УДК 616.36-004.7
DOI: 10.35693/2500-1388-2020-5-3-186-192

Successful experience of liver transplantation at the Samara Center of organ and tissue transplantation (a clinical case)

Aleksandr V. Kolsanov[1], Oleg V. Fatenkov[1], Aleksei A. Mironov[1], Maksim N. Myakotnykh[1], Yuliya Yu. Pirogova[1], Vitalii V. Grebennikov[1], Irina V. Tkebuchava[2], Boris I. Kharitonov[1]

[1]Samara State Medical University (Samara, Russia)
[2]Samara City Clinical Hospital No. 1 n.a. N.I. Pirogov (Samara, Russia)

Аннотация

Aim – to summarize the available data on the liver transplantation (LT) case.

The work describes the indications and contraindications for LT, examination of a potential recipient before the operation, the maintenance of a waiting list. A clinical case is presented – the first successful liver transplantation in the Samara Center of organ and tissue transplantation.

Keywords: liver transplantation, Samara Center of organ and tissue transplantation, cirrhosis, indications and contraindications for liver transplantation, waiting list, examination of a recipient.

Conflict of interest: nothing to disclose.

Citation

Kolsanov AV, Fatenkov OV, Mironov AA, Myakotnykh MN, Pirogova YuYu, Grebennikov VV, Tkebuchava IV, Kharitonov BI. **Successful experience of liver transplantation at the Samara Center of organ and tissue transplantation (a clinical case).** *Science & Innovations in Medicine*. 2020;5(3):186-192
doi: 10.35693/2500-1388-2020-5-3-186-192

Information about authors

Aleksandr V. Kolsanov – PhD, Professor RAS, the Head of the Department of Operative surgery and clinical anatomy with a course of innovative technologies. ORCID: 0000-0002-4144-7090

Oleg V. Fatenkov – PhD, Associate Professor, the Department and Clinic of Faculty therapy. ORCID: 0000-0002-4928-5989

Aleksei A. Mironov – PhD, Associate Professor of the Department of Operative surgery and clinical anatomy with a course of innovative technologies. ORCID:0000-0003-4228-7022

Maksim N. Miakotnykh – Surgeon of the Samara Surgical Center for the Coordination of Organ Donation, assistant of the Department of Operative surgery and clinical anatomy with a course of innovative technologies. ORCID: 0000-0003-0166-6878

Yuliya Yu. Pirogova – PhD, the Head of the gastroenterological department of the Clinic of Faculty therapy. ORCID: 0000-0003-4640-1902

Vitalii V. Grebennikov – Surgeon of the Samara Surgical Center for the Coordination of Organ Donation. ORCID: 0000-0002-1730-8496

Irina V. Tkebuchava – the Head of the intensive care unit of Samara City Clinical Hospital №1 n.a. N.I. Pirogov. ORCID: 0000-0002-7710-6319

Boris I. Kharitonov – PhD, the Head of the organ transplant surgery department in the Clinics of SamSMU. ORCID: 0000-0001-8161-7288

Corresponding Author

Maksim N. Myakotnykh
Address: Samara State Medical University, 89 Chapaevskaya st., Samara, Russia, 443099.
E-mail: maksim_miakotnykh@mail.ru
Phone: 8 (964) 981 21 09.

Received: 02.04.2020
Revision Received: 15.05.2020
Accepted: 18.05.2020

Успешный опыт трансплантации печени в Самарском центре трансплантации органов и тканей (клинический случай)

А.В.Колсанов[1], О.В. Фатенков[1], А.А. Миронов[1], М.Н. Мякотных[1], Ю.Ю. Пирогова[1], В.В. Гребенников[1], И.В. Ткебучава[2], Б.И. Харитонов[1]

[1]ФГБОУ ВО «Самарский государственный медицинский университет» Минздрава России (Самара, Россия)
[2]ГБУЗ СО СГКБ №1 им. Н.И. Пирогова (Самара, Россия)

Аннотация

Цель – обобщить имеющиеся данные о трансплантации печени (ТП).

В работе представлены показания и противопоказания к ТП, обследование потенциального реципиента перед ТП, особенности ведения листа ожидания. Приводится описание клинического случая – первой успешной ТП в Самарском центре трансплантации органов и тканей.

Ключевые слова: трансплантация печени, Самарский центр трансплантации органов и тканей, цирроз печени, показания и противопоказания к ТП, лист ожидания, обследование реципиента.

Конфликт интересов: не заявлен.

