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Influence of simultaneous laparoscopic cholecystectomy and Toupet fundoplication on physical status of patient

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Abstract

Gallstone disease is one of the most common surgical pathology. Hiatal hernia is widespread easier. This fact forms basis of combination of gallstone disease and hiatal hernia, which is often to occur. Aim of our work was to assess the impact of simultaneous operations for patients with gallstone disease in combination with a hiatal hernia, to evaluate the safety of simultaneous laparoscopic operations performed using developed technique. Compare the impact of simultaneous technique with such using classic technique. Choose the optimal treatment strategy. To form the sample, we used the data accumulated involynian regional clinical hospital (Lutsk. Ukraine) in the minimal invasive surgery unit. The sample consisted of two groups: group 1 - 126 patients who underwent simultaneous laparoscopic treatment of cholelithiasis and hiatal hernia using our own developed technique, group 2 - 206 patients who underwent only cruroraphy and Toupet fundoplication. It was shown that the method of simultaneous laparoscopic treatment in the first group made it possible to prevent re-

hospitalization, second operation, and all associated with hospital stay and surgery risks at the cost of a slight increasing the average duration of the operation (51 ± 9 versus 42 ± 6 minutes in the second group). No negative affect on RCRI, ARISCAT, P-POSSUM scales detected. At the same time, there was no statistically significant increase in complications (5.5% versus 6.3% for the first and second groups, respectively, $p=0.832$), mortality remained zero, which indicates safety. The method promises an increase of efficiency of surgical treatment.

Key words: surgery; laparoscopy; simultaneity; hiatal hernia; gallstone disease

Data from 2019 from open sources (MedScape, Cochrane) claim that from 15 to 20% of the adult population of Western countries have gallstone disease [1]. Every year, 2-4% of these patients begin to suffer from symptoms of the disease [2]. About 9% of hospitalized patients will develop complications, which will account for 0.2% -0.6% of deaths. About 70% of these deaths are caused by direct consequences of cholecystitis and choledocholithiasis [2]. Up to 12% of patients with gallstone disease have a concomitant hiatal hernia [3, 4]. Such statistics highlight the relevance of the development and improvement of techniques for performing simultaneous operations, and according to the recommendations of the ERAS society, minimally invasive surgery should be at the forefront of this development [5].

It is also known that during the operation the body experiences traumatic and painful stress [6]. Because of this, a large number of inflammatory mediators are released locally, as well as the stress hormone cortisol [6]. At first, this compensatory mechanism helps the body to cope with damage, but the processes become destructive. Such phenomena as edema, pain “stress-diabetes”, although they are the result of defense mechanisms, still significantly complicate and prolong the period of healing and rehabilitation [6]. This is directly related to complications, hospital stays, and treatment costs [5]. Shorter operation time, less trauma, against the background of effective patient management should be a priority goal in treatment, since it minimizes the negative impact of surgical stress on the patient (Kehlet H. 2006).

During 2016 – 2019 years 332 patients with hiatal hernia where threatened. Each patient underwent laparoscopic Toupet fundoplication. In 126 patients gallstone disease were diagnosed. Therefore simultaneous laparoscopic cholecystectomy was performed. For performing simultaneous operations own developed technique was used (fig.1) [7]. Other 206 patients underwent classic laparoscopic Toupet fundoplication [8].

Selection into groups was performed exclusively on the basis of the principles of surgical comorbidity. All patients underwent planned surgical treatment. The average hospital stay before surgery was 1 day for diagnosing and preparing. To assess the condition of

patients during and after surgery, visual indicators were used, such as blood pressure, blood glucose concentration, and the P-POSSUM scale. The creatinine levels of patients in both groups were also taken into account. Also, in the treatment of all patients, the ARISCAT scales were used to assess pulmonological risks after surgery, RCRI (LEE), to assess perioperative cardiovascular complications for elective surgery, ASA. During the operation, the volume of blood loss was assessed. The PT-RHDS scale was used to assess the patient's condition after surgery and the readiness for discharge. As in the research of colleagues (Weiss & oth.), An indicator of 7 points was considered satisfactory, that is, ready for discharge. Retrospective data analysis was carried out.

