

RESECTION TECHNIQUES IN RELATED LIVER TRANSPLANTATION

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<https://doi.org/10.5281/zenodo.12534554>

Abstract. *Relevance. Transplantation is the only radical treatment for end-stage liver disease. Improving the results of liver transplantation directly depends on the preparation of recipients, careful selection of donors, surgical technique and methods of rehabilitation in the postoperative period. Despite the positive results achieved in the survival of recipients after transplantation, the complication rate is still high, which requires further research in this direction.*

The purpose of the study: to analyze the results of the initial stage of the introduction of related liver transplantation in the Republic of Uzbekistan.

Research materials. For the period from February 12, 2018 to February 2024, 96 related transplantations of the right lobe of the liver were performed in patients with decompensated liver failure of various etiologies.

Research results. The postoperative period in recipients passed without complications in 55 cases, which amounted to 57.3%, in the remaining 41 patients (42.7%), one or more complications were noted after the intervention. Thus, among 41 patients, the development of 72 different complications (from 1 to 3 complications) was noted. At the same time, complications that occurred in 21 patients (21.9%) in the early postoperative period required relaparotomy. Among 41 patients, 15 patients (15.7%) died in the early postoperative period, in the long-term period (3 years after transplantation) there was another 1 death in a patient with chronic rejection against the background of refusal to take immunosuppressive drugs. In general, among the recipients operated at the center for the period from 2018 to 2024, the nearest satisfactory results were obtained in 84.4%, while in the long-term period this figure was 79.2%

Summary. The analysis showed that the survival rates of grafts and recipients to a large extent depend on the characteristics of surgical tactics, nosology, and the severity of the initial state of the recipient. At the initial stages of the implementation of the program, the so-called “center effect” is essential.

Keywords: *liver transplantation, end-stage liver disease, complication rate, living related donors.*

INTRODUCTION. According to the World Health Organization (WHO) 10% of the world's population has chronic liver disease, which is more than half a billion (600 million) people, with more than 20 million people worldwide suffering from cirrhosis and/or liver cancer [1,6,9]. The incidence rate of liver cirrhosis (LC) ranges from 14 to 30 cases per 100000 population. The WHO predicts that the number of such patients will increase by more than 60% in the coming decades due to the widespread hepatotropic intoxications and viral liver lesions [2,11].

MATERIALS AND METHODS. During the period from 12 February 2018 to February 2024, 96 related right lobe liver lobe transplants were performed at the Republican Specialized Scientific and Practical Medical Centre of Surgery named after Academician V.Vakhidov in patients with decompensated liver failure of various aetiology (Figure 1).

The age of recipients varied from 19 to 52 years and averaged $34,2 \pm 2,1$ years. All patients were operated on with the following diagnosis: liver cirrhosis (at the time of surgery class B-C according to Child-Pugh, MELD from 13 to 23 points), portal hypertension with various degrees of varicose veins of the oesophagus and stomach, with high risk of development or bleeding in the history, ascites, splenomegaly.