Для цитирования:

Колсанов А.В., Фатенков О.В., Миронов А.А., Мякотных М.Н., Пирогова Ю.Ю., Гребенников В.В., Ткебучава И.В., Харитонов Б.И. **Успешный опыт трансплантации печени в Самарском центре трансплантации органов и тканей (клинический случай).** *Наука и инновации в медицине.* 2019;5(3):186-192
doi: 10.35693/2500-1388-2020-5-3-186-192

Сведения об авторах

Колсанов А.В. – д.м.н., профессор РАН, заведующий кафедрой оперативной хирургии и клинической анатомии с курсом инновационных технологий. ORCID: 0000-0002-4144-7090

Фатенков О.В. – д.м.н., доцент, заведующий кафедрой и клиникой факультетской терапии. ORCID: 0000-0002-4928-5989

Миронов А.А. – к.м.н., доцент кафедры оперативной хирургии и клинической анатомии с курсом инновационных технологий. ORCID:0000-0003-4228-7022

Мякотных М.Н. – врач-хирург Самарского хирургического центра координации органного донорства, ассистент кафедры оперативной хирургии и клинической анатомии с курсом инновационных технологий. ORCID: 0000-0003-0166-6878

Пирогова Ю.Ю. – к.м.н., заведующая гастроэнтерологическим отделением клиники факультетской терапии. ORCID: 0000-0003-4640-1902
Гребенников В.В. – врач-хирург Самарского хирургического центра координации органного донорства. ORCID: 0000-0002-1730-8496
Ткебучава И.В. – заведующая отделением реанимации. ORCID: 0000-0002-7710-6319
Харитонов Б.И. – к.м.н., заведующий хирургическим отделением пересадки органов Клиник СамГМУ. ORCID: 0000-0001-8161-7288

Автор для переписки
Мякотных Максим Николаевич
Адрес: Самарский государственный медицинский университет, ул. Чапаевская, 89, г. Самара, Россия, 443099.
E-mail: maksim_miakotnykh@mail.ru

ТП – трансплантация печени; ОТП – ортотопическая трансплантация печени; ЦП – цирроз печени; ГЦК – гепатоцеллюлярная карцинома; КЖ – качество жизни; АлАТ – аланинаминотрансфераза; АсАТ – аспартатаминотрансфераза; ГГТ – гамма-глутамилтранспептидаза; ЩФ – щелочная фосфатаза; ПТИ – протромбиновый индекс; МНО – международное нормализованное отношение; АЧТВ – активированное частичное тромбопластиновое время; ЭКГ – электрокардиография; ЭхоКГ – эхокардиография; УЗИ – ультразвуковое исследование; УЗДГ – ультразвуковая допплерография; ЭГДС – эзофагогастродуоденоскопия; КТ – компьютерная томография; СРБ – С-реактивный белок; УДХК – урсодезоксихолевая кислота; АД – артериальное давление; ЧСС – частота сердечных сокращений; ОРИТ – отделение реанимации и интенсивной терапии.

Рукопись получена: 02.04.2020
Рецензия получена: 15.05.2020
Решение о публикации принято: 18.05.2020

INTRODUCTION

Liver transplantation (LT) is the most effective and the only radical treatment for patients with end-stage chronic liver disease, acute fulminant liver failure, and some malignant liver tumors [1, 2]. The transplantation program, particularly LT, is a significant contribution of the Samara State Medical University to the development of the innovative potential in health care of the Samara region [3].

HISTORY OF LIVER TRANSPLANTATION

In 1963, T. Starzl performed the first orthotropic liver transplantation (OLT) in the USA, while K. Absolon conducted the second OLT in 1964. Unfortunately, the patients died, and several subsequent surgeries were fatal. In 1968, T. Starzl performed the first successful LT with a surviving patient [3]. In Russia, the first OLT was performed in Moscow in 1990 by A. K. Eramishantsev.

Currently, at least 25,000 LTs are performed per year worldwide [4]. The need for this surgery occurs annually in approximately 20–40 patients per one million of the population. After LT, the one year survival rate of the recipients is 85%–90%, five-year survival rate is 70%–75%, ten-year survival rate is up to 60%, and twenty-year survival rate is 40%. The best prognosis is seen in patients with cholestatic diseases [1, 2, 4]. The high survival rate is due to the emergence of new drugs for immunosuppression and solutions for the storage of organs, improvement of surgical techniques, as well as the early diagnosis and treatment of LT complications. According to the Russian Transplantation Society, an annual increase in the number of LTs using the resources of both intravital and cadaveric donations has been noted in Russia. In Russia, 325 and 438 transplants were performed in 2015 and 2017, respectively [2].