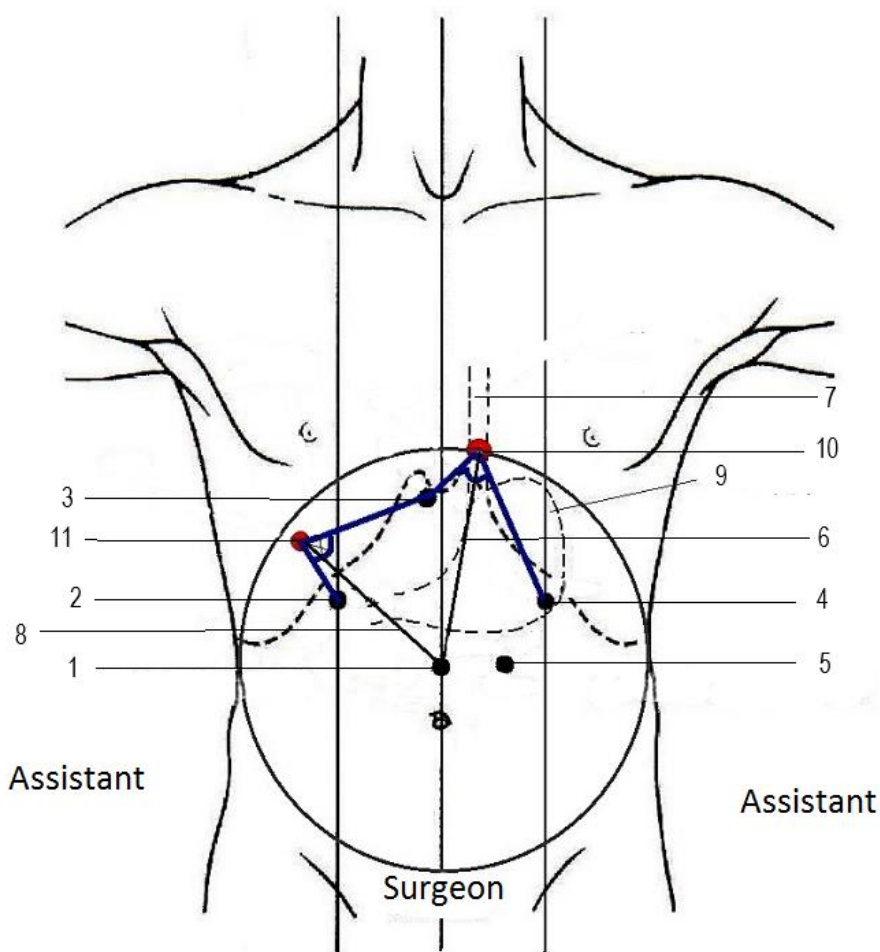


Figure 1 Port Arrangement 1 - Video port. 2 - Retractor. 3 - Functional surgeon port. 4 - Functional surgeon port. 5 - Additional clamp. 6 - 2/3 Length of the laparoscope. 7 - Esophagus. 8 - 1/2 the length of the laparoscope. 9 - Stomach. 10 - Target, the angle between the instruments 60-90 degrees. 11 - Target, the angle between the tools is 60-90 degrees.

The majority of patients were women, aged 45-60 years, with an operational risk of ASA 2 and two comorbidities (Tab. 1-2).

