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Original article ■

Treatment of Perforative Peptic Ulcer

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SUMMARY

Perforation of peptic ulcer (PPU) is the most frequent complication of peptic ulcer disease. PPU is a serious complication which demands urgent diagnostic procedures, reanimation and surgical intervention.

The aim of this study was to establish the frequency of PPU, diagnostic and therapy procedures, time and kind of surgical methods, as well as morbidity and mortality in two groups of patients. Based on the results obtained, it will be concluded if there is a statistically significant improvement in treating these patients.

The paper presents a prospective-retrospective study which included patients treated at the Surgical Clinic, Clinical Center Niš, in the period 1994-2006.

The patients were divided into two groups: A - examined group (2001-2006) and B - control group (1994-2000). The division was done based on the application of better and quicker diagnostic and reanimation procedures, urgent surgical treatment of secondary bacterial peritonitis (SBP) in A group patients, while such possibilities lacked in B group patients.

The results of this study showed that 168 patients from the A group and 197 patients from the B group underwent the same surgical procedures, but with a significant decrease in number and severity of postoperative complications: (53.57% of patients and 91.87% of patients, respectively) (p<00001). Mortality of patients in groups A and B was 17.8% and 27.4%, respectively (p=0,042).

The results on mortality obtained in the A group patients are in keeping with the literature data, which, on the other side, is not the case when discussing the ways of treating PPU, the incidence and numerous complications. This high risk group of patients demands worldly acknowledged surgical and reanimation procedures.

Key words: **peptic ulcer, perforation, peritonitis**

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INTRODUCTION

Peptic ulcer disease is a systemic disease of the entire organism. It takes approximately 15-25 years to fully develop.

Ulcer represents a local manifestation of the ulcer disease. Mucosal injury and, thus, peptic ulcer occur when the balance between the aggressive factors and defense mechanisms of gastroduodenum is disrupted. It can affect any part of the alimentary system as well as the sites of ectopic gastric mucosal tissue (1).

Complications of ulcer disease are: hemorrhage, perforation, penetration, stenosis and they affect 20-25% of patients (1, 2).

The aim of our research, based on the prospective-retrospective study with two groups of patients, was to analyze: the number of patients who developed PPU, applied diagnostic procedures, time between discovering PPU and surgical intervention, surgical procedure, incidence and severity of postoperative complications, treatment strategies, number of hospitalization days and mortality of patients.

EXAMINEES AND METHODS

This is a prospective - retrospective study which included patients treated at the Surgical Clinic, Clinical Center Niš, in the period 1994-2006. The patients were divided into two groups: A - examined group (2001-2006) and B - control group (1994-2000).

Criteria were established regarding different diagnostic and reanimation procedures, time taken to decide about performing surgical intervention on PPU, and ways of treating secondary bacterial peritonitis (SBP).

Patients of both groups were approximately of the same age. Severe health condition of patients with haemodynamic, electrolyte and acid - base disbalances was explained by delayed contacting a doctor, often 12 to 18, sometimes even 24 hours after the perforation. The patients over 65 also experienced hepatorenal dysfunctions and multiorganic insufficiency. Due to poor health condition, surgical activity was often contraindicated.

A group patients underwent the following diagnostic procedures: abdominal radiography in standing position or left lateral decubital position, if indicated, and abdominal echo. CT scan was rarely performed, only when previous methods could not provide complete and valid information about the disease. Such strategy provided more successful treatment of PPU, and possible complications. Better preoperative resuscitation, rapid accession surgery, antibiotics administered before and during operation, better abdominal lavage and in some cases post-operative lavage contributed to the successful treatment of SBP.

B group patients received the Ro diagnostic procedures; reanimation procedures were longer as well as the period up to surgical intervention. In those patients, antibiotics were not administered before and during surgery, there was no postoperative abdominal lavage, so that the possibility of complications was greater, and the very treatment of SBP was less successful.

The research results were systematized and presented in the tables below (Excel 2000, Word 2000). Program package SPSS, version 10.0 and Statcalc Epi-Info version 5a were used for the purpose of statistical analysis. The following statistical tests were used: t-test, Mantel-Haenszel's test with Yates correction and Fisher's test.

RESULTS

A group patients involved 603 examinees with acute abdomen and peritonitis, hospitalized in the period 2001-2006, of which 168 (27.86%) with PPU: 111 (66.07%) men and 57 (33.92%) women, mean age 52.5 (19-86 years). Perforative duodenal ulcer (PDU) was found to be by 3.5% more often than perforative gastric ulcer (PGU).