INDICATIONS FOR LIVER TRANSPLANTATION

The indication for LT is an irreversible acute or a chronic end-stage liver failure of various etiologies [1, 2, 5].

1. *Fulminant hepatic failure.* It is most often (up to 80% of cases) caused by acute viral hepatitis; less often (up to 30%) by chemicals, poisons, and medicines; and very rarely (up to 10%) by hepatic ischemia and hypoxia, as well as metabolic disorders. Mortality in fulminant liver failure reaches 50%–90%, and LT must be performed within 2–3 days.

2. *Cholestatic diseases.* LT is performed for primary biliary cholangitis and primary sclerosing cholangitis in adult patients in 10.9% and 9.9% of cases, respectively. In pediatric patients, LT is performed for biliary atresia in 55% of cases. LT is the only effective method for treating patients with liver failure due to primary biliary cholangitis and primary sclerosing cholangitis in the stage of hepatic cirrhosis (HC). LT is contraindicated in cholangiocarcinoma due to the high probability of recurrence.

3. *Non-cholestatic diseases.* LT is performed in adult patients for HC of toxic (alcoholic) origin in 21.6%, HC due to chronic viral hepatitis C in 19.5%, HC due to chronic viral hepatitis B in 6.1%, cryptogenic HC in 12%, and autoimmune hepatitis in 5% of cases.

4. *Congenital defects in liver metabolism.* This group of diseases includes α1-anti-trypsin deficiency, lenticular progressive disease, hereditary hemochromatosis, tyrosinemia, primary hyperoxaluria, type I and II glycogenosis, and familial hypercholesterolemia.

5. *Malignant liver tumors.* This is primarily hepatocellular carcinoma (HCC), hepatoblastoma, and epithelioid hemangioendothelioma. Benign tumors affecting the entire liver (hemangiomatosis, hepatocellular adenoma, and nodular fibrous hyperplasia) are rare indications for transplantation.

6. Diseases that are rare indications for liver transplantation. This group includes cystic fibrosis, Budd-Chiari syndrome/disease, familial cholestasis or Byler disease, Alajil syndrome, Caroli disease in children, polycystic liver disease, familial amyloid polyneuropathy (TTR-amyloidosis), and alveococcosis.

CRITERIA FOR INCLUSION INTO THE WAITING LIST

LT can be performed on any patient with end-stage liver disease to prolong his life span or improve its quality [1]. Patients are selected if their estimated life expectancy without LT is ≤ 1 year or if the patient has an unacceptable quality of life due to the liver disease [1, 6]. After determining the need for LT, it is necessary to ensure that all the resources of the conservative treatment have been depleted, and the possibility of

transplantation for the patient should then be evaluated [5].

The prognosis of a patient with HC can be assessed using several scales, such as Child–Turcotte–Pugh (CTP) and MELD-Na (Mode for End-Stage Liver Disease). The CTP scale takes into account indicators such as total bilirubin, blood albumin, prothrombin time, the presence of ascites, and encephalopathy, and the possible scores range from 5 to 15. MELD is calculated using a formula based on total bilirubin, creatinine, international normalized ratio (INR), and blood sodium, and the number of points can vary from 6 to 40, which predicts a three-month survival rate from 100% to 7%, respectively.

HC patients should be referred for a consultation at the Transplant Center if CTP is ≥ 7 and MELD is ≥ 15, or in case the first serious complication develops (ascites, esophageal variceal bleeding, and hepatic encephalopathy) [1]. HCC requires an acceleration of the surgery in case of repeated episodes of bleeding from esophageal varicose veins (EVV), decompensation of hepatic encephalopathy, refractory ascites and spontaneous bacterial peritonitis, and progressive hepatorenal syndrome [2, 6]. The median survival rate for patients with type I hepatorenal syndrome is <2 weeks; therefore, they should be referred for transplantation immediately [1].

CONTRAINDICATIONS FOR LT

Contraindications can be absolute or relative [1, 2].

Absolute contraindications include HIV infection, extrahepatic spread of malignant tumors, active extrahepatic infection (including tuberculosis), active alcoholism, mental illness, metastatic liver damage, and severe decompensated cardiovascular disease.

Relative contraindications include high cardiac or anesthetic risk, portal vein thrombosis, history of interventions on the liver, age over 65 years, non-compliance of the patient, and body mass index over 35 kg/m2.