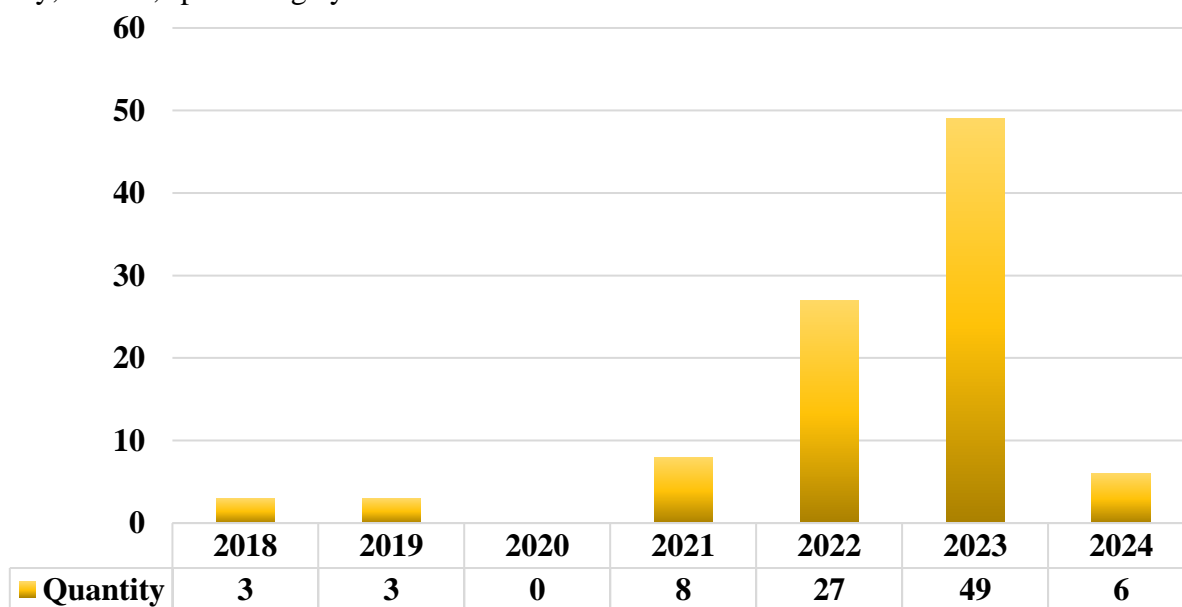


Figure. 1. Quantity of operations performed from 2018 to 2024

The etiological factors of cirrhosis in 95% were viral hepatitis: in 83% of cases combined form of viral hepatitis B+D, in 12% viral hepatitis C. Among other etiological factors in 1 case the operation was performed in a patient with CKD on the background of toxic hepatitis due to poisoning with heavy metal salts, in 1 case in a 19 years old patient with Caroli's disease (2,5% each, respectively) (Fig 2).

Donors for related liver transplantation were: in 4 cases wives, in the rest - close relatives. The age of donors varied from 26 to 46 years and averaged 39.8 ± 9.1 . All donors were examined according to the unified protocols of diagnostics of related donor-recipient pairs.

HLA typing, cross lymphocytotoxic test and multislice computed tomography (MSCT) of the abdominal cavity on a wide-detector CT scanner "Aquilion One - 640" version Genesis (Canon Medical Systems, Japan) were performed on all pairs (Fig.3).

The studies were performed preoperatively and on the 4th-5th day after the intervention to assess the status of the applied shunts.