Group B included 523 patients, hospitalized in the period 1994-2000, of which 197 (37.66%) with PPU, mean age 52.5 (29-86 years): 102 (51.77%) men and 95 (48.22%) women. PDU was found twice more often than PGU (Table 1, Figures 1, 2).

Figure 1. *Perforative duodenal ulcer*

Figure 2. *Benign perforative gastric ulcer*

Table 1. *Patients with PPU*

	Gastric ulcer	Duodenal ulcer	Total
Group A	36 (21,42%)	132 (78,57%)	168
Group B	64 (32,48%)	133 (67,51%)	197
p	0,025*		

PPU- Perforation of peptic ulcer

Treatment of PPU is surgical care of the perforation hole and prevention of SBP. There were approximately 1% of patients in group A and 5% in group B who refused surgical treatment and were conservatively treated.

Surgical methods: omentoplastic suture (OPS), gastroenteric anastomosis (GEA), selective proximal vagotomy (SPV), ulcer excision with gastroenteric anastomosis (UEGEA), gastric resection with digestive tract reconstruction by Billroth II method (BII).

There were twice more patients with PGU in group B. Surgical strategy was the same in both groups. GEA (twice) and SPV (3 times) were used more often in group B (1/3) (Table 2a).

The number of patients with PDU was the same in both groups. Surgical methods differed in respect to incidence. GEA and UEGEA were rarely used in group B patients (4 times and 3 times, respectively) (Table 2b).

We found that the same surgical methods were used in both groups and the incidence, in total, was approximately the same (Table 2c).

Postoperative complications were divided into those treated conservatively - infection of the operative wound (IOW), ECHO finding of free fluid within the abdominal cavity (FF), and those which demanded reintervention: dehiscence after laparotomy (DL), suture dehiscence (SD), GEA dehiscence (GEAD) and pus collection (PC). Patients who developed duodenal fistulas were not treated at our clinic.

After treating PGU, there were more cases of postoperative complications treated conservatively in B group patients. In this group of patients, IOW was found more often after OPS, UEGEA and BII. FF finding was more often after OPS, GEA and SPV, while in group A, FF was found more often after UEGEA and BII.

Treatment of PDU also includes various complications: IOW in group A was more often after GEA, while in group B they were more often after OPS and UEGEA.

Patients in A group were diagnosed with FF in abdominal cavity more often after GEA, UEGEA and BII, and in B group after OPS and SPV. However, the total incidence of conservatively treated complications after PDU surgeries was by 10% higher than after PGU (Table 3a).

The percentage of postoperative complications was greater in patients who underwent surgical reintervention than those treated conservatively.

In A group there were three times less complications after PGU surgeries. In this group, DL was more often after UEGEA and BII, SD was more often after SPV and UEGEA, GEAD after GEA and PC after GEA.

In group B, DL was more often after OPS, GEA and SPV; SD was more often after OPS, GEAD after GEA and besides GEA, PC was found in greater percentage after all PGU surgical interventions.

Patients with duodenal fistulas (DF) were not treated at our clinic but their incidence was by 2.5 times higher in B group (Table 3b).

After treating PDU, complications which needed reintervention were by 15% more often in B group.

In A group, DL was more often after GEA, UEGEA and BII. PC was found more often after SPV, UEGEA and BII.

In B group, greater percentage of DL occurred only after SPV, SD after OPS, while GEAD was most often after all methods except OPS and SPV. PC was found after OPS and GEA in more cases.

In both groups, DF occurred only after BII in approximately equal number of cases (Table 3c).

Our researches showed that B group patients, who were treated conservatively or underwent surgical care, developed more postoperative complications which were twice more often in this group (Table 4).

Even though reanimation procedures and operative care of PPU patients have made progress over the past few years, mortality is still high due to SBP and individual health condition. Mortality in A group is lower by 10%. In this group, mortality was increased only after UEGEA. All other surgical methods were followed by a higher degree of mortality in B group. Therefore, we cannot claim that SBP is the only cause of a higher degree of mortality (Table 5).

