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SURGICAL TREATMENT OF PATIENTS WITH HEPATIC CIRRHOSIS ACCOMPANIED BY ESOPHAGEAL AND GASTRIC VARICEAL HEMORRHAGE

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Abstract

Objective: To improve the results of surgical treatment of patients with hepatic cirrhosis complicated by esophageal and gastric variceal hemorrhage by means of use of active surgical approach.

Methodology: Clinical analysis of the results of treatment of 105 hepatic cirrhosis patients with the syndrome of intrahepatic portal hypertension was conducted for the period of 2006 to 2014. Treatment programs included waiting conservative tactics with the use of surgical methods only as the operation of despair, as well as the active surgical tactics by using M.D. Patsior surgery. The significance of differences in indices was assessed by using the Student performance coefficient. Differences were considered significant at $p < 0.05$.

Results: The inclusion of active surgical tactics into the treatment program of patients with compensated and sub-compensated hepatic cirrhosis provides reduction in the total number of complications and postoperative hospital mortality, as well as the time of hospital treatment of patients with a favorable outcome. In addition, it was found that operational risk of death from multiple organ failure was very high in patients with decompensated hepatic cirrhosis.

Conclusion: Active surgery tactic allows to decrease the total number of complications from 97.4% to 25.0%, including of recidivation of bleeding: from 12.9% to 7.1%, the frequency of development of hepatic decompensation: from 16.9% to 14.3%, of median wound abscess: from 6.5% to 3.6%, pneumonia and pleuritis: from 2.3% to 0%, to reduce the postoperative lethality rate from 100% to 35.7%, the hospital lethality rate from 76.6% to 35.7%.

Keywords: Portal hypertension, Hepatic cirrhosis, Esophagus, Surgery, Hemorrhage.

Introduction

The weak spot of the contemporary surgical hepatology is the treatment of patients with hepatic cirrhosis (HC) at the moment of acute occurrence of esophageal and gastric bleeding (1–3).

Esophageal and gastricvariceal hemorrhage (EGVH) is the main, but, as a rule, delayed indication to surgical treatment of PH syndrome-complicated HC (4,5).

Emergency surgeries are widely used, and among them there are both different kinds of portacaval anastomosis (6–8), and direct surgeries of esophagocardial area veins (4,9,10).

In the recent years, the range of methods for treatment of EGVH was increased by two more methods: transjugular intrahepatic portacaval anastomosis (5,11,12) and orthotopic transplantation of donor liver (13,14).

In such a way, nowadays it is absolutely clear that an HC patient at the height of EGVH has not to be treated stereotypically. But no single program for treatment of such patients has been developed yet. The algorithms of curative actions in cases of EGVH represented in certain works are disputable, in the first instance, in the aspect of the order and volume of hemostatic supports. Due to that, the improvement of the outcome of treatment of HC patients with acute EGVH, related to both further improvement of hemostasis methods and rational combination thereof, and improvement of the entire treatment program, including early surgery and adequate measures for correction of the defective functions of affected body, are exceptionally topical (10).

In view of the above, the goal and main objectives of the study were determined.

The goal of the study is to improve the outcomes of surgical treatment of patients with HC complicated by EGVH by means of administration of active surgical approach. Objectives of the study:

1. To clarify the particulars of the liver blood supply in patients with PH due to HC.
2. To determine an optimum variant of surgical treatment of patients with HC complicated by EGVH.
3. To justify the expediency of including active surgical approach into the integrated program of treatment of patients with HC complicated by EGVH. To formulate the indications for its use thereof.

On the basis of analysis of liver angiographic studies data, of the outcomes of surgeries, and reasons for the occurrence of postoperative complications, an optimum variant of surgical treatment was developed for treatment of patients with HC complicated by EGVH.

Methods

The study was conducted in compliance with the plan of scientific research and permit of the Ethical Committee of the State Funded Educational Institution of Further Vocational Education “Kazan State Medical Academy” of the Ministry of Health of the Russian Federation (state registration number 01.20.0005921).

Clinical analysis of the results of treatment of 105 HC patients with the syndrome of intrahepatic PH was conducted for the period of 2006 to 2014.

The first studied clinical controlled group consisted of 77 patients suffering HC complicated by EGVH, the treatment program of this group provided expectant conservative approach with the use of surgery methods only as a “desperate operation”.

The second (principal) studied group consisted of 28 patients suffering HC complicated by EGVH, the integrated treatment program of this group provided active surgical approach with the use of M. D. Patsiora operation.