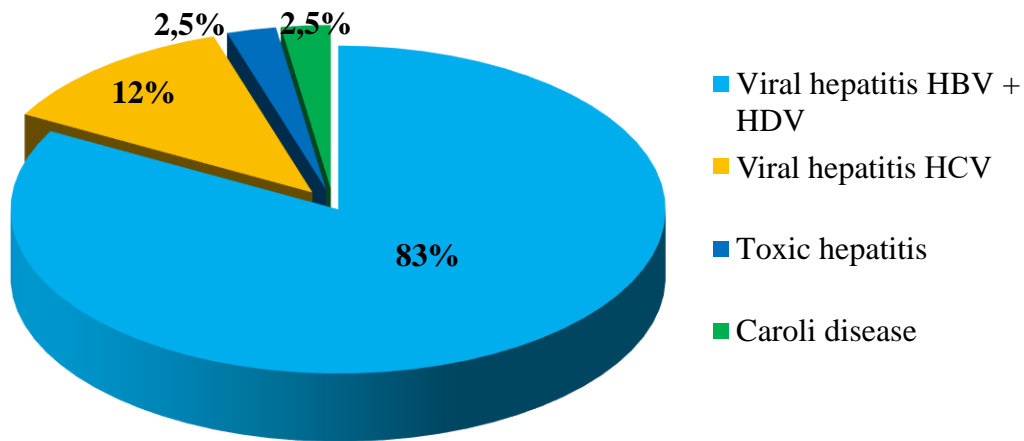


Figure 2. Etiological factors of liver cirrhosis

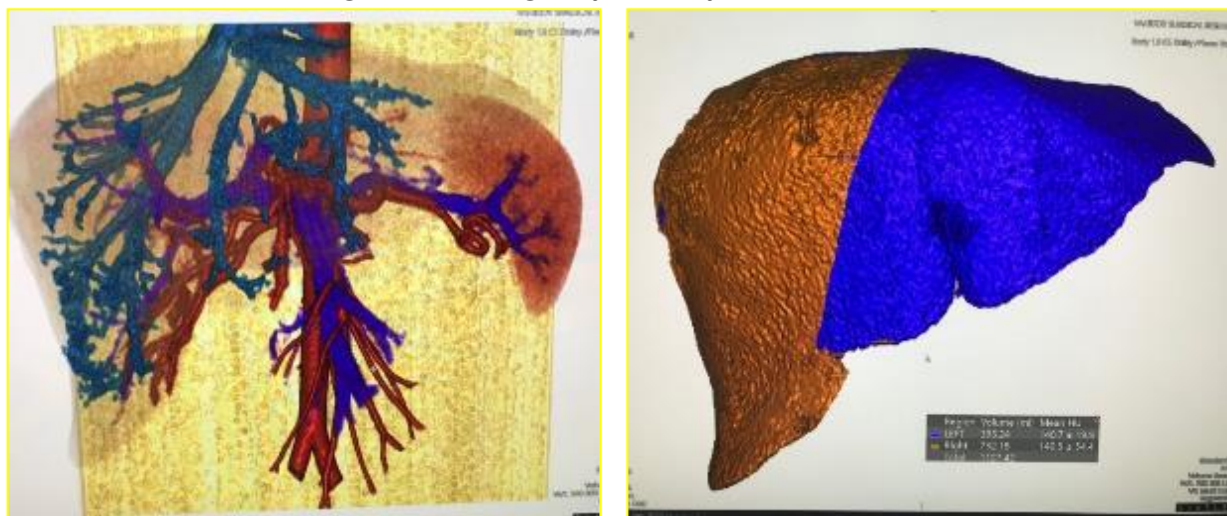


Figure 3. Angioarchitectonics and volumetric indices of the donor liver

In addition to the standard verification of arterial and portal anatomy, the number of hepatic caval anastomoses was determined, taking into account the possible need for prosthetic reconstruction of the latter (Fig. 4).

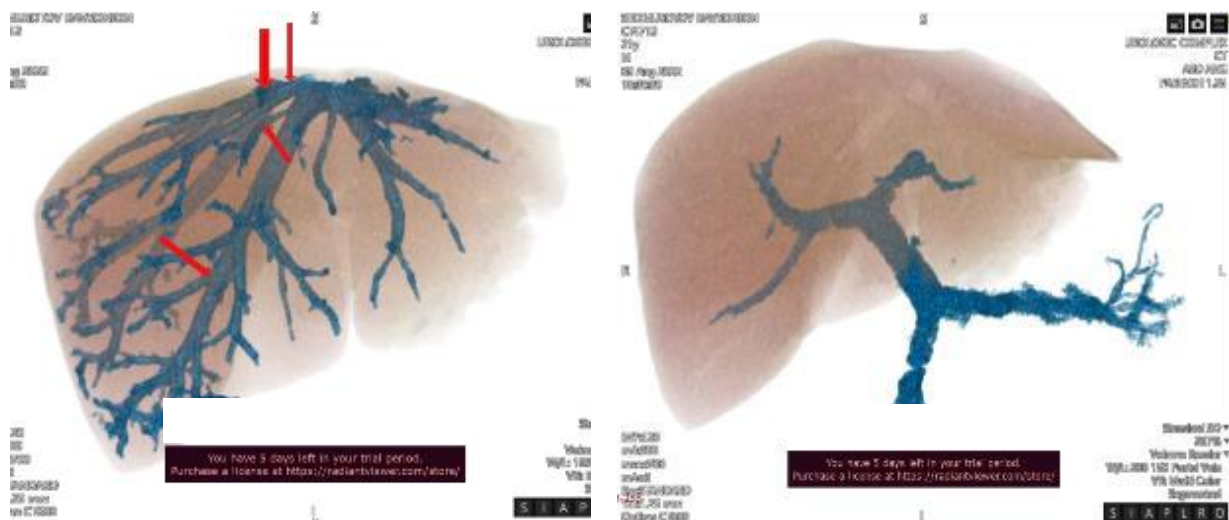


Figure 4. Reconstruction of hepatic caval and portal system of the donor

The right lobe of the liver was taken from all donors.

The stages of hepatectomy were performed according to the standard technique with mobilization of the liver, isolation of hepatic-duodenal ligament elements, inferior vena cava with ligation and crossing of all additional hepatic tributaries, isolated isolation of the right, middle and left hepatic veins with subsequent crossing of portal and hepatic veins and hepaticocholedochus on a clamp.

The next stage was implantation of the graft in the orthostatic position with standard application of one or several hepatocaval, portoportals, arterial and biliary anastomoses.

RESULTS. The weight of the transplanted right lobe ranged from 460 to 1100 g. GRWR (graft recipient weight rate) index ranged from 0.7 to 1.6%. Donors retained the left lobe in a volume of at least 35% of the total liver weight, with GRWR index ranging from 0.7 to 1.6%.

