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REVIEW ARTICLE**EVALUATION OF THE EFFECTIVENESS OF SURGICAL MANAGEMENT IN LOCAL PURULENT-SEPTIC COMPLICATIONS OF ACUTE PANCREATITIS****OCENA SKUTECZNOŚCI CHIRURGICZNEGO LECZENIA MIEJSCOWYCH ROPNO-SEPTYCZNYCH POWIKŁAŃ OSTREGO ZAPALENIA TRZUSTKI****Oleksiy Yu. Cherkun, Dmytro A. Sytnik, Andriy S. Kaliuzhka, Volodymyr D. Sheyko, Volodymyr H. Hryn**
HIGHER STATE EDUCATIONAL ESTABLISHMENT OF UKRAINE, UKRAINIAN MEDICAL STOMATOLOGICAL ACADEMY, POLTAVA, UKRAINE**ABSTRACT**

Introduction: In the past decades, mortality in acute pancreatitis ranges from 3% to 15% and depends mainly on the severity of the diseases, which is characterized by the development of necrotic processes in the pancreas and systemic complications. Notwithstanding the numerous studies on severe forms of acute pancreatitis, no significant improvement of treatment outcomes of this category of patients is observed. The integrated diagnosis and treatment of this pathology, prognosis and prevention of purulent-septic complications are relevant to date.

The aim: To evaluate the effectiveness of surgical management depending on the nature and incidence of local purulent-septic complications of acute pancreatitis.

Materials and methods: We have analyzed the treatment outcomes of 422 patients with acute pancreatitis who were treated in the Surgical Unit at Poltava Regional Clinical Hospital in the period from 2010 to 2015. All patients were admitted to hospital following 1-7 days after infection. 315 (74.6%) of them were diagnosed with mild acute pancreatitis; patients received conservative treatment and were discharged from the hospital within 7-10 days. Moderate and severe pancreatitis with the development of local parapancreatic complications were diagnosed in 107 patients (25, 4%) (men=67 (62.6%); women=40 (37, 4%)). Age of patients ranged from 22 to 81 years (47, 9±1.5 years). The severity of the disease was determined according to BISAP score, the presence of multiple organ failure was confirmed by the Modified Marshall Score (2012 modification). Patients were examined in compliance with the requirements of the Order of the Ministry of Health of Ukraine No 297 as of 02 April, 2010.

Review and conclusions: Moderate acute pancreatitis is characterized by localization of purulent-septic complications in 1-2 anatomical areas with fluid component mainly. Severe acute pancreatitis is characterized by the localization of purulent-septic complications in 2 or more anatomical areas with tissue component mainly. The efficacy of aspiration-and-drainage interventions depended on the proliferation of fluid accumulations in 1-2 anatomical areas and presence of fluid component mainly. Primarily, open necrosectomy is the most appropriate surgery to be performed in patients with mainly tissue component in the fluid aggregations and the prevalence of local parapancreatic complications in more than two anatomic areas.

KEY WORDS: acute pancreatitis, necrosectomy, multiple drainage, purulent-septic complications

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INTRODUCTION

The paper has been written within the research scientific work, carried out at the Department of Surgery No 2 at the Higher State Educational Establishment of Ukraine "Ukrainian Medical Stomatological Academy", entitled "Differentiated surgical management in parapancreatic infectious-septic complications of destructive pancreatitis"; State registration number 0116U005439.

In recent decades, mortality in acute pancreatitis (AP) ranges from 3% to 15% and depends mainly on the severity of the diseases, which is characterized by the development of necrotic processes in the pancreas and systemic complications [1, 2]. Notwithstanding the numerous studies on severe forms of acute pancreatitis, no significant improvement of treatment outcomes of this category of patients is

observed. The integrated diagnosis and treatment of this pathology, prognosis and prevention of purulent-septic complications (PSC) are relevant to date [3].

Recent publications report that severe acute pancreatitis occurs in 10-30% of patients [4]. The severity of the patients' state correlates with the degree of prevalence of necrotic changes [5]. The most severe form of acute pancreatitis is characterized by bacterial infection of foci of necrosis and occurs in 30-40% of patients with necrotizing pancreatitis. 50% to 80% of such patients die due to development of PSC at the advanced stages of the disease [6, 7]. At the same time, antibiotic prophylaxis does not reduce mortality and the incidence of infection of foci of necrosis.

Current principles and approaches to the treatment of acute pancreatitis with PSC contribute to certain reduction

of lethal consequences, though their incidence remains significant. Despite the fact that more than a third of patients with acute pancreatitis dies due to development of purulent-septic complications the management of this group of patients remains to be clearly defined [8].

THE AIM

The paper was aimed at the evaluation of the efficacy of surgical management depending on the nature and incidence of local septic complications of acute pancreatitis.