Both groups were comparable in terms of gender, age, surgical diagnosis, anatomic localization of the source of hemorrhage, severity of initial state, level of HC compensation and nature of hemostatic therapy.

The participants of the study were: males - 68, females – 37, namely: in the principal treatment group – 21 and 7, in the controlled group – 47 and 30 correspondingly. The patients aged 15 to 39 y.o. were 49, 40 to 59 y.o – 41, above 60 y.o. and older – 15. Namely, in the principal group – 11, 14 и 3, in the controlled group – 38, 27 and 12 correspondingly.

In 27 patients HC progressed as a result of alcohol-induced liver injury, in 23 (21.9%) – as a result of viral hepatitis type C, in 22 – as a result of viral hepatitis types B and C, in 15 – as a result of liver damage by hepatotoxic compounds.

In 18 patients the researchers failed to determine the etiology of HC.

In 22 patients a mild blood loss was observed. It is characterized by: single or repeated blood vomiting, melanorrhagia, moderate (up to 100 heartbeats per min.) tachycardia, signs of peripheral vasoconstriction. AP didn't change, as a rule. Er value not less than 3.0 mio., Hb rate more than 100 g/L, Ht more than 0.3, deficiency of circulating blood volume 10 – 20% (700 – 1250 mL).

48 patients had medium blood loss. This was evidenced by: tachycardia up to 120 heartbeats per minute. AP up to 80 – 90 mmHg. Er value up to 2.5 mio., Hb content 80 to 100 g/L, Ht 0.25 to 0.3, deficiency of circulating blood volume 20 – 30% (1300 – 1800 mL). 35 patients had vast blood loss. This was evidenced by: pulsus vacuus of more than 120 heartbeats per minute. AP up to 60 mmHg and lower. Er value is less than 2.5 mio., Hb content less than 80 g/L, Ht less than 0.25, deficiency of circulating blood volume more than 30% (2000 mL and more).

According to Child-Pugh score (1973) all patients have been divided into three prognostic groups. Class A included 10 (9.5%), Class B – 44 (41.9%), and Class C – 51 (48.6%) patients. Namely, in the principal group – 4 (14.3%), 14 (50%) and 10 (35.7%), in the controlled group – 6, 30 and 41 patients.

In 76 patients suffering from EGVH within esophagogastroduodenoscopy the researchers detected esophageal varices, in 29 – esophageal and fore-stomach varices. Of 76 patients suffering from esophageal varices, in 65 of them the varices have localized in the lower third of esophagus, in 11 – in the lower and the median third.

In 30 patients, the 2nd degree of intensity was detected, and in 75 patients, the 3rd degree of intensity of variceal hemorrhage was detected according to A. G. Scherzinger (1986).

Localization of the source of hemorrhage was detected in 67 patients. Those were mucosal erosions punching the walls of varices. The last was located, in 54 patients, in the distal third of esophagus, in 13 – in the fore-stomach. 38 patients had endoscopic evidence of the bleeding which has taken place, but the researchers failed to identify the localization of its source.

In the course of ultrasound investigation of hepatic parenchymata, in 41 patients the size of liver was increased, and in 16 patients the size of liver was decreased, and in 48 patients the size of liver was within the expected range for age.

In 33 of 99 patients, transudate in the abdominal cavity was detected as echo-free area in the sub-hepatic space. In 63 patients, ascitic fluid filled the entire abdominal cavity. In 3 persons ascites, which was not diagnosed in the course of clinical examination, was detected sonographically.

In 75 patients on the height of EGVH the severity grade of the general state was evaluated according to SAPS (Simplified acute physiology score) (J. Le Gall, 1983). Thus, in 4 patients the score according to SAPS was up to 5 (mild grade), in 60 – 6 to 13 (average grade), in 17 – 14 and more (severe grade).

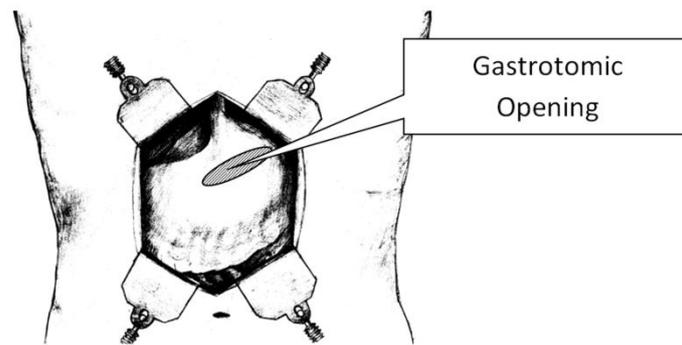
In patients of the controlled group the surgical approach was used as “desperate operation”, were there was no hope for conservative homeostasis, and the severity of the patients’ state had progressively grown, in 13 patients.