After the transplant taking into account the anatomical features of vessels and bile ducts at the stage of back table the vascular and biliary reconstruction of the latter was carried out. The character of the applied anastomoses in connection with certain peculiarities of the graft is shown in Table 1.

Table 1.

Summary results of the reconstructive stage of donor graft implantation

№	Reconstruction options	Quantity	%
"Back table" segmental hepatic vein reconstruction			
	without hepatic vein reconstruction	60	62,5%
	segmental hepatic vein reconstruction	36	37,5%
	Reconstruction of segmental hepatic veins using autovenous and ePTFE prostheses	33	34,3%
Liver-caval reconstruction			
	monovenous hepatic caval anastomosis	38	39,5%
	two separate hepatic-caval anastomoses	22	22,9%
	3 anastomoses using autovenous and ePTFE prostheses	27	28,1%
	4 anastomoses with ePTFE prostheses	6	6,25%
Reconstruction of the portal blood flow			
	porto-portal termini-terminal anastomosis	94	98,0%
	renoportals shunt	2	2,0%
Arterial anastomoses			
	hepatic artery	93	96,8%
	splenic artery	3	3,2%
Arterial reconstruction			
	"end-to-end" anastomosis with separate knotted sutures	45	46,8%
	"Cobra"-type "end-to-end" anastomosis	42	43,7%
	"end-to-end" anastomosis with continuous "parachute" sutures	9	9,3%
	arterial anastomosis with inverted splenic artery	3	3,1%
Biliary reconstruction (bilio-biliary anastomosis-54)			
	biliobiliary anastomosis	39	72,2%
	two biliobiliary anastomoses	15	27,7%
Biliary reconstruction (bilio-digestive anastomosis-42)			

	1 duct	10	23,8%
	2 duct	23	54,7%
	3-4 ducts	9	21,4%

The postoperative period in the recipients was without complications in 55 cases, which was 57.3%, while the remaining 41 patients (42.7%) had one or more complications after the intervention. Thus, there were 72 different complications (from 1 to 3 complications) among 41 patients. At the same time, the complications in 21 patients (21.9%) required relaparotomy in the early postoperative period.

Out of 96 recipients, 15 patients (15,7%) died in the early postoperative period, in the distant period (3 years after transplantation) there were 5 more deaths in patients with chronic rejection on the background of refusal to take immunosuppression drugs, non-compliance with the recommended regime and late treatment on the background of the developed complication.

In general, among the recipients operated on at the centre in the period from 2018 to 2024, the nearest satisfactory results were obtained in 84.4%, while in the distant period this indicator was 79.2%

DISCUSSION. An important principle of obtaining organs from living related donors, in particular the liver, is to ensure the safety of surgical intervention in the donor, which requires adequate assessment of the risk of surgery, including the study of his or her health status and anatomical features [8]. The assessment of the suitability of a particular related liver donor for a particular recipient is highly individual and the decision depends largely on the diagnostic, surgical, and rehabilitation capabilities of the surgical centre [9]. Therefore, the approaches to the decision on the suitability of a part of the liver of a living related donor are different and should be based on the exclusion of harm to the donor. At the same time, the obtained graft should meet the parameters of the recipient. Otherwise, the donor will be subjected to needless risk [3].

The surgical technique of obtaining liver fragments from a living donor is constantly improving due to the development of methods for visualising the anatomical details of the liver structure of a particular donor, as well as intraoperative navigation, and surgical techniques for parenchyma separation [4,10]. The differences in approaches to the selection of lifetime adult donors of liver fragments primarily concern age criteria, anthropometric features, and morphofunctional characteristics of the potential donor's liver. These aspects may vary over time and depend on the experience of a particular centre performing this type of transplantation care [7].

Improvement of surgical technique, development of methods of visualisation of anatomical features of donor liver structure, intraoperative navigation for parenchyma separation have nowadays allowed to significantly improve the immediate results of intervention and to reduce mortality during the first three months after surgery - from 50% in 1984 to 10% in 2002, according to the European Liver Transplantation Register [5].

