2. RN - retroperitoneonecrosis.					

Table 1: *Distribution of patients with severe acute pancreatitis with varying degrees of intra-abdominal hypertension, depending on the prevalence of retroperitoneal tissue damage and the volume of peritoneal effusion.*

In patients of groups 1 - 2, starting from days 2 - 3, there was a distinct decrease in the APACHE II scale indices. In the patients of the 3rd and 4th groups, on the contrary, there was an increase in the APACHE II scale values, which by the 5th day increased, respectively, to 20.7 ± 1.7 - 25.3 ± 1.2 points and by 7 m day - up to 23.5 ± 1.4 - 27.2 ± 1.3 points. At the same time, a direct correlation was noted between the IAP level and the APACHE II scale indicators.

Of 61 patients with severe AP, who underwent EVHV during the first 3 days from the onset of the disease, 46 (75.4%) achieved a positive clinical effect, manifested by a decrease in the IAP level and APACHE II scale indices, as well as regression of signs of endotoxicosis and organ dysfunctions. Moreover, in 86.9% of cases, laparoscopic intervention was of a one-stage nature.

Out of 65 patients with severe AP, death occurred in 17 (26.1%). There were no lethal outcomes in the 1st group. In group 2, 2 out of 17 patients died (11.8%), in group 3, out of 15 patients, 5 (33.3%) died. The highest mortality rate (58.8%) was noted in the 4th group of patients (10 of 17 patients died). At the same time, in groups 3 - 4 of patients, early mortality (up to 14 days from the onset of the disease) was 28.1% (9 of 32 patients died), and the overall mortality was 46.9%.

Within 14 days from the onset of the disease, in patients with severe OP with 1st degree IHD, lethal outcome occurred in 1 (4.5%), with IIH of the 2nd degree - in 5 (20.0%), with IHD 3 grade 4 - in 8 (57.1%), with grade 4 IHD - in 3 (75.0%) patients.

Conclusion

Thus, in patients with severe OP, the main predictor of the development of persistent IHD accompanied by early MOF is extended PH. Persistent IHD, combined with organ failure and widespread ROP, is an absolute indication for early decompression interventions on the PBC and the abdominal wall in patients with severe AP. It should be borne in mind that the category of patients with severe AP in terms of the degree of IHD and the severity of organ dysfunctions is rather heterogeneous. In patients with AP with transient organ dysfunction and/or functional insufficiency of one organ, as a rule, an effective method of surgical correction of IHD is VLS with drainage of the abdominal cavity. In patients with AP in conditions of persistent IHD with functional insufficiency of two or more organs, VLS of the abdominal cavity must be supplemented by laparoscopic decompression and drainage of the PCB by wide dissection of the peritoneum in the zones of retroperitonecrosis. If the IHV remains stable for 5 - 7 days after the EVHV performed, it is advisable to perform a mini-laparotomy with the imposition of a decompression pancreatomomentobursostomy. In patients with severe AP with grade 4 IHD, due to the insufficient effectiveness of the correction of IHV by means of EVHI, it is necessary to initially resort to early decompression laparotomy and nasointestinal intestinal intubation.

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