In the principal group, the medical drug therapy played a supplementary role in achievement of hemostasis. In the principal group, all 28 patients (100% of observations) have undergone surgical treatment.

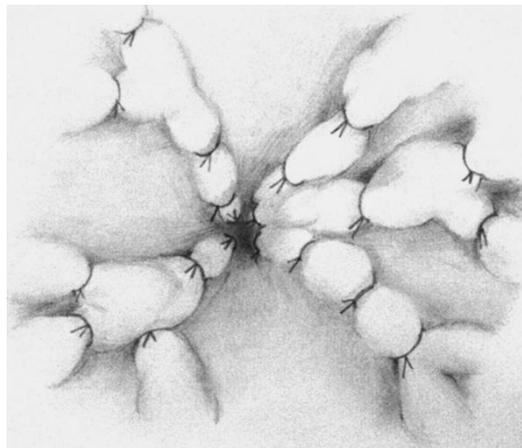
Celiogastrostomy and underrunning of esophageal and gastric varices were conducted according to the method of M. D. Patsiora (9). Principally important technical particularities of the surgical intervention conducted by the authors were as follows.

1. Apparatus correction of supramedian abdominal approach with the use of four retractors by Sigal-Kabanov (RSK-10). Two of them were at the head of the surgical table, and two of them were at the feet part of the surgical table, to the left and to the right from the patient. The left head retractor was the lead. It secured abduction of soft tissues of

the anterior abdominal wall in the area of the direct object of surgical interference. It was installed along the axis of the surgical action. The stand of that retractor was fixed at the intersection of the imaginary line drawn through the surgeon's eye to the point of the orthographical projection of the fore-stomach or inner esophageal fenestra to the anterior abdominal wall, with the guide bar of the surgical table. Three other retractors were intended for back tension and formation of access "window". They provided for lateral disposition of soft tissues of the anterior abdominal wall. The tractive power, at the correction of RSK-10, was directed vertically. After creation of the wound of the necessary size and form, the tension of retractors was fixed until the end of the operative procedure (Figure 1).



2. Stopping the bleeding by means of consequent longitudinal underrunning of varicosity veins' trunks of the abdominal part of esophagus and further underrunning in a staggered order of the varicosity veins of the fore-stomach (Figure 2).



Underrunning using separated interrupted stitches was commenced from the most pronounced trunk of varicosity vein at low stomach curvature. Pulling the previously applied threads, 3-4 vein trunks were underrun in the esophagus at the distance of 3-4 cm proximal of the esophageal and gastric junction.

After that, fore-stomach varicosity veins were consequently underrun in staggered order.

3. The use of Vicrylresorbable synthetic suture as suture material.

Ascertaining general laboratory and biomedical measurements was carried out using standard methods: total bilirubin was measured using Jendrassik, Gleghorn methods; aspartate transaminase and alanine transaminase concentration was measured using Reitman, Frankel methods; alkaline phosphatase was measured using Bodansky method; total protein was measured using Kingsley method.

Emergency endoscopic examination was carried out using "PENTAX FG-29M" gastrofibroscope (Japan) and "CV-70 Olympus" video gastroscope (Japan) with recording the examination on video tapes.

The ultrasound scan of the hepatobiliary system was carried out using "Aloka SSD-1700" device (Japan) and "Voluson 730 Expert" by "General Electric" (USA) with application of curvilinear transducers at the frequency in the range of 3-5 MHz.

Arteriography was carried out in the aritero-posterior view in the horizontal position of a patient using the angiography equipment by "General Electric" (United States) completed with "Fluoricon - 300" X-ray television system.

Statistical processing of the results of the study was carried out using the variation statistics method by means of calculation of arithmetic mean (M), mean-square deviation (σ), and average error (m). The statistical significance of the differences in indexes was estimated using Student's t-test. The differences were regarded as valid at the value of $p < 0.05$.