Table 2a. *PGU treatment methods*

	Group A	Group B	p
OPS	27 (75%)	46 (71,87%)	0,911
GEA	2 (5,55%)	6 (9,37%)	0,702
SPV	1 (2,77%)	4 (6,25%)	0,653
UEGEA	2 (5,55%)	3 (4,68%)	0,999
BII	4 (11,11%)	5 (7,81%)	0,713
Total	36	64	-

PGU- perforative gastric ulcer

OPS- omentoplastic suture

GEA- gastroenteric anastomosis

SPV- selective proximal vagotomy

UEGEA- ulcer excision with gastroenteric anastomosis

BII - gastric resection with digestive tract reconstruction by Billroth II method

Table 2b. *PDU treatment methods*

	Group A	Group B	p
OPS	108 (81,81%)	113 (84,96%)	0,601
GEA	8 (7,4%)	3 (2,20%)	0,213
SPV	4 (3,03%)	4 (2,94%)	0,999
UEGEA	4 (3,03%)	2 (1,5%)	0,447
BII	8 (7,4%)	12 (9,02%)	0,388
Total	132	133	-

PDU- Perforative duodenal ulcer

OPS- omentoplastic suture

GEA- gastroenteric anastomosis

SPV- selective proximal vagotomy

UEGEA- ulcer excision with gastroenteric anastomosis

BII - gastric resection with digestive tract reconstruction by Billroth II method

Table 2c. *Total number of therapeutic procedures*

	Group A	Group B	p
OPS	135 (78,57%)	159 (80,71%)	0,962
GEA	10 (5,95%)	9 (4,56%)	0,721
SPV	5 (2,97%)	8 (4,06%)	0,784
UEGEA	6 (3,57%)	5 (2,53%)	0,788
BII	12 (7,14%)	17 (8,62%)	0,742
Total	168	197	-

OPS- omentoplastic suture

GEA- gastroenteric anastomosis

SPV- selective proximal vagotomy

UEGEA- ulcer excision with gastroenteric anastomosis

BII - gastric resection with digestive tract reconstruction by Billroth II method

Table 3a. *Postoperative complications treated conservatively*

		GROUP A			GROUP B		
		Number	**IOW**	**FF**	**Number**	**IOW**	**FF**
PGU	OPS	27	3 (11,11%)	2 (7,4%)	46	12 (26,08%)	9 (19,56%)
	GEA	2	1 (50%)	0	6	3 (50%)	2 (33,33%)
	SPV	1	0	0	4	0	2 (50%)
	UEGEA	2	0	1 (50%)	3	1 (33,33%)	0
	BII	4	1 (25%)	1 (25%)	5	2 (40%)	1 (20%)
	Total complications	9 (25%)			31 (48,43%)		
p			0,037*				
PDU	OPS	108	8 (7,4%)	6 (5,55%)	113	23 (20,35%)	12 (10,61%)
	GEA	8	2 (25%)	2 (25%)	3	0	0
	SPV	4	1 (25%)	0	4	1 (25%)	1 (25%)
	UEGEA	4	0	1 (25%)	2	1 (50%)	0
	BII	8	4 (50%)	4 (50%)	12	6 (50%)	3 (25%)
	Total complications	28 (21,21%)			47 (35,33%)		
p			0,015*				

PGU- perforative gastric ulcer, PDU- perforative duodenal ulcer

OPS- omentoplastic suture, GEA- gastroenteric anastomosis

SPV- selective proximal vagotomy

UEGEA- ulcer excision with gastroenteric anastomosis

BII- gastric resection with digestive tract reconstruction by Billroth II method

IOW- infection of operative wound

FF- free fluid within abdominal cavity

Table 3b. *Reintervention of postoperative PGU complications*

			GROUP A			
	Number	**Deh.lap.**	**Deh.sut.**	**Deh.GEA**	**PC**	**DF**
OPS	27	3 (11,1%)	4 (14,8%)	0	2 (7,4%)	0
GEA	2	0	0	1 (50%)	1 (50%)	0
SPV	1	0	1 (100%)	0	0	0
UEGEA	2	1 (50%)	1 (50%)	0	0	0
BII	4	1 (25%)	0	0	1 (25%)	1 (25%)
Total complications			17 (47,22%)			
			GROUP B			
	Number	**Deh.lap.**	**Deh.sut.**	**Deh.GEA**	**PC**	**DF**
OPS	46	8 (17,3%)	13 (28,2%)	0	5 (10,8%)	0
GEA	6	4 (66,6%)	0	4 (66,6%)	2 (33.3%)	0
SPV	4	3 (75%)	0	0	1 (25%)	0
UEGEA	3	0	0	0	1 (33,3%)	0
BII	5	1 (20%)	0	0	2 (40%)	3 (60%)
Total complications			47 (73,43%)			
p = 0,016*						

PGU- perforative gastric ulcer, OPS- omentoplastic suture
GEA- gastroenteric anastomosis, SPV- selective proximal vagotomy
UEGEA- ulcer excision with gastroenteric anastomosis
BII- gastric resection with digestive tract reconstruction by Billroth II method
DL- dehiscence laparotomy, SD- suture dehiscence, GEAD- GEA dehiscence,
PC- pus collection, DF- fistula of duodeny