Table 1. Operations indifferent age and sex groups

Operations	Age	25-44		45-60		60-75		75-90	
	Sex	M	W	M	W	M	W	M	W
Laparoscopic cholecystectomy + laparoscopic Toupet funduplications		2	4	10	51	12	43	3	1
Laparoscopic Toupet funduplications		8	6	41	63	27	57	2	2

Table 2. ASA risks

ASA	Number	Percent
1	9	2,7
2	281	84,6
3	42	12,7

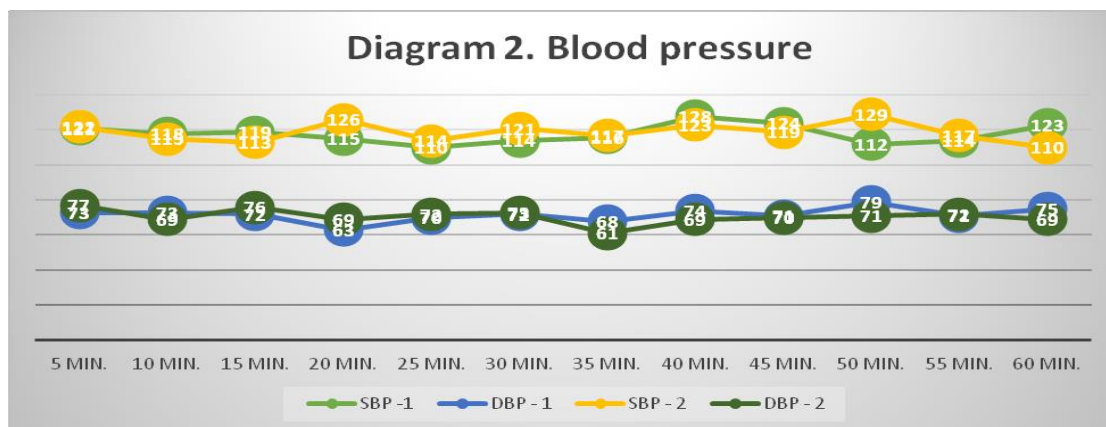
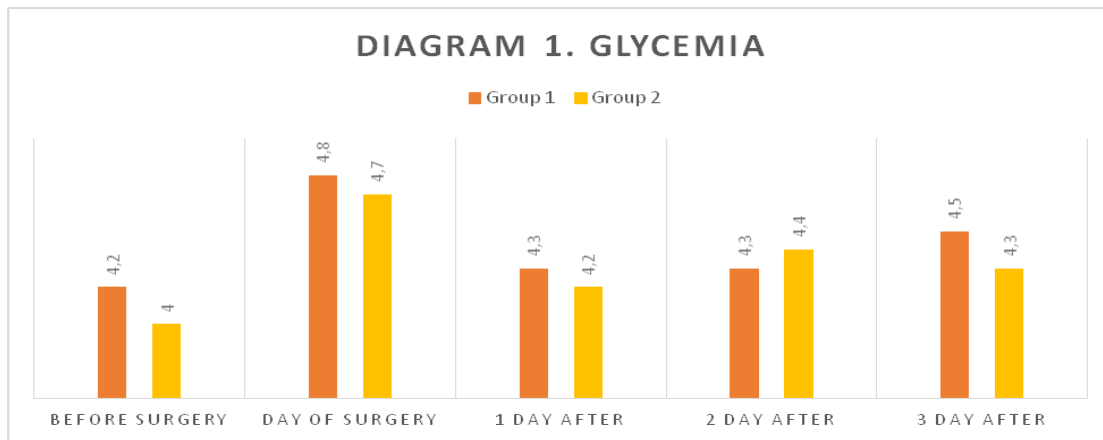
After the analysis and assessment using the P-POSSUM scale, where the minimum and maximum indicators did not differ significantly in the study and control groups (from 5 to 17, average 7.84, n = 126 for the first group, from 6 to 16, average 7.77, n = 206 for the second group). The average levels are fairly uniform, the difference is insignificant.

According to the RCRI (Lee) scale, almost all patients had risk category 2 in the first and second groups. There were also patients with risk category 1 (24 people (19%) in the first group and 37 people (18% in the control), and with risk category 3 (1 in the first and 3 in the second group, 0.8% and 1.5%, respectively).

There was also an increase in the operation time and the time of anesthesia in the group of simultaneous laparoscopic treatment. The average operation time in the first group was 51 ± 9 minutes, in the control group this indicator was 42 ± 6 minutes. The increase of time in the first group by 17% due to the larger volume of the operation registered. All operations in the first and second groups were performed within 2 hours, which, in turn, did not increase the risks of pulmonary complications (ARISCAT).