POTENTIAL RECIPIENT EXAMINATION BEFORE LT

Standard examination before OLT includes the following [1]:

1) Determination of the blood group and Rh factor;

2) General blood test with white blood cell (WBC) differential;

3) Biochemical blood test: total protein and fractions, bilirubin, alanine aminotransferase (ALT), aspartate aminotransferase (AST), gamma-glutamyl transpeptidase (GGTP), alkaline phosphatase (ALP), total cholesterol, low-density lipoproteins, glucose, non-hemoglobin iron, potassium, sodium, calcium, chlorine, urea, creatinine, uric acid, and C-reactive protein (CRP);

4) Coagulogram: prothrombin index (PTI), INR, activated partial thromboplastin time (APTT), fibrinogen, and antithrombin III;

5) General urine analysis;

6) Infectious screening: HIV, syphilis, markers of viral hepatitis B and C; PCR diagnosis (qualitative) of cytomegalovirus infection, Epstein-Barr virus, herpes simplex virus; when indicated, PCR diagnosis of HBV and HCV.

7) Consultation with a TB-specialist in an antituberculosis clinical center in a primary care facility, with a diaskin test when indicated;

8) Plain chest X-ray, pulmonary function test;

9) Electrocardiography (ECG), echocardiography (EchoCG);

10) Ultrasound examination (US) of the abdominal organs, kidneys, thyroid gland, pelvic organs; and ultrasonic Doppler examination (USDE) of the portal system and veins of the lower extremities;

11) Endoscopic examination: esophagogastroduodenoscopy (EGDS), colonoscopy;

12) contrast-enhanced computed tomography of the abdominal cavity;

13) Tumor markers: CA 125, CA 15-3, CA 19-9, specific PSA, alpha-fetoprotein, and carcinoembryonal antigen (CEA).

After complete examination of the patient, a board of transplant surgeons, hepatic infection specialists, gastroenterologists, and anesthesiologists make a decision to include the potential recipient in the waiting list for the LT [1, 4, 6].

CLINICAL CASE

The first successful liver transplant was performed at the Samara Center of organ and tissue transplantation in June 2018. The article provides a description of this clinical case with details of the OLT procedure and the case follow-up of the recipient throughout the year.

Female patient M., 43 years old, was routinely admitted to the gastroenterology department of the Samara State Medical University Clinic on February 8, 2018. Upon admission, the patient complained of ochrodermatosis and sclera icterus, skin itching, insomnia at night and drowsiness during the day, heaviness in the right hypochondriac region, general asthenia, and rapid fatigue.

Case history

The patient reported to have been ill since January 2016, when she suddenly began to notice the scleral icterus, increasing ochrodermatosis, and intense itching. After ruling out the mechanical and infectious causes of the jaundice, she was hospitalized in the gastroenterology department with a diagnosis of chronic cryptogenic hepatitis of moderate activity with cholestasis syndrome. Markers for autoimmune cholestatic liver disease were tested. For the first time, a significant increase in AMA (Ig G+A+M) of 1:640 (the norm is less than 1:40) was revealed. The clinical diagnosis of primary biliary cholangitis in the stage of liver cirrhosis was established. Ursodeoxycholic acid (UDCA) preparations were prescribed as background therapy. Since July 2016, she had been a group II disabled person. Despite adequate drug therapy, the progressive negative course of the disease continued.

Due to HC decompensation at least three times a year, the patient was treated in a gastroenterological hospital.

Anamnesis vitae

The patient was born in the Chelyabinsk region in 1974, and was the second child in the family. She grew and developed in accordance with sex and age. She had a vocational secondary education, worked in trade, and had no occupational hazards. Living conditions were satisfactory. She is married and has two healthy children. The patient denied to have had any harmful habits. Family history was unremarkable. She had no drug intolerance, and hemotransfusion was not performed.

Physical examination data

Examination on the day of hospitalization in the gastroenterology department revealed a general condition of moderate severity, icteric skin, and icteric sclera. The lymph nodes were not enlarged. Vesicular breathing was perceived in the lungs. Heart sounds were quiet, with a regular rhythm. Blood pressure (BP) was 160/100 mmHg. Heart rate (HR) was 72 beats/min. The abdomen was soft and sensitive in the right hypochondriac region. The liver was palpable 7 cm below the costal margin, and had a densely elastic consistency. The size of the liver according to Kurlov was 16 cm–15 cm–14 cm. The spleen was palpable 3 cm below the costal margin. The patient Defecated once a day, and the stool was loose, without pathological impurities. No edema was observed.