MATERIALS AND METHODS

We have analyzed the results of treatment of 422 patients with acute pancreatitis who were treated in the Surgical Unit at Poltava Regional Clinical Hospital in the period from 2010 to 2015. All patients were admitted to hospital following the 1-7 days after infection. 315 (74.6 %) of them were diagnosed with mild acute pancreatitis; patients received conservative therapy and were discharged from the hospital within 7-10 days. Moderate and severe pancreatitis with the development of local parapancreatic complications were diagnosed in 107 patients (25, 4%) (men=67 (62.6%); women=40 (37, 4%)). Age of patients ranged from 22 to 81 years (47, 9 ± 1.5 years). The severity of the disease was determined according to BISAP score, the presence of multiple organ failure was confirmed by the Modified Marshall Score (2012 modification) [5]. Patients were examined in compliance with the requirements of the Order of the Ministry of Health of Ukraine No 297 as of 02 April, 2010.

To diagnose the local and purulent-septic complications, all patients underwent ultrasonography, computed tomography and fine-needle aspiration of fluid aggregations. To ease the analysis of the prevalence of local parapancreatic complications, the retroperitoneal space was conditionally divided into 8 regions: 1 – parapancreatic fat, lesser sac; 2 – the area of the splenic angle of the colon; 3 – fat pancreatic-duodenal area; 4 – left subphrenic area; 5 – right retrocolar area; 6 – left retrocolar area; 7 – the root of the mesentery and inter-looped aggregations; 8 – fat pelvis.

The patients have been assigned into 2 groups depending on the severity of AP according to the International classification of acute pancreatitis working group, Atlanta 2012 [10]. Group I (n=44; men=27 (61,3%); women=17 (38.7%); the average age 44.8 ± 1.7 years) involved patients with moderate AP. Group II (n=63; men=40 (63,5%); women=23 (36,5%); the average age $48,1\pm 1,6$ years) involved patients with severe AP. Thus, the groups were matched for age and gender.

REVIEW AND DISCUSSION

In Group I, the computed tomography with intravenous contrast (following the 4-7 days of the onset of the disease) showed swelling of the pancreas and infiltration of parapancreatic fat, proliferated to 1 anatomical site in

65,9% of cases, 2 anatomical areas in 18,2% of cases, 3 or more in 15.9% of cases. In the cases, when parapancreatic aggregations were limited to a single anatomic site, CT with i/v contrast showed no sequestral masses; primarily, drainage to 22 patients (59,5%) was conducted under ultrasound control. The infected contents were obtained in 14 cases (63.6 %), pus: in 6 (27,3%), pus with detritus: 2 (9,1%). Repeated evaluation of the patients' state within 48-72 hours, considering the therapeutic element (lavage and antibiotic therapy), showed a decrease in the amount of fluid aggregations by 2-4 times. 2 patients (9.1%) showed 2.1 ± 0.28 BISAP score severity (1 to 3), 2 or more points according to the Marshall score, in one or more systems.

In 20 cases (90.9%) drainage was the final stage of surgical treatment; the drainage was removed in reduce of the amount of serous secretions to 10-30 ml. The follow up examination showed the presence of PSC in 2 cases (9.1%). Therefore, in this case aspiration-and-drainage intervention allowed to delay open surgery and contributed to, first, the demarcation and "localizing" the focus of inflammation. Subsequent laparotomy with necrosectomy (NSE) was the final stage of surgical treatment of these patients.

The indication for ultrasonography-controlled multiple drainage was proliferation of parapancreatic aggregations into 2 anatomic areas and the absence of available sequestrators, confirmed by the CT. The surgery was performed in 6 patients (16.2%): purulent contents were obtained in 5 cases (83.3%), pus with detritus in 1 (16.7%) case. 1 patients underwent open NSE; stage-by-stage NSE was not performed.

Primary open surgery was performed in 9 (24,3%) patients with parapancreatic aggregations localized in three or more areas and/or in presence of sequestral masses, confirmed by the resulting data of abdominal CT with i/v contrast: 7 (77,8%) cases of laparotomy with NSE; 2 cases (22.2%) of laparotomy with lumbotomy and NSE. In 6 cases (66.7%) the operation was one-stage; pus with clearly circumscribed sequestral masses was obtained intraoperatively. Three patients required staged-by-stage surgery. Treatment in this group of patients lasted on the average of 22.6 ± 2.7 days with no lethal cases.

In Group II, the primary ultrasonography-controlled drainage was performed in 19 patients (31,1%) with parapancreatic aggregations localized in one (15 patients (78,9%)) or two (4 patients (21,1%)) anatomical areas without free sequestra, confirmed by the resulting data of abdominal CT with i/v contrast. The infected contents were obtained in 7 (36,8%) cases, pus in 9 (47,4%) cases, pus with detritus in 3 (15,8%) cases. Repeated evaluation of the patients' state on day 2-3 showed lowering of the average BISAP score ($2,1\pm 0,29$ points) (1 to 3); signs of permanent multiple organ failure (Marshall two or more score in one or more systems) were observed in 4 patients (21.1%). Drainage was effective in 15 patients: 4 patients required open surgical interventions, namely, laparotomy with NSE, which was the final stage of treatment of these patients.