Table 3c. *Reintervention of postoperative PDU complications*

			GROUP A			
	Number	**Deh.lap.**	**Deh.sut.**	**Deh.GEA**	**PC**	**DF**
OPS	108	5 (4,6%)	6 (5,5%)	0	4 (3,7%)	0
GEA	8	4 (50%)	0	2 (25%)	1 (12,5%)	0
SPV	4	0	0	0	1 (25%)	0
UEGEA	4	1 (25%)	0	2 (50%)	2 (50%)	0
BII	8	3 (37,5%)	0	0	2 (50%)	3 (37,5%)
Total complications			36 (27,27%)			
			GROUP B			
	Number	**Deh.lap.**	**Deh.sut.**	**Deh.GEA**	**PC**	**DF**
OPS	113	6 (5,3%)	14 (12,38%)	0	18 (15,9%)	0
GEA	3	1 (33,3%)	0	1 (33,3%)	1 (33,3%)	0
SPV	4	1 (25%)	0	0	0	0
UEGEA	2	0	0	2 (100%)	0	0
BII	12	3 (25%)	0	2 (16,6%)	3 (25%)	4 (33,33%)
Total complications			56 (42,1%)			
p = 0,016*						

PDU- Perforative duodenal ulcer, OPS- omentoplastic suture
GEA- gastroenteric anastomosis, SPV- selective proximal vagotomy
UEGEA- ulcer excision with gastroenteric anastomosis
BII- gastric resection with digestive tract reconstruction by Billroth II method
DL- dehiscence laparotomy, SD- suture dehiscence, GEAD- GEA dehiscence,
PC- pus collection, DF- fistula of duodeny

Table 4. *Total complications - Incidence*

Number of patients		**Complications**		
		Without reintervention	**Reintervention**	**Total**
Group A	168	37 (22,02%)	53 (31,54%%)	76 (53,57%)
Group B	197	78 (39,59%)	103 (52,28%)	181 (91,87%)
p		0,00005*	0,0001*	$<1x10^{-6}$

Table 5. *Mortality*

	A		B		p
	Pain	**Mortality**	**Pain**	**Mortality**	
OPS	135	23 (17%)	159	39 (24,5%)	0,154
GEA	10	2 (20%)	9	4 (44,4%)	0,350
SPV	5	0	8	3 (37,5%)	0,230
UEGEA	6	2 (33,3%)	5	1 (20%)	0,999
BII	12	3 (25%)	17	7 (41,1%)	0,449
Total	168	30 (17,8%)	197	54 (27,4%)	0,042*

OPS- omentoplastic suture

GEA- gastroenteric anastomosis

SPV- selective proximal vagotomy

UEGEA- ulcer excision with gastroenteric anastomosis

BII- gastric resection with digestive tract reconstruction by Billroth II method

DISCUSSION

Ulcer disease may last for over ten years, while during the first ten years, about 60% of patients experience individual discomforts. The mechanisms of mucosal injury are thought to be mainly caused by imbalance of defensive and aggressive factors. Gastric ulcer develops by prevailing of aggressive factors over the defensive ones, while the collapse of the defensive mechanisms and Helicobacter pylori activity gives duodenal ulcer. This disease is often followed by complications. The incidence of complications was by three times higher in our patients' groups compared to the available data (55-60% to 20-25%) (1, 2).

PPU is the most common complication of the ulcer disease (about 40%). Such complication is a serious indication for urgent surgical intervention, with a high percentage of morbidity and mortality.

After learning about the role of Helicobacter pylori and achievements in pharmaceutic industry, the use of modern medicines have helped decreasing the complications of ulcer disease. PPU is a disease of the modern world, which demands urgent surgical care and shows high percentage of morbidity and mortality. It occurs in about 40% of patients, both in patients who take antiulcer therapy and patients who expressed PPU as a first symptom of the ulcer disease.

However, a recent research has shown that there is a difference in the percentage representation of perforated duodenal and gastic ulcers which are more common in younger men than in women (3).

Clinically, this complication is dramatic and divided into 3 stages: stage I (first 6 hours): chemical peritonitis followed by acute abdomen and shock; stage II (after 6-12 hours)-latent stage - the patient feels better, and stage III (after 12 hours) - SBP develops, shock and sepsis follow.