Provisional diagnosis

Primary biliary cholangitis in the stage of liver cirrhosis, Child-Pugh class C. Portal hypertension syndrome. Syndromes of cholestasis and hypersplenism. Hypertensive disease, stage II, risk group III.

Examination plan

General blood test with WBC differential, general urine analysis, biochemical blood test (total protein, albumin, total bilirubin with fractions, ALT, AST, GGTP, ALP, glucose, urea, creatinine, potassium, sodium, and amylase), study of hemostasis, determination of blood group and Rh factor, general analysis of feces, EGDS, ultrasound of the abdominal cavity, USDE of the portal system, and ECG.

Treatment prescribed

The treatments prescribed include 500 ml of glucose 5% and 10 ml of potassium chloride 4% intravenous drip-feed, ademetionine 800 mg/day intravenous bolus, orally UDCA 1250 mg/day, omeprazole 20 mg/day, pancreatin 25,000 U/day, spironolactone 100 mg/day, losartan 50 mg/day, and bisoprolol 2.5 mg/day.

Results of additional research methods (the norms adopted in the clinic are given in brackets)

Complete blood count: leukocytes 5.68 × 10^9/l (4.4–11.3 × 10^9/l), erythrocytes 3.68 × 10^{12}/l (3.5–4.7 × 10^{12}/l), hemoglobin 112 g/l (120–140 g/l), platelets 130 × 10^9/l (180–320 × 10^9/l), and ESR 20 mm/h.

Biochemical blood test: total bilirubin, 272.2 μmol/L (<20.5 μmol/L); direct bilirubin, 268.9 μmol/L; ALT, 58.1 U/L (<32.0 U/L); AST, 115.3 U/l (<32 U/L); ALP, 704 U/l (20–140 U/L); GGTP, 463 U/L (<42.0 U/L); total protein, 72.5 g/l (65–85 g/L); albumin, 32.4 g/L (35–52 g/L); amylase, 76 U/L (up to 100 U/L); glucose, 4.3 mmol/L (3.3–5.89 mmol/L); urea, 3.1 mmol/L (2.5–8.3 mmol/L); creatinine, 108.1 μmol/L (44–80 mmol/L); potassium, 4.1 mmol/l (3.6–6.1 mmol/l); and sodium, 137 mmol/l (135–150 mmol/l).

Blood group and Rh factor: A (IV) Rh (+) positive.

Hemostasis: PTI (prothrombin index) 63% (70%–120%), INR 1.36 (0.8–1.2), APTT 40.2 s (28–40 s), and fibrinogen 3.27 g/l (2–4 g/l).

General feces analysis: no abnormalities; the reaction to occult blood was negative.

ECG: sinus rhythm; horizontal position of the electrical axis of the heart.

US of the abdominal cavity, conclusion: signs of diffuse cirrhotic liver changes, chronic non-calculous cholecystitis, and diffuse changes in the pancreas.

EGDS, conclusion: varicose veins of the lower third of the esophagus of degree 1–2, superficial gastritis.

USDE of the portal system, conclusion: signs of portal hypertension with the presence of portosystemic anastomoses.

Clinical diagnosis

Primary biliary cholangitis in the stage of liver cirrhosis with Child-Pugh class B (9 points) and MELD 22 points; portal hypertension syndrome; degrees 1–2 EVV. Syndromes of cholestasis, hypersplenism, and hepatodepression; stage 1 hepatic encephalopathy; chronic superficial gastritis with exacerbation; chronic cholecystitis, non-calculous, with hypomotor dysfunction, and remission; chronic biliary-dependent pancreatitis with preserved exocrine pancreatic function, remission; hypertensive disease, stage II, risk group III.

Taking into account the clinical and laboratory data, the progressive course of the disease, the low efficiency of drug therapy, Child–Pugh indicators of 9 points, and MELD indicator of 22 points, the patient was asked to undergo examination to decide whether to be included in the OLT waiting list.

The patient's consent to undergo the LT was obtained, a complete examination was performed, and no contraindications to OLT were identified. By the decision of the board of doctors, in March 2018, patient M. was included in the waiting list for LT, and her case follow-up was performed at the Samara Center of organ and tissue transplantation.

On June 13, 2018, the patient was admitted to the gastroenterology department of the Samara State Medical University Clinic due to the deterioration of her condition.

Patient complaints included intense skin itching, an increase in general asthenia and fatigue, drowsiness during the day and insomnia at night, a gradual increase in the size of the abdomen.

