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CLINICAL CASE OF STAGED TREATMENT OF COMBINED COMPLICATIONS OF ORTHOTOPIC LIVER TRANSPLANTATION

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Hepatic artery thrombosis (HAT) following liver transplantation (LT) is a severe life-threatening complication that can lead to graft loss and mortality after LT. According to different reports, HAT incidence ranges from 2% to 9%. Modern endovascular and radiosurgical techniques allow for minimally invasive liver graft revascularization. Nonetheless, a major consequence of even a successful revascularization is ischemic cholangiopathy, which can lead to ischemic biliary strictures and anastomotic leak. The paper presents a clinical case of long-term complex treatment of combined complications of LT using minimally invasive endovascular and endoscopic techniques.

Keywords: orthotopic liver transplantation, biliary strictures, hepatic artery thrombosis, endobiliary stenting.

INTRODUCTION

Early HAT following LT is a devastating complication that can lead to graft loss and recipient death. According to different authors, the overall incidence ranges from 2% to 9% [1]. Arterial anastomosis is extremely important, but non-surgical risk factors for thrombosis, such as coagulation disorders against the background of decreased synthetic liver function, multiple arterial anastomoses and reconstructions, embolizations prior to transplantation, etc. are equally important [2–4].

Endovascular recanalization of the hepatic artery is considered the safest method of treatment. Modern radiosurgery techniques allow minimally invasive revascularization of the hepatic graft, including in cases of multiple attempts to form arterial anastomosis with recurrent thrombosis [5, 6].

A major consequence even after successful liver transplant revascularization is ischemic cholangiopathy, which can lead to ischemic biliary strictures and anastomotic leak [7]. Modern therapeutic tactics for biliary strictures correction provides for the priority of endoscopic methods of treatment and includes endoscopic retrograde cholangiopancreatography (ERCP) with subsequent installation of plastic stents [8–10].

In cases of ischemic cholangiopathy, it is not uncommon for long, complex strictures that are difficult to treat endoscopically to form. Prolonged external biliary tract drainage carries a risk of severe infectious complications and can be used in modern conditions for decompression in cases where it is not possible to recanalize stricture endoscopically [11]. The way out of such situations is the use of hybrid techniques including staged and simultaneous use of endoscopic and percutaneous drainage.

This paper presents a clinical case illustrating a multidisciplinary hybrid approach to the treatment of LT complications.

CLINICAL OBSERVATION

Patient J., female, 58. Liver cirrhosis on the background of chronic unverified hepatitis was first diagnosed in 2015. The patient received conservative therapy under the supervision of a hepatologist, with moderate positive dynamics. The disease worsened from February 2019 (Child–Pugh class C, MELD score 18–24). The patient was examined and put on the LT waiting list. Antithrombin III level at outpatient was 87%.

On October 25, 2019, orthotopic LT was performed using the piggy-back technique. Donor: male, 26 years old, diagnosed with brain death resulting from penetrating head injury. Primary cold ischemia time was 385 minutes, warm ischemia 40 minutes, and liverless period 55 minutes. End-to-end arterial anastomosis between the native hepatic arteries of the graft and the recipient was performed.

On October 26, 2019, follow-up ultrasound examination and subsequent CT angiography diagnosed HAT, and severe antithrombin III deficiency (38%) was detected in the laboratory.

On October 26, 2019, the patient underwent emergency angiography, recanalization and stenting of the hepatic artery (Aneugraft 4.0 × 27 mm stent graft). Two doses (1000 ME) of antithrombin III were administered.

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The postoperative period subsequently had no complications. The patient was transferred from the intensive care unit on day 4, she was discharged from the hospital on day 23 after the operation. Graft function was satisfactory. During outpatient follow-up, she received triple immunosuppressive therapy (tacrolimus, myfortic, prednisone), anticoagulants, and antiplatelets. After 6 months, follow-up angiography was performed – hepatic artery stent was passable (Fig. 1).

In April 2021, the patient noted gradual appearance and increase of bile-tinged skin, recurrent pain in the right subcostal area and increase in body temperature up to 38.6 °C. On April 27, 2021, the patient was admitted to the outpatient clinic. On admission to the hospital, marked biliary hypertension signs were revealed. According to ultrasound findings: right and left lobe ducts up to 14 mm, segmental ducts up to 5–8 mm, choledochus 16–17 mm. Blood flow in the liver graft was satisfactory. Also noteworthy was the rapid increase in laboratory signs of obstructive jaundice (Table). Magnetic resonance cholangiopancreatography (MRCP) showed multiple strictures in the biliary anastomosis area. There was encapsulated liquid mass (hematoma) in the subhepatic space (3.9 × 3.2 × 2.8 cm). There were no signs of liver graft structure and perfusion disorders (Fig. 2).