PPU is usually diagnosed (90%) by clinical examination (older patients experience middle intensity pain, which may last for several days, and appears in over 68% of patients) and native radiography of the abdomen in a standing position. However, some authors suggest that negative radiographs are found in 50% of PPU cases. Therefore, a left lateral decubital abdominal radiography is suggested as a better method in diagnosing pneumoperitoneum.

Any delay in diagnosing, surgical care and postoperative treatment increases morbidity and mortality of these patients. The therapy of PPU is surgical, complex and urgent. It includes: urgent reanimation procedures and preparation for surgery, surgical intervention, postoperaive reanimation and managing SBP. Surgery: operative care of the perforation hole, abdominal lavage and drainage.

I) Urgent surgical preparation includes alleviation of pain, prophylactic use of antibiotics (although their role is not yet confirmed), electrolyte imbalance and hypovolemia correction. In cases of severe health condition of a patient with signs of hypovolemic-septic shock, reanimation procedure is more intense and complex. Mortality of this disease is extremely high, in spite of doctors' expertise and medical achievements.

Potentional complication of PPU is SBP which is the result of bacterial contamination and spilling the gastric content (undigested food, gastric acid), duodenal content and bile into the abdominal cavity. Peritonitis increases the chances of abscess occurrence and its

retaining in the third space decreases the circulatory volume, causes acid-base and electrolyte imbalance and low kidney perfusion with a decreased diuresis. As the illness progresses, those disturbances lead to hypovolemic-septic shock.

Paralytic ileus, therefore abdominal distension, increase the pressure on diaphragm and decreases the lung expansion, sometimes even with atelectasis and decreased blood oxygenation, the symptoms worsen if a patient has a susceptible respiratory system, or if a patient is older, which increases the operative risk (4).

Recent opinions strictly define the logarithm of preoperative and postoperative care and treatment of patients according to the Danish National Committee on Biomedical Research Ethics, which is registered as clinicaltrials.gov (NCT00624169) (5).

Neglected cases of SBP can be fatal. By the end of the 19th century, mortality was over 90%, but thanks to the operative treatment and more efficient therapy at the beginning of the 20th century, mortality was by 2.5 times lower, 40% (6).

Total incidence of peritoneal infection and abscess is hard to determine because it directly depends on its cause. Perforative appendicitis is the leading cause of SBP, while PPU follows. After elective surgeries without infectious agent, SBP incidence is less than 2% (5). Surgeries of inflammatory diseases without visceral perforation can be followed by SBP in less than 10% of patients, but if perforation is included, SBP occurs in more than 50% of patients. Over 90% of SBP cases are caused by monomicrobical infection: Gr- bacteria 30%, Gr+ bacteria 15% and anaerobical bacteria less than 10% (7).

Pathophysiology of SBP starts with decrease in intraabdominal fibrinolytic activity which leads to the accumulation of fibrine and forming of fibrinous adhesions (8), which is a good defense mechanism on the one hand, but on the other, fibrinous matrix allows bacteria to accumulate and grow, which either leads to dissemination of the process and sepsis or to abscess forming (9, 10).

II) Treatment of PPU includes both operative and nonoperative strategies. SBP caused by PPU is usually treated ten or five days with the third generation Cephalosporines. They are usually combined with metronidazole and synthetic penicillins, although there are even studies which advocate monobiotic therapy. The aim is to start as soon as possible with surgical and antibiotic therapies in order to prevent bacteria and their toxins to contaminate the abdominal cavity.

Operative strategy depends on the type of illness and severity of the intraabdominal infection. Intraoperative thorough lavage with up to 20 liters of saline solution is combined with antibiotics (metronidazole) and abdominal drainage in order to bring morbidity, complications and mortality to the lowest level (11). According to some other authors, intraoperative lavage may cause dissemination of a process and therefore should not be used (12). Constant postoperative monitoring of the patient lowers the possibility of complications, which, if appear, may lead to tertiary peritonitis (TP). TP may be a result of inadequate preoperative preparation, operative treatment and postoperative monitoring of a patient (13 - 15).

III) For a long time, no one considered conservative way of treatment as valid (Taylor's method), which is now being taken into reconsideration (16). For now, operative treatment of PPU is a golden rule.

Operative method, morbidity and mortality, depend on the preoperative health condition of a patient, the already existing cardiovascular, respiratory and renal diseases. Researches have shown that operative risk should be assessed according to APACHE II scoring system (17), and severity of abdominal sepsis according to Jabalpur scoring system which is the most simple and the most efficient (18). Patient age is also an important risk factor, although children's mortality is 18% according to some data (19).