According to the same registry, today one-year survival rate of recipients is 82%, three-year survival rate is 75%, ten-year survival rate is 61%. Vascular complications are considered to be the most serious cause of mortality after orthotopic liver transplantation. The results of one of the largest AASL cohort studies showed that the incidence of arterial thrombosis in orthotopic liver transplants from living donors was 6.5%, and in orthotopic liver transplants from postmortem donors - 2.3%, the incidence of portal thrombosis - 2.9 and 0%, respectively [2].

CONCLUSION. Taking into account our modest experience in performing liver transplantations, we have highlighted some technical approaches, which in our opinion is reasonable for safe intervention and prevention of damage to anatomical structures of the donor graft. Intraoperative ultrasound with marking of large intraparenchymal vessels was performed during planning of the resection line to preserve adequate venous outflow from the remnant, to ensure safe isolation of hepatic veins and further decision on the necessity of their anastomosing during implantation (Fig. 5).

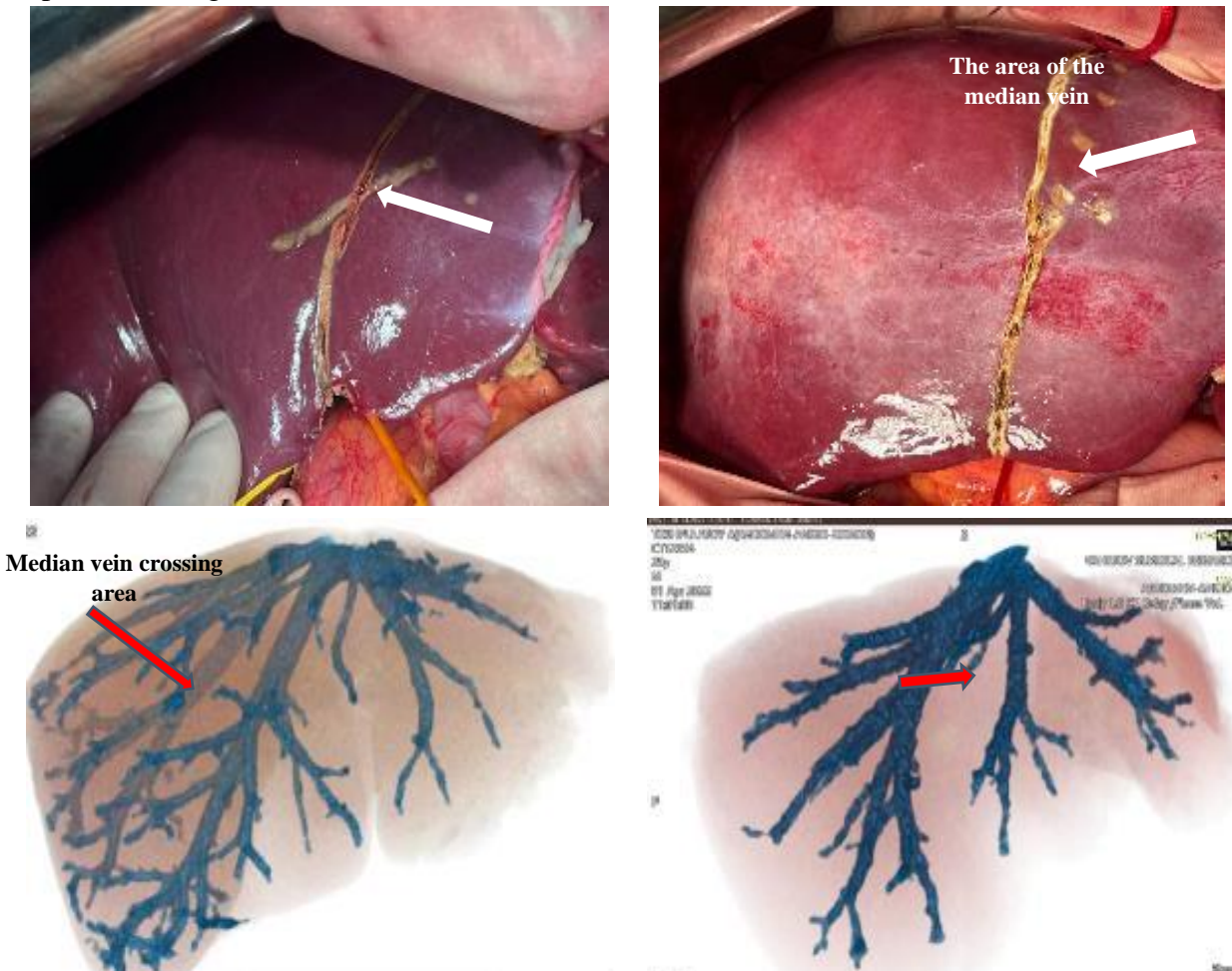


Figure 5. Liver resection line with marking of hepatic vein branches passage

It was taken into account that the line of parenchyma resection and venous vessels crossing should provide adequate volume and blood circulation in the residual remnant and at the same time minimize the probability of formation of "undrained" zones in the graft. In the presence of large venous outflows (3-5 mm and more) their integrity was preserved until the complete liver splitting and the beginning of vascular isolation of the graft.