According to the patient management protocols, when performing ERAS surgical treatment, all patients received a carbohydrate load before surgery in liquid form in period of 2 hours before the intervention. Subjective discomfort, hunger and nausea were rare in both groups before surgery (6 people or 4.7% for the first group, and 14 people or 6.7% for the second). The indicators that were responsible for the stress response were monitored at all

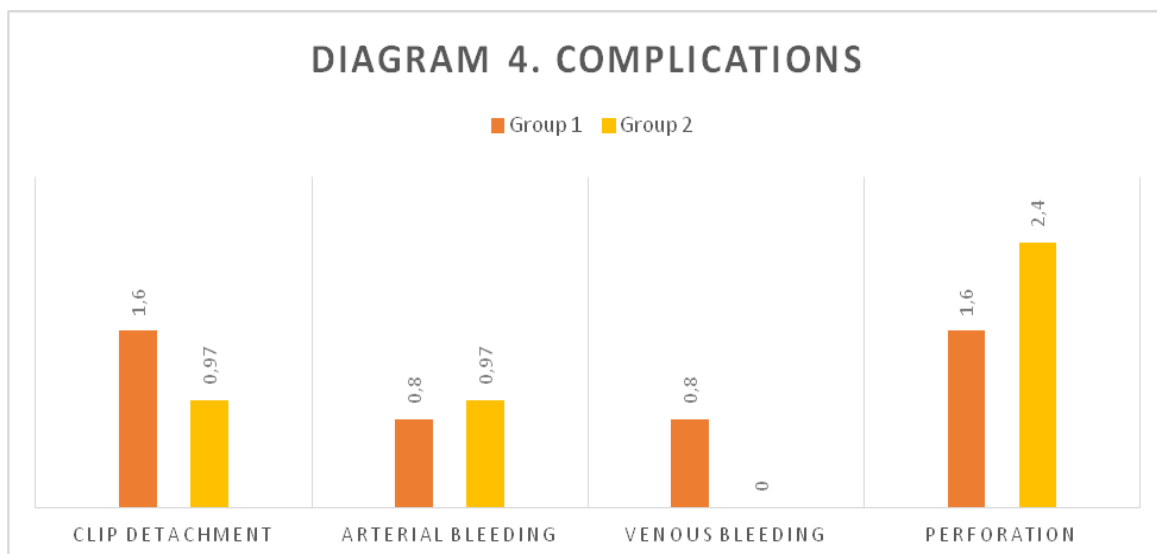
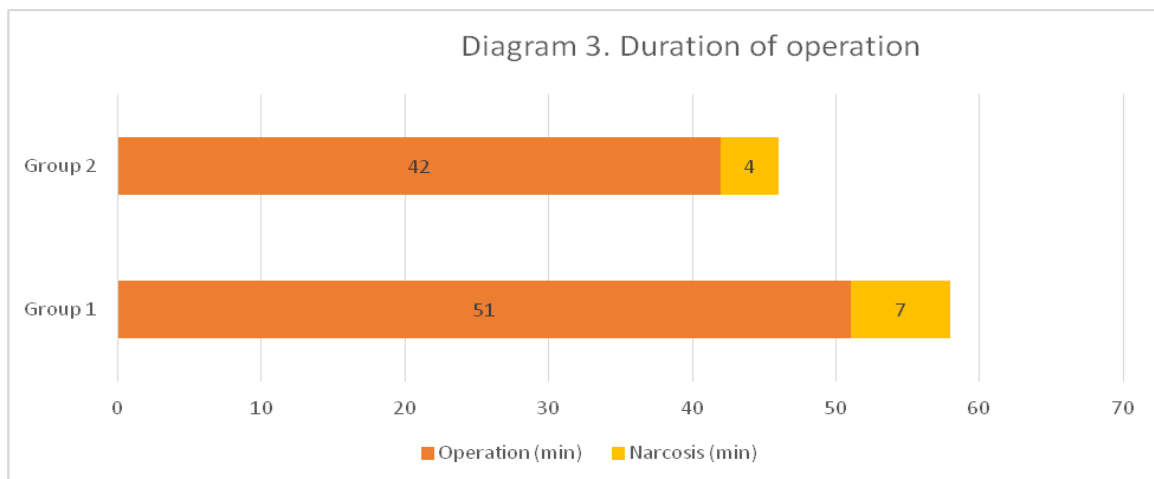
stages (diag. 1, 2). The glycemic level is highly informative for the assessment of surgical stress. There were no significant differences in both groups (Diagram 1). Correction with insulin or 40% glucose was not required in both groups.