Biochemical blood test from 06/14/18: total bilirubin, 208.1 μmol/l; total protein, 71.2 g/l; albumin, 26.9 g/l; GGTP, 127.9 U/L; ALP, 510.3 U/L; creatinine, 57.9 mmol/l; sodium, 135.4 mmol/l.

Hemostasis from 06/14/18: PTI, 67%; INR, 1.31; APTT, 42.6 sec; fibrinogen, 3.29 g/l.

Other laboratory indices are presented in **Tables 1 and 2.**

An ultrasound of the abdominal organs revealed free fluid (ascites) for the first time. Objective status by Child–Pugh was class C (11 points) and MELD was 20 points.

On June 15, the patient was transferred to the surgical department of the organ transplantation center because a donor organ compatible with the blood group and anthropometric parameters was available. The donor was a 33-year-old woman, hospitalized in one of the Samara hospitals on June 12 with a diagnosis of acute cerebral circulation disorder of hemorrhagic type, rupture of the medial cerebral artery aneurysm, subarachnoid hemorrhage, hemotamponade of the ventricles III and IV, and cerebral edema.

On June 14, 2018, a team of surgeons from the Samara Surgical Center for Organ Donation Coordination was summoned to the donor for evaluation. The necessary examinations had been performed. Infection screening revealed no hepatitis B and C virus and HIV infections. General blood test indicators of a potential donor included hemoglobin, 121 g/l; erythrocytes, 3.9 × 1012/l; and hematocrit, 38.3%. The results of the biochemical blood test included creatinine, 89 μmol/L; urea, 5.2 mmol/L; total bilirubin, 6.7 μmol/L; ALT, 24.3 U/L; AST, 12.6 U/L; total protein, 54.3 g/l; potassium, 4.05 mmol/l; and sodium, 149 mmol/l.

Thus, after the examination, the donor was regarded as a potential multi-organ donor, and activities for its conditioning were started.

On June 15, 2018, at 10:40 am after the diagnosis of brain death was established, the death of the patient was pronounced. The donor was taken to the operating room. After visual assessment, the liver was found to be suitable for transplantation.

Explantation of the donor organs was performed based on the classical method according to Starlz. Organs were perfused with 15 liters of Custodiol solution. A liver biopsy was performed before packing the liver in triple sterile bags.

Back table in the operating room revealed that the donor liver did not have vascular anomalies. Express biopsy revealed fatty hepatosis <10%. The liver was found to be suitable for transplantation.

After hepatectomy, reconstruction of the inferior vena cava was performed using the "piggy back" technique. The end-to-end reconstruction of the portal vein was performed, and the liver was included in the bloodstream. After initiating the blood flow, an immediate outflow of bile was noted. Upon completion of the arterial reconstruction and activation of arterial blood flow, the liver acquired normal turgor and color.

The last stage was the end-to-end choledocho-choledochoanastomosis. With intraoperative liver US, blood flows were clearly visualized in the intrahepatic portal vein and the hepatic artery system. The total surgery time was 7 h 30 min. The time of cold ischemia of the graft was 5 h 52 min.

After LT, the patient was transferred to the resuscitation and intensive care unit (ICU). When effective spontaneous breathing was restored, she was extubated (6 h after the surgery). In the ICU, infusion and antibiotic therapy was prescribed; hemostasis and acid-base state were corrected.

The results of the biochemical analysis 12 h after the start of blood flow: total protein, 55.8 g/l; albumin, 26.7 g/l; total bilirubin, 128.8 μmol/l; creatinine, 54.2 mmol/l; urea, 5.8 μmol/L; ALT, 378.6 U/L; AST, 447.5 U/L; amylase, 17.9 U/L; ALP, 334.9 U/L; GGTP, 200 U/L; potassium, 4.05 mmol/l; sodium, 149 mmol/l.

General blood test indicators 12 h after the surgery: hemoglobin, 105 g/l; erythrocytes, 3.25 × 10^{12}/l; hematocrit, 30.2%; leukocytes, 4.5 × 10^{9}/l; and platelets 92 × 109/l.

On day 2 after the LT, a positive trend was noted. Adequate intestinal peristalsis appeared, with gas discharge. An insignificant serous-hemorrhagic discharge was observed along the drains. However, with a general improvement in the patient's condition, signs of hepatic dysfunction and an increase in cytolysis syndrome persisted (ALT, 419.6 U/L; AST, 314.6 U/L, ALP, 261.1 U/L; and GGTP, 88.5 U/L).