After the graft intake, at the stage of "Back table" in the presence of large venous outflow tracts actively washed with preserving solutions in order to adequately reconstruct the recipient, synthetic and autovenous prostheses were applied with the subsequent use of local haemostatic agents in the area of anastomosed veins (Fig. 6).

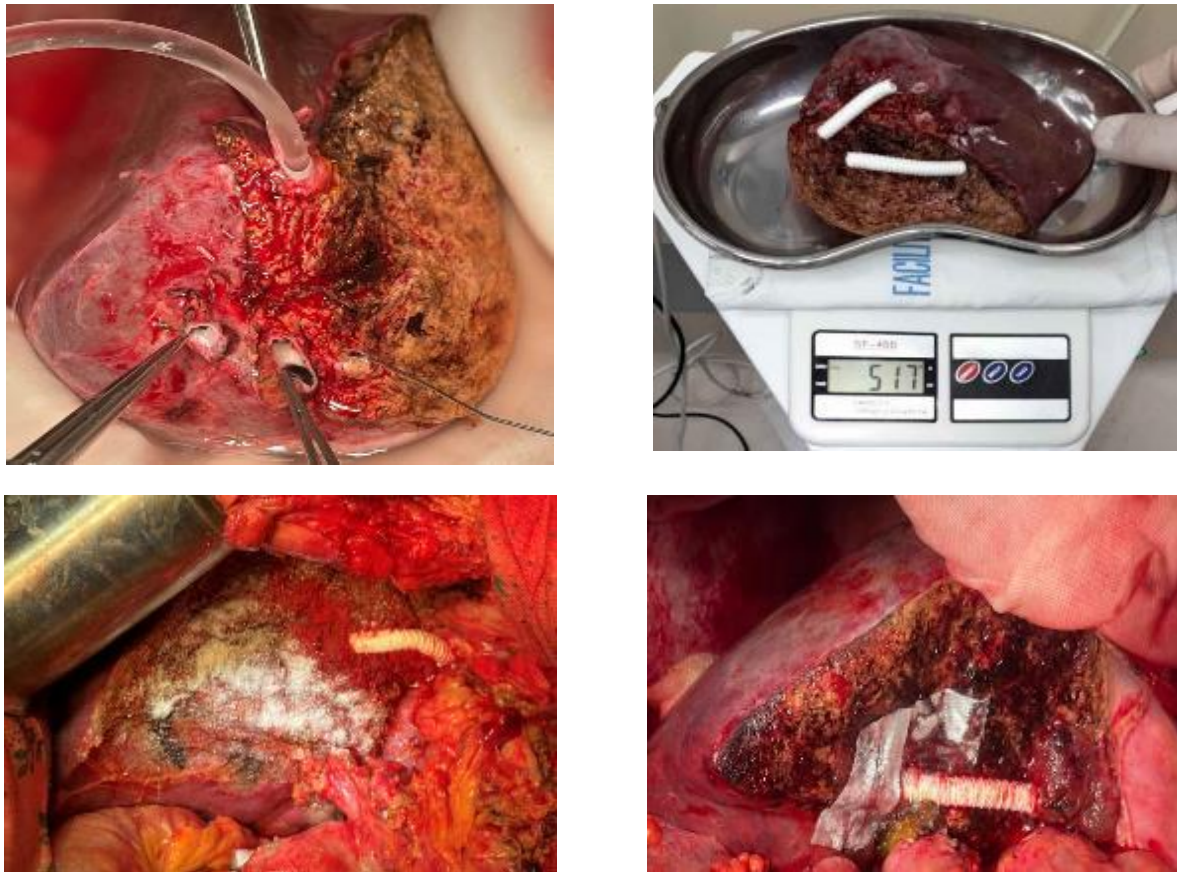


Figure 6. Large venous outflow tracts and implanted ePTFE prostheses

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