According to ASA score system, a period between the moment when pain starts and surgery has a direct influence on the incidence of complications and mortality (20).

Operative strategy, laparoscopic or open surgical techniques yield the same results, emphasizing that there is a smaller number of operative wound infection cases after laparoscopic surgical care of a perforated duodenal ulcer (21). Lately, laparoscopic method has been frequently used for PDU (22). Methods of surgical treating PPU are various:

- Simple sutured omentoplasty (Mikulitz 1887);
- Perforation suture with vagotomy, usually proximal gastric vagotomy (PGV);
- Truncal vagotomy with gastroenteric anastomosis (GEA) if stenosis or callosity are present.
- Ulcer excision with suture without vagotomy (high risk patients).
- Partial gastrectomy if the operative risk is acceptable. The method is usually applied on gastric ulcers or callous duodenal ulcers with or without stenosis.

Some authors prefer laparascopic treatment of ulcus perforation using glue with omentoplasty and Graham patch (23).

Differences and advantages of laparoscopic and open methods have been considered by some authors from Sarajevo (24).

Choosing an operative strategy is not an easy task, despite new findings in drug - and laparascopic surgery, which has been described in recent papers (25).

In some cases, mortality after these procedures is extremely high. Turner WW Jr. (1988) reported that mortality after suture with omentoplasty or ulcer excision was 12%, after primary gastric resection 45%, and after simple sutures even 62%. This is why it is recommended to perform ulcer suture with omentoplasty or ulcer

excision with suture in case of PGU, while in case of PDU, if possible, primary gastric resection is performed (26).

The possibilities of treatment of ulcer perforation have not yet been exhausted. Thus, professor T. Stegmann et al. in his book Perforated Peptic Ulcer-new insights, from 2011, describes the treatment of perforated ulcers, "stamp" method and compares the efficacy of sweep biodegradable lactide-glycolide-caprolactone with omentopatches (27). Patients over 60 years of age, with PPU and high APACHE II and SAPS scores, who underwent suture with omentoplasty, by open surgery or laparoscopy, enter a morbidity risk of 25% and mortality over 20% (28).

In Japan, mortality of PPU patients over 70 years has been studied. Results have shown that mortality is higher if a perforation is treated with a simple suture, but may lower if this method is combined with vagotomy.

Ulcer relapse five years after suture intervention on PDU was diagnosed in 63,6% of patients, and after vagotomy in 38,1%.

After gastrectomy in PGU, mortality is higher than after suture intervention. Mortality is even higher if a patient has entered a septic shock, if a surgery was delayed more than 24 hours and if a patient suffers from other illnesses as well.

Ulcer relapse after the suture was diagnosed in 41,2% of patients, and after gastrectomy in 15,9%.

According to some researches, authors recommend suture with vagotomy in treating PDU, unless the perforated hole is wider than 20 mm or if ulcer is combined with stenosis. Method of choice in treating PGU is gastric resection (29, 30). Graham's patch is a commonly used method in treating PDU. This procedure has given extremely high percentage of mortality and therefore it has been commonly studied. It has been found that a bile leakage is a risk factor, which can lead to a lethal outcome in 55,6% of cases, unlike the expected 2,7% mortality without this complication (31).

Morbidity and mortality of PPU patients depends on ulcer dimension and diameter of the perforated ulcer hole.

Type A: simple prepyloric ulcer in the anterior wall: laparoscopic suture with omentoplasty has 9% morbidity and 4% mortality;

Type B: ulcer with a large defect: excision and suture performed, reported morbidity 22%, and mortality 20%;

Type C: ulcer with a duodenal destruction and penetration into the nearby organs: gastrectomy in 75% of cases, reported morbidity 34% and mortality 17% (32, 33).

The results of the present study showed that at the Clinic for General Surgery CC Nis there were 168 patients with PPU in group A: 36 (21,42%) patients were diagnosed with PGU and 132 (78,57%) had PDU. Results of our research showed that the age limit has changed, in comparison to the world standards. Average age of patients in group A was 52,5 years and 57,5 years in group B. Only few of them reached clinic within 6 hours since perforation, which is also the most convenient time to perform a surgical intervention. Patients were often in very bad health condition, had extreme electrolyte imbalance with signs of hypovolemic-septic shock. Those patients needed an urgent reanimation procedure. Reanimation procedure was more thorough and more successful in group A, due to newest advancements and reanimation procedures.

Patients in group B came to the clinic after more than 6 hours of pain. They were in a very bad general condition, with symptoms of endotoxic shock. Preoperative preparation and resuscitation of these patients was shorter, incomplete, without the use of antibiotics which increased the risk of complications, morbidity, treatment SBP severity and mortality of this disease.