The criterion for the development of arterial hypotension was evaluated as a decrease in mean arterial pressure by 30% from the initial one, or below 80 mm Hg. in the systolic phase, or deviation of the ST segment on the ECG. The tactics for stopping hypotension were the same in all cases, and consisted of increasing the rate of infusion of colloid solutions, or adding pressors (it took 2 times in the first and second groups, that is, 1.6% for the first group and 0.97% for the second). A significant difference in blood pressure in both groups was not registered at all stages of the operation (Diagram 2).

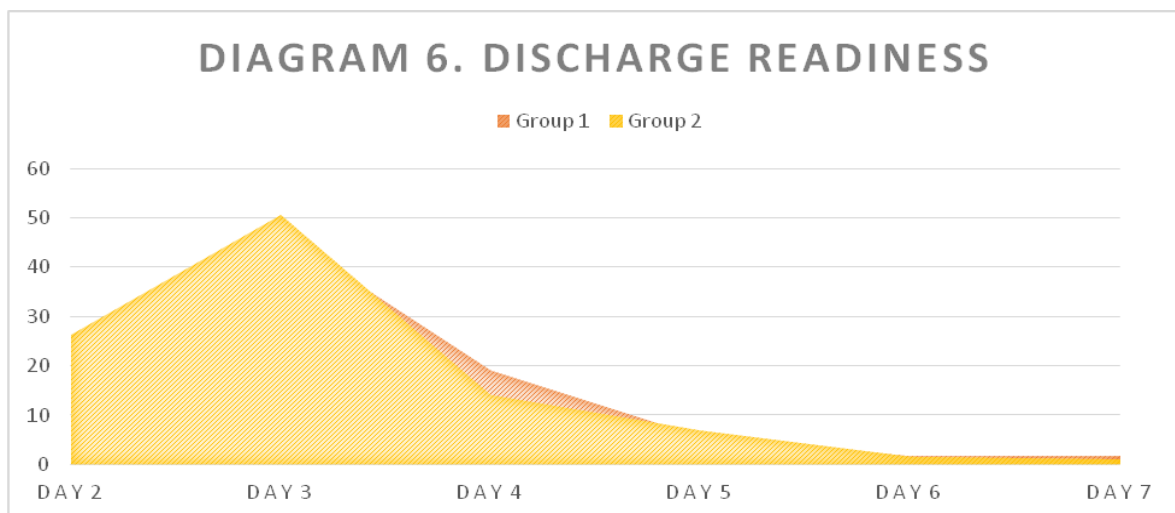
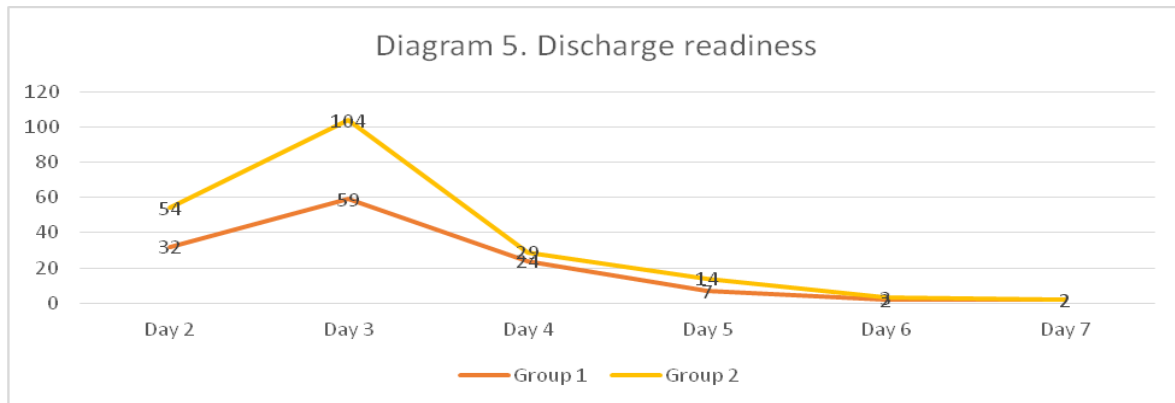
Operation time, one of the most important indicators of the effectiveness of the surgical technique, increased insignificantly in the study group compared with the control group. We considered the increase in the operation time and the time of anesthesia as natural, because the volume of the operation increased in the group of laparoscopic simultaneous surgical treatment (Diagram 3).