Indications for ultrasonography-controlled multiple drainage, performed in 20 patients (32.8 %) was proliferation of the process to 2 or more anatomic areas, the absence of free sequestra, confirmed by the resulting data of abdominal CT with i/v contrast, and presence of the "echo-window". In this case, the infected punctuate was diagnosed in 1 case (5.0%), pus was obtained in 5 (25.0%) cases, pus with detritus in 14 (70.0%) patients. The BISAP 2.4 ± 0.30 score severity (1 to 4), signs of Marshall score multiple organ failure was observed in 14 (70.0%) of patients. Multiple drainage was the final stage of treatment in 6 (30.0%) patients. 14 (70.0%) patients underwent laparotomy with NSE and 6 (42.9%) of them required stage-by-stage NSE.

22 patients (36.1%) with localization of parapancreatic aggregations in 3 and more anatomic areas, confirmed by the resulting data of abdominal CT with i/v contrast, underwent primary open surgeries; in 9 (40.9%) cases they were infected (gas bubbles) and in 13 (59.1%) cases presence of pus with sequestral masses was detected. Laparotomy with NSE was performed in 12 patients, and 10 patients underwent laparotomy with lumbotomy with NSE. Evaluation of the patients' state within 48-72 hours showed: BISAP 2.5 ± 0.30 score (1 to 4) severity; signs of multiple organ failure were observed in 11 (50%) patients, signs of SIRS were preserved in 13 patients (59.1%). 14 (63.6%) patients underwent stage-by-stage NSE after dynamic ultrasound/CT monitoring.

Average hospital stay in Group II was 41.2 ± 3.9 days. Mortality in Group II accounted for 31.7% (20 patients).

Implementation of the advanced technologies contributed to introduction of minimally invasive interventions, changing the situation in the diagnosis and treatment of infected pancreatitis. Laparoscopic treatment shows encouraging outcomes, since it is less invasive, requires a shorter period of hospital stay, and has a lower mortality than open surgeries. However, it should be taken into account that the experience of such treatment remains to be limited; it cannot be used in all cases, because it has certain contraindications and requires data of long-term observations to make a conclusion about the equivalence of the outcomes of minimally invasive interventions to the outcomes of conventional methods of surgery.

Incision, sanitation and drainage of purulent foci can be made by both the conventional laparotomy and one of the minimally invasive methods. External drainage of the infectious-septic foci from mini-access with application of mini-assistant apparatus; endoscopic internal drainage of the cavity of the abscess with necrosectomy; percutaneous puncture of cavity of the infected aggregation, controlled by the medical imaging equipment [3].

Surgical approaches to the purulent-septic complications are specific. The analysis of surgical management in various forms of acute pancreatitis using minimally invasive technologies, conventional laparotomy, as well as their combination, based on the characteristics of the infectious factor, contributed to outline the principles of treatment of this contingent of patients [7].

In recent years, most publications emphasize the use of percutaneous fine-needle aspiration and drainage of the infected aggregation of fluid, controlled by the advanced medical imaging equipment. The technical simplicity of performing of percutaneous aspiration of the cavity of infected fluid aggregation, the possibility of performing a low-traumatic intervention regardless of the severity of the patient's condition attracts the attention of many authors to this group of interventions in patients with purulent parapancreatitis. The method enables administration of antibacterial drugs into the purulent cavity and its cleansing with antiseptic solutions. The state of the cavity can be also controlled by the dynamic fistulography. The intervention is performed through the liver, gastro-splenic ligament and gastrointestinal ligament, lesser omentum, translumbarly and transgastrically, if no other access is available. When draining a pathological focus, the preference is given to introduction of two drains, enabling the creation of aspiration-washing system [8].

Thus, the problem of criteria for the choice of surgical management in parapancreatic infectious and septic complications of acute pancreatitis, namely the timing, surgical volume and approach, is insufficiently solved to date. Currently, the limit, where the expediency of using minimal invasive surgery ends and the time comes to use open surgeries is not completely defined. In this regard, there is a need to distinguish between indications for the use of minimally invasive techniques and laparotomy. Unresolved issues in the diagnosis and choice of therapeutic approach in patients with parapancreatic infectious and septic complications of acute pancreatitis, different views on the indications for surgery, determining the timing and surgical volume, analysis of the effect of thyroid hormones on the progress of the disease, determine the relevance of this study aimed at their solution.

CONCLUSIONS

1. Moderate acute pancreatitis is characterized by localization of purulent-septic complications in 1-2 anatomical areas with fluid component mainly.
2. Severe acute pancreatitis is characterized by the localization of purulent-septic complications in 2 or more anatomical areas with tissue component mainly.
3. The efficacy of the aspiration-drainage procedures is dependent on the proliferation of fluid aggregations into the 1-2 anatomical areas and presence of fluid component mainly.
4. Primarily, open necrosectomy is the most appropriate surgery to be performed in patients with mainly tissue component in the fluid aggregations and the prevalence of local parapancreatic complications in two or more anatomic areas.

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Authors' contributions:

According to the order of the Authorship.

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The Authors declare no conflict of interest.

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