In group A, 99% of PPU patients were surgically treated, and only 1% (tectal perforation) was treated conservatively (usually patients who refused surgical intervention).

In group B, the conservative method was slightly more frequent (about 5%); the patients with serious health condition who refused surgical treatment underwent the Taylor's method of treatment. Such difference in treating PPU shows more determined and aggressive surgeon approach in treating the complications of this disease.

In both groups of patients the same surgical procedures were used.

PUG: OPS, in most cases (group A-75%, group B- 71,87%), other methods were performed in approximately the same number of cases in both groups except for BII gastric resection, which was performed in 11,11% of patients in group A, and in 7,81% in group B.

PUD was operatively treated in both groups and surgeries were performed in approximately the same percentage of patients.

Summarized results from both groups showed that there was not any significant progress in the number and types of surgical procedures on PPU in the past, which is in keeping with the worldly accepted official statements.

We divided postoperative complications in two groups:

1. Complications which did not require reintervention (conservative treatment);
2. Complications which needed reintervention.

In group A after surgical treatment of PGU, 25% of patients with complications were treated conservatively, as opposed to 48.43% of B group patients B group patients ($p=0.037$).

In A group patients with PDU, 21.21% of complications did not require reintervention, while this was necessary in 35.33% of B group patients ($p=0.015$).

Complications which needed reintervention after treating PGU were reported in 47,22% of cases in group A and 73,43% in group B (p=0,016). Complications which required reintervention after treating PDU were reported in 27,27% of cases in group A and 42,1% in group B (p=0,016) patients.

Complications which required reintervention were treated differently:

Dehiscence after laparotomy (group A-18, group B-27) by resuture of the laparotomy.

Dehiscence suture: places of perforation, including those having occurred after other types of surgical interventions, in group A after treating PGU were diagnosed in 6 patients and they were resutured in 66,66% of cases, and ulcer excision was performed in the rest of the cases. After treating PDU, there were 6 suture dehiscences, and secondary BII resection was performed. In group B with PGU, dehiscence suture of perforation places, including those having occurred after other types of surgical interventions, was diagnosed in 13 cases. All the patients underwent BI gastric resection (44,44%) and BII (55,55%).

GEA dehiscence after PGU surgeries in group A: in one patient - resuture, after PDU there were 4 patients, 2 of which (50%) were resutured and other two patients underwent BII gastric resection. In group B: after PGU surgery there were 4 GEA dehiscences which were resutured. After PDU surgeries and 5 GEA dehiscences, BII resection was performed in 80% of patients and resuture in 20% (gastric resections BI or BII which were performed secondarily were not added to PPU treating results data).

Postoperative abscess occurrence: in group A, 17 patients were conservatively treated and only 14 needed drainage. In Group B, 30 patients with postoperative abscess were conservatively treated and 33 patients underwent reintervention.

Duodenal fistulas: 4 cases in group A and 7 cases in group B were not treated at our clinic.

Total rate of postoperative complications in group A was 53,57% and 91,87 in group B ($p<1x10^{-6}$).

Such high percentage of individual and total complications directly influenced the duration of hospitalization and morbidity. Average duration of hospitalization after treating PGU by suture with omentoplasty was 9 days (7-11d) in group A and 13,5 days (9-18d) in group B. After other surgical procedures, hospitalization lasted 15 days (8-22d) in group A and 20,5 (19 -29d) in group B. Hospitalization duration after PDU suture with omentoplasty was 11,5 days (8-15d) in group A and 15,5 days (12-19d) after other surgical methods. In group B, after suture with omentoplasty, hospitalization lasted 13,5 days (9-18d) and 19 days (10-28d) after other surgical methods.

Even though a significant progress in reanimation procedures and operative treatment of PPU patients has been made, following the principles of the gastroduodenal surgery, mortality rate is still high, mostly because of the SBP and health condition of the patients. After suture with omentoplasty in group A, mortality rate was 17,8%. In group B, after suture with omentoplasty mortality was 24,5%, and after other procedures 38,46%. Total mortality rate was 27,4% (p=0,042).

If we compare ways of treating PPU with those applied in the rest of the world, we shall not come out with satisfactory results. PGU was treated by suture with omentoplasty in 75% of cases in group A and 72% in group B. Other surgical methods were rarely applied.

Such kind of approach is in a direct collision with the standards on treating ulcer perforations - suture with omentoplasty should be performed only in cases of a serious patient health condition, while ulcer excisions and partial gastric excision should be the methods of choice in treating PGU.