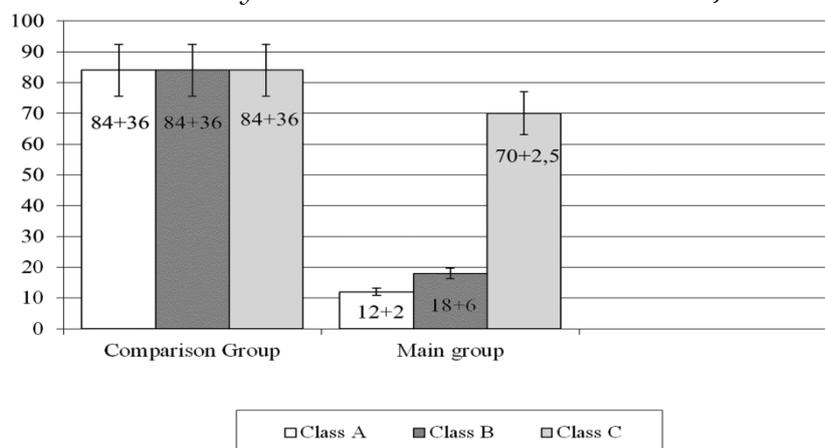
Results

In patients with compensated (Class A) and sub-compensated (Class B) HC, a significant degradation of the vascular tree was with mild or severe deformation and disordered position of vessels were detected (the first type of blood supply in patients with HC).

In patients with decompensated (Class C) HC, in the course of by-pass hepatolienography, the vascular tree in the liver was absent, although according to the data of Dopplersonography, the indications of hemorrhage were detected (the second type of blood supply in patients with HC).

The data obtained from the two types of intrahepatic vascular pattern has to be taken into consideration when selecting the treatment approach. In all patients, curing methods was started with installation of Sengstaken-Blakemore tube, regarding it as an obligatory mechanical factor for achievement of homeostasis.

Stengstaken-Blakemore tube timing in patients of the controlled group was selected randomly. Herewith, the period of stay in the hospital was 3.5 ± 1.5 days (Fig. 3).



In 13 patients from the controlled group, the severity of the patients’ state had progressively grown. Three patients of 13 were administered surgical treatment after 3 days, six – after 5 days, and after 7 days from the day of hospitalization to surgical station. All those patients had more than 4 recurrences in the anamnesis, and a high degree of hyperenzymemia. On the ground of long-term conservative treatment, recurrences of hemorrhage and late surgical support, in all of those patients, progressive decompensation of liver function was observed. For this very reason all patients who have undergone surgery, from the controlled group, had decompensated HC and the 3rd degree of esophageal and gastric varices according to A. G. Scherzinger. In the principal group, all 28 patients have been undergone surgery at the earliest possible time, before the decompensation of liver function. Namely: 7 patients have been undergone surgery after 12 hours, twelve patients – after 24 hours, and nine patients – after 48 hours from hospitalization to surgical station. The transformation of the approach using four RSK-10 retractors helped to create, at the same position, length and quality of dissection, absolutely new conditions for surgical exposure (Table 1). The analysis of measurements presented therein evidences a significant improvement of the surgical exposure to all previously poorly approachable anatomic structures.

Table-1. Volume-Spatial Relationships in Stab during the Correction of Supramedian Abdominal Approach Using Four Sigal-Kabanov Retractors (M±m)

| Object of Examination | Investigated Parameter | | | | | | | | |
|-----------------------|------------------------|---------------|-----------------------|----------------|---------------|----------------|----------------|----------------|--------------|
| | Length (cm) | Width (cm) | Sp (cm ²) | Gr (cm) | Gvn (cm) | UODlengt h (°) | UODwidt h (°) | UNOOD (°) | L (cm) |
| Esophageal Hiatus | 18.75±1.3 7 | 21.4±1.2 3 | 1263.6±79. 1 | 12.29±1.5 3 | 7.71± 1.45 | 73.78± 9.47 | 79.11± 6.3 | 79.83±6.7 9 | 1.9± 0.97 |
| Cardia | 18.75±1.3 7 | 21.4±1.2 3 | 1263.6±79. 1 | 10.33±1.6 8 | 7.61± 1.5 | 80.56± 8.37 | 83.72± 4.65 | 82.47±3.9 4 | |
| Fundus of Stomach | 18.75±1.3 7 | 21.4±1.2 3 | 1263.6±79. 1 | 14.3±1.36 | 6.72± 1.78 | 77.44± 3.12 | 80.88± 3.95 | 81.5±5.11 | 1.47 ± |

| | | | | | | | | | |
|----------|-----------|----------|------------|-----------|---------|-----------|----------|-----------|------|
| | | | | | | | | | 1.23 |
| Spleen | 18.75±1.3 | 21.4±1.2 | 1263.6±79. | 12.88±1.1 | 9.0±1.0 | 75.14±2.2 | 78.37±3. | 78.78±2.6 | |
| Vascular | 7 | 3 | 1 | 5 | 7 | 1 | 2 | 5 | |
| Pedicle | | | | | | | | | |