In order to correct the hepatic dysfunction, a hemodialysis session with selective plasma filtration and adsorption was performed on June 17, which resulted in positive laboratory dynamics.

From June 17, i.e., on day 2 after the surgery, the patient started a three-component immunosuppressive therapy according to the scheme of oral tacrolimus of prolonged action with a starting dose of 4 mg/day and mycophenolic acid of 1440 mg/day, intravenous drip-feed prednisolone of 200 mg/day.

On June 18, in the presence of positive dynamics, the patient was transferred for after-treatment in a specialized department. In the organ transplantation department, antibacterial infusion and immunosuppressive therapy continued.

The drains were removed on day 5 after the surgery, and the patient was transferred to tableted methylprednisolone at a dose of 16 mg/day on day 6. The tacrolimus dose was adjusted according to its blood concentration. The target concentration was achieved by day 14, with 12 mg/day of tacrolimus of prolonged action.

In the postoperative period, no growth of pathological flora was noted when analyzing the bacteriological cultures of urine and blood. Graft ultrasound was performed daily. On day 14 of hospitalization, the sutures were removed.

At discharge, the biochemical parameters were as follows: total protein 63.8 g/l; albumin, 39.6 g/l, total bilirubin, 32.7 μmol/L, creatinine, 57.5 μmol/L; urea, 4.6 mmol/L; ALT, 49.4 U/L; AST, 22.6 U/L; GGTP, 122.5 U/L; potassium, 4.66 mmol/L; and sodium, 140.5 mmol/L.

Indicator	Before OLT (June 2018)	On discharge (July 2018)	3 months after LT	6 months after LT	One year after LT
Erythrocytes, 10^{12}/l	3,6	3,98	3,86	4,09	4,08
Hemoglobin, g/l	111	120	116	117	121
Leukocytes, 10^9/l	5,04	9,12	6,1	5,2	5,14
Platelets, 10^9/l	149	218	129	127	157
ESR, mm/h	33	22	15	34	20

Таблица 1. *Динамика показателей общего анализа крови в течение года наблюдения*
Table 1. *Dynamics of the general blood test results during the year of observation*

Indicator	Before OLT (June 2018)	On discharge (July 2018)	3 months after LT	6 months after LT	One year after LT
Total bilirubin, μmol/l	208,1	32,7	8,61	6,6	20,7
ALT, U/L	53,3	49,4	25,6	21,2	25,7
AST, U/L	141,5	22,6	21,7	16,6	17,7
ALP, U/L	510,3	262,2	91	138,2	94
GGTP, U	127,9	122,5	46	52	56
Urea, mmol/l	5,6	4,6	6,67	6,02	4,38
Creatinine, μmol/l	57,9	57,5	112	110	78,8
Potassium, mmol/l	4,67	4,66	3,55	4,2	4,32
Glucose, mmol/l	5,3	4,52	5,02	4,36	4,62
Total protein, mmol/l	71,2	63,8	79,2	64,3	67,2
Albumin, mmol/l	26,9	39,6	34,1	38,4	36,2

Таблица 2. *Динамика основных биохимических показателей в течение года наблюдения*
Table 2. *Dynamics of the main biochemical indexes during the year of observation*

The results of the general blood test at discharge: hemoglobin, 120 g/l; erythrocytes, 3.98 × 1012/l; hematocrit, 37.6%; leukocytes, 9.12 × 109/l; platelets, 218 × 109/l.

Conclusion of the USDE of the liver vessels: blood flow velocity in hepatic artery was 0.71 m/s, RI 0.60; the portal vein was not dilated, the maximum speed was 1.36 m/s; the maximum blood flow velocity along the inferior vena cava was 0.27 m/s; there was no free fluid in the abdominal cavity.

The patient was discharged on July 6, 2018 in a satisfactory condition and liver transplant function.

The scheme of immunosuppression was prescribed, which included 14 mg of tacrolimus of prolonged action at 10-00, 360 mg of mycophenolic acid at 8-00 and 360 mg at 20-00, and 2 t. of methylprednisolone 4 mg in the morning after meals. It was also recommended to take acetylsalicylic acid 75 mg once a day, 1 capsule of omeprazole 20 mg 2 times a day, and losartan 50 mg and bisoprolol 2.5 mg in the morning under the control of BP and HR. For outpatient examination, control of the concentration of tacrolimus in the blood should be performed 2 times a month, ultrasound of the transplant once a month; control of hepatic functional parameters, urea, blood creatinine, and complete blood count, PCR diagnostics (qualitative) for cytomegalovirus, Epstein-Barr virus, and herpes simplex virus once a month. Case follow-up at the Samara Center of organ and tissue transplantation is recommended at least once a month.