In treating PDU, suture with omentoplasty was mostly performed (group A-82%, group B-85%). Other operative methods were also rarely performed.

According to data taken from the literature, surgical principles of treating PDU are divided into: suture with vagotomy if the perforation hole is under 20 mm width, and if the perforation hole is bigger, or the stenosis is excessive, gastrectomy should be performed. Our results are directly opposite to those presented in literature data.

Although it seems to be a safer method, regarding the complications and mortality, suture with omentoplasty, performed in our patients, is still not a definite solution to the ulcer disease, especially when speaking about recidivism. It is our opinion that in treating ulcer disease and its complications more radical principles should considered. However, the therapy principles should not be applied so strictly (after PGU- resection, after PDU up to 20 mm wide perforation hole-suture with vagotomy, over 20 mm -gastric resection), because operative method also depends on other factors such as: age, health condition, preoperative preparation, intraoperative finding and severity of SBP. Technically speaking, there are no unique operative principles in treating PPU but suture with omentoplasty, which is one of the most used methods at our clinic, but the least used anywhere else in the world.

CONCLUSION

Acute abdomen caused by PPU is a serious surgical problem and demands a serious approach. We cannot be content with the results obtained in this study. Percentage of morbidity, mortality and hospitalization duration are in keeping with the world standards, which is not the case with ways of treatment and operative methods. Patients with PPU are high risk patients and they should be provided with complete urgent preoperative preparation and reanimation, and operative method should include some useful experiences of others: suture with omentoplasty should be performed only in

cases of a serious health condition of a patient, while ulcer excisions and partial gastric excision should be the methods of choice when treating PGU. Surgical principles of treating PDU are divided into: suture with vagotomy if the perforation hole is under 20 mm of width, and if the perforation hole is bigger, or the stenosis is excessive, gastrectomy should be performed. These statements must not be taken strictly as the choice of operative technique in each case depends on many other factors (age, concomitant diseases, general patient condition, etc). Although omentoplasty sutures bring a series of complications or prolongation of hospitalization and increase morbidity, this is still the most frequently used method in our clinic, but the least used anywhere else in the world.

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LEČENJE PERFORATIVNOG ULKUSA ŽELUCA

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Sažetak

Perforacija ulkusa gastroduodenuma (PUGD) je najčešća komplikacija ulkusne bolesti. Predstavlja vrlo ozbiljnu komplikaciju koja zahteva urgentnu dijagnostiku, reanimaciju i hirurško lečenje.

Cilj ovog rada je da, kod dve grupe naših bolesnika, utvrdimo učestalost PUGD-a, dijagnostičke i terapijske procedre, vreme i vrstu preduzetih hirurških intervencija, morbiditet i mortalitet bolesnika. Na osnovu dobijenih rezultata utvrdićemo da li poslednjih godina postoji statistički značajno poboljšanje u lečenju ovih bolesnika.

Ispitivanje predstavlja prospektivno-retrospektivnu studiju bolesnika lečenih na Hirurškoj klinici Kliničkog centra Niš, u periodu od 1994. do 2006. godine. Bolesnike smo podelili u dve grupe: ispitivana grupa: A - od 2001. do 2006. godine i kontrolna grupa: B - od 1994. do 2000. godine. Podela je izvršena prema primeni bržih i boljih dijagnostičkih i reanimacionih procedura, urgentnijem zbrinjavanju mesta perforacije i adekvatnijem lečenju sekundarnog bakterijskog peritonitisa (SBP) bolesnika grupe A, dok takvih mogućnosti nije bilo tokom lečenja bolesnika grupe B.

Podaci studije pokazali su da je u grupi A bilo 168, a u grupi B 197 bolesnika sa PUGD-om kod kojih su urađene iste hirurške procedure, ali da je u grupi A došlo do značajnog smanjenja komplikacija: 53,57% prema 91,87% bolesnika grupe B ($p<0,0001$). Mortalitet bolesnika grupe A iznosio je 17,8%, dok je u grupi B znatno viši: 27,4%.($p=0,042$).

Dobijeni rezultati mortaliteta bolesnika grupe A se poklapaju sa podacima dobijenim iz literature, što nije slučaj sa metodama lečenja PUGD-a i SBP-a, učestalosti i vrstama komplikacija i mortalitetom. Ovi bolesnici spadaju u grupu bolesnika visokog rizika kod kojih treba primenjivati svetski priznate i usvojene hirurške i reanimacione postupke.

Ključne reči: **želudačni ulkus, perforacija, peritonitis**