In the course of correction using four RSK-10 retractors, the absolute depth of the wound was reducing. Moreover, the surface area of the opening in the abdominal wall exceeded the surface area of two surgeon’s fists. ($p < 0.05$). And as a result, the hands easily fitted into the wound, and the surgeon actually worked not from the level of the skin opening, but from the level of internal organs. Herewith, the degree of freedom of manipulations in the wound chamber was determined not by the absolute, but surgical depth thereof. Parameters of surgical depth of the wound, in the course of hardware correction using four RSK-10 retractors, was significantly lower than the absolute depth of the wound using two RSK-10 retractors ($p < 0.05$). Within the apparatus correction using four Retractors by Sigal-Kabanov, the angle of surgical activity, both in length and in width, was limited not by skin boundaries, but by overhanging internal organs. And those could have been sufficiently displaced or mobilized. The analysis of short-term results of treatment of patients suffering from HC and having EGVH under the influence of different treatment programs showed that in the controlled group the complications occurred in 75 (97.4% of observations) patients, and in the principal group the same complications occurred in 7 (25.0% of observations) patients. According to Table 2, the expectant conservative approach in patients suffering from HC complicated by EGVH doesn’t allow to avoid a great number of complications. On the contrary, including the active surgical approach in the treatment program of the patients of Class A and Class BHC complicated by EGVH effectively reduces the number of post-operational complications.

Table 2. The Structure of Complications.

| Item No. | Complications | Comparison Group (n = 77) | | Main Group (n = 28) | |
|----------|---------------------------|---------------------------|------|---------------------|-------|
| | | Number of Patients | % | Number of Patients | % |
| 1 | Bleeding recidivism | 24 | 31.2 | 2 | 7.1* |
| 2 | Pyogenesis of medius stab | 5 | 6.5 | 1 | 3.6* |
| 3 | Pneumonias and pleuritis | 2 | 2.3 | - | - |
| 4 | Hepatic decompensation | 69 | 89.6 | 10 | 35.7* |

*: Significant difference $p < 0.05$

In patients of Class C HC, the operational risk of lethality caused by multiple organ failure is very high. Therefore, in the presence of symptoms of liver function decompensation the operation should not be conducted. The post-operational lethality rate in the controlled group was 100% (13 patients), and in the principal group the rate was 35.7% (10 patients). The hospital lethality rate in the controlled group was 76.6% (Classes A: 0%, B: 30.5%, C: 69.5%), and in the principal group the rate was 35.7% (only Class C). The duration of treatment of patients with benign outcome in the controlled group was in Class A: 18.1 ± 3.0 days, in Class B: 22.0 ± 2.0 days, and in the principal group the duration of treatment was 13.0 ± 2.0 and 17.25 ± 1.0 days correspondingly.

Discussion

Therefore, without any claim to absolute completeness, we hope that the results of the conducted study would be useful for practicing surgeons and could help to direct ways for the further progress of this area of surgical hepatology:

1. In patients with intrahepatic PH there is a close correlation between the degree of HC compensation and the state of liver intraorganal vascular bed. In by-pass splenoportograms, in patients of Class A and B HC, a significant degradation of the vascular tree, deformation and disordered arrangement of blood vessels was detected. In patients of Class C HC, no vascular tree was observed in by-pass splenoportograms.
2. The expectant conservative approach in patients with HC complicated by EGVH did not prevent a large number of complications and did not help to achieve a significant decrease in the lethality rate.
3. Introduction of the active surgical approach into the treatment program for patients of Class A and BHC complicated by EGVH allows to decrease the total number of complications from 97.4% to 25.0%, including the recidivation of hemorrhage: from 12.9% to 7.1%, the frequency of development of hepatic decompensation: from 16.9% to 14.3%, of median wound abscess: from 6.5% to 3.6%, pneumonia and pleuritis: from 2.3% to 0%; to reduce the postoperative lethality rate from 100% to 35.7%, the hospital lethality rate from 76.6% to 35.7%.

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and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5). Informed consent was obtained from all patients for being included in the study.

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