The increase in the operation time and, accordingly, anesthesia (intubation-extubation time) was insignificant, and the risks of complications did not increase, and there was no increasing of complications during the operation and in the postoperative period. Complications in both groups were insignificant and amounted to 6 (4.8%) for the first group (clip detachment from the duct - 2 (1.6%), bleeding from an artery - 1 (0.8%), bleeding from a vein - 1 (0.8%), perforation of the gallbladder - 2 (1.6%)), and 9 (4.4%) for the second (detachment of the clip from the duct - 2 (0.97%), arterial bleeding - 2 (0.97%), perforation of the gallbladder - 5 (2.4%)) (diagram 4).



Also, after the analysis of the accumulated data, the indicators of patients' readiness for discharge were studied. Readiness for discharge, as one of the most important indicators of the effectiveness and safety of the method, was studied from the first postoperative day for all patients [9]. For a numerical objective assessment, the PT-RHDS form was used [10]. A numerical expression of readiness for discharge less than 7 points was considered unsatisfactory and the hospital stay was extended. 7 points and above was considered

satisfactory and the hospital stay could be terminated, and the patient was discharged for outpatient observation, subject to the patient's moral readiness and the doctor's confidence in the expediency and possibility of early discharge. 9 points was considered a good indicator, and the patient is discharged under outpatient supervision. It should be added that in all cases, treatment was carried out according to ERAS protocols, and early discharge was desirable and encouraged by the medical staff. Discharge readiness shown in diag. 5, 6. It is known that when a patient is in a hospital, the likelihood of hospital infections and other complications associated with a hospital stay in a medical institution and physical inactivity increases every day. Also, an important fact is the fact that costs increase both on the part of the patient and on the part of medical institutions with each next day, which may be inappropriate on the one hand, and reduce patient compliance on the other.



It should be noted that although in the first group, the average duration of hospitalization was longer (3.25 days for the first group, 3.1 days for the second), the difference was not significant ($p=0.832$).

The method of laparoscopic simultaneous surgical treatment of gallstone disease and hiatal hernia used in the first group fully justified itself. The safety of this method was

confirmed statistically (the number of complications did not significantly exceed the number of complications in the control group). Although it is worth noting that a small number of subjects does not allow us to be fully confident, and therefore this technique needs further research. The feasibility of this method from the financial and logistic point of view is beyond doubt. Against the background of the possibility of re-hospitalization for the treatment of comorbid pathology (strategy two diseases - two treatments), the increase looks even more insignificant. Also, the possibility of treatment with one hospitalization significantly reduces the risks of hospital complications, the time and cost of treatment, does not require a second operation, damage of the abdominal cavity, and repeated anesthesia. From the point of view of the authors of the article, the method fully justifies itself, and can be used for the treatment of uncomplicated cholelithiasis and hiatal hernia. Also, the method needs to increase the statistical base and subsequent research.

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