Treatment and examination after discharge were prescribed in accordance with the standards approved by the Order of the Ministry of Health of the Russian Federation dated December 28, 2012 No. 1584n "On approval of the standard of primary health care in the presence of a transplanted liver."

During the next year after LT, the patient followed with high compliance all recommendations for outpatient treatment and examination. The general condition of the patient during the follow-up period was satisfactory. There were no clinical signs of graft dysfunction (jaundice, ascites, pruritus, fever). There were no laboratory signs of dysfunction either.

Tables 1 and 2 present the main laboratory data in dynamics during the year after OLT.

In November 2018, *liver shear wave elastography* was performed to assess the condition of the graft. *It was concluded that* liver stiffness corresponded to F < 2 fibrosis stage on the METAVIR scale.

Within a year after OLT, liver ultrasound was performed repeatedly (according to the standard of management after LT). *The US results of the graft one year later* showed that the liver was not enlarged, the echogenicity had no pathology, the echostructure was homogeneous, sound conductivity had no pathology, periportal zones had no pathology, no focal pathology was found, vessels of the portal system were passable, and the blood flow direction was hepatopetal.

CONCLUSION

During the follow-up year, the function of the hepatic graft was satisfactory; no episodes of rejection or dysfunction were noted. The patient continues to be monitored at the Samara Center of organ and tissue transplantation.

Conflict of interest. *The authors declare no conflict of interest.*

ЛИТЕРАТУРА / REFERENCES

1. Liver transplantation. National clinical guidelines Ed. Gotje SV. M., 2013. (In Russ.). [Трансплантация печени. Национальные клинические рекомендации под. редакцией акад. Готье С.В. М., 2013].
2. Moisyuk YaG, Malinovskaya YuO, Bogomolov PO. Transplantatsiya pecheni. Sovremennye dostizheniya i problemy. *Vestnik MEDSI. Onlain zhurnal dlya vrachei*. 2016;29. (In Russ.). [Мойсюк Я.Г., Малиновская Ю.О., Богомолов П.О. Трансплантация печени. Современные достижения и проблемы. *Вестник МЕДСИ. Онлайн-журнал для врачей*. 2016;29].
3. Kotelnikov GP, Kolsanov AV. Innovation in SSMU: infrastructure, training, development of breakthrough projects, transfer of technologies into practice, public participation in Russian and regional innovation ecosystem. *Science & Innovations in Medicine*. 2016;(1):6–11. (In Russ.). [Котельников Г.П., Колсанов А.В. Инновационная деятельность СамГМУ: инфраструктура, подготовка кадров, формирование прорывных проектов, трансфер технологий в практику, участие в российской и региональной инновационной экосистеме. *Наука и инновации в медицине*. 2016;(1):6–11].
4. EASL clinical guidelines: liver transplantation. *Journal of Hepatology*. 2016;2(2):84–108. (In Russ.). [Клинические рекомендации EASL: трансплантация печени. *Journal of Hepatology*. 2016;2(2):84–108].
5. Ivashkin VT, Mayevskaya MV, Pavlov ChS, et al. Treatment of liver cirrhosis complications: Clinical guidelines of the Russian Scientific Liver Society and Russian gastroenterological association. *Russian Journal of Gastroenterology, Hepatology, Coloproctology*. 2016;26(4):71–102. (In Russ.). [Ивашкин В.Т., Маевская М.В., Павлов Ч.С. и др. Клинические рекомендации Российского общества по изучению печени и Российской гастроэнтерологической ассоциации по лечению осложнений цирроза печени. *Российский журнал гастроэнтерологии, гепатологии, колопроктологии*. 2016;26(4):71–102]. doi: 10.22416/1382-4376-2016-26-4-71-102
6. Khubutia MSh, Andreitseva OI, Zhuravel SV, et al. Procedure for drawing up and keeping a liver transplantation waiting list. Transplantologiya. *The Russian Journal of Transplantation*. 2009;(1):13–19. (In Russ.). [Хубутия М.Ш., Андрейцева О.И., Журавель С.В. и др. Методика формирования и ведения «листа ожидания» трансплантации печени. *Трансплантология*. 2009;(1):13–19]. doi: 10.23873/2074-0506-2009-0-1-13-19