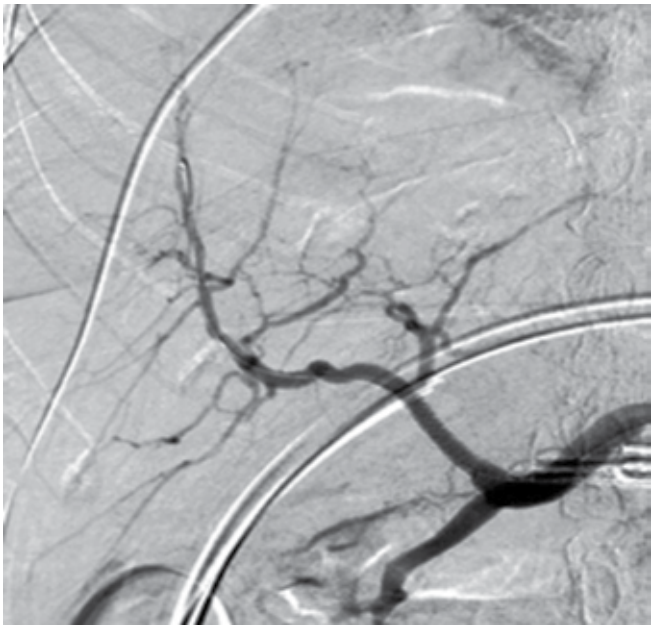

Fig. 1. Control angiography result 6 months after hepatic artery graft stenting

On April 30, 2021, an attempt at endoscopic recanalization was made. However, the guidewire could not be passed proximal to the stricture zone. Simultaneously, celiacography was performed, revealing up to 80% stenosis in the area of the previously installed stent (Fig. 2). Given the need for urgent resolution of biliary hypertension, the patient underwent ultrasound-guided percutaneous, transhepatic external drainage. Convincing positive ultrasound results (May 18, 2021 – up to 4 mm intrahepatic ducts, 10 mm choledochus) and laboratory dynamics were obtained after drainage (Table). Drainage of 400–700 ml bile daily. At the follow-up antegrade cholangiography, there was no contrast inflow that was distal to the biliary stricture zone (Fig. 2).

Given the available clinical data, after the patient's condition was fully stabilized, percutaneous transhepatic and endoscopic stenting of the biliary tract was performed on May 20, 2021 using the rendezvous method. Under hybrid operating room conditions, the constriction zone was recanalized antegradely with the help of an introducer and a guidewire; the guidewire was passed into the duodenum, grasped with endoscope forceps, replaced by a standard guidewire (4 m), and the common bile duct was stented with a 10 cm long, 8 Fr diameter plastic stent (Fig. 3).

The next step was balloon angioplasty of the restenosis area with a 4.0 × 20 mm catheter and hepatic artery stenting with a 4.0 × 32 mm drug-eluting stent (Promus) performed on May 26, 2021. Stent post-dilation at the level of its proximal part was done with a 4.5 × 15 mm high pressure balloon (Fig. 4).

Table

Dynamics of laboratory indicators

Indicator	27/04/2021	29/04/2021	01/05/2021	13/05/2021	24/05/2022	Units
Leukocytes	7.44	7.8	7.67	6.67	7.8	$\times 10^{9/L}$
Hemoglobin	131	123	94	92	93	g/L
Platelets	201	178	204	212	283	$\times 10^{9/L}$
Bilirubin	62	149	53.4	15	5.3	μmol/L
Direct bilirubin	–	141	38.8	–	–	μmol/L
ALT	493	742	462	52.7	20	U/L
AST	298	669	219	29.8	18.2	U/L
Creatinine	137	122	115	125	99	μmol/L
Urea	7.9	8.1	5.6	7.4	6.3	Mmol/L
INR	1.1	1.09	1.1	1.07	1.03	
Tacrolimus	4.7	–	6.7	7.4	6.1	ng/mL

The postoperative period was marked by a clear positive trend. Percutaneous transhepatic drainage was closed on day 6 and removed on day 14 after surgery. Follow-up MRCP revealed no filling defects, regression of biliary hypertension signs. The patient was discharged for outpatient treatment on day 10 after surgery.

Graft function was stable at month 12 after the surgical treatment. Laboratory results are presented in Table. The biliary stent was changed at months 5 and 10, and a nitinol stent is planned to be installed. Follow-up angiography found no signs of impaired hepatic blood flow at month 12 after restenosis correction.

DISCUSSION

Early HAT is a devastating complication that can lead to graft loss and patient death. High MELD scores, recipient age, prolonged warm ischemia time and hemostasis disorders are the most significant independent risk factors for HAT [5]. Minimally invasive endovascular restoration of arterial blood flow in the graft is the method of choice for surgical treatment in modern conditions and allows achieving a good outcome in most cases [12]. The use of drug-eluting stents carries a high risk of restenosis in the long term and, in our opinion, requires angiographic follow-up every 6 months. Based on world experience in coronary interventions, drug-eluting stents reduce the risk of restenosis significantly [13].

Ischemic cholangiopathy develops in more than half of patients with HAT [7]. Technical methods of endoscopic treatment of biliary strictures are diverse but extended; complex strictures of ischemic origin are often resistant to therapeutic endoscopy techniques [14, 15]. In such cases, hybrid techniques can be used. The use of plastic stents as the first-line solution for acute surgical problems seems to us justified. At the same time, the need to revise and replace plastic stents every 3–6 months has additional economic, technical and organizational challenges. Currently, there are ongoing discussions about the possibility of using self-expandable metallic stents (SEMS) in this situation. The main advantage of SEMS is that the number of required endoscopic interventions is reduced significantly [10]. The next stage in the described clinical case is the insertion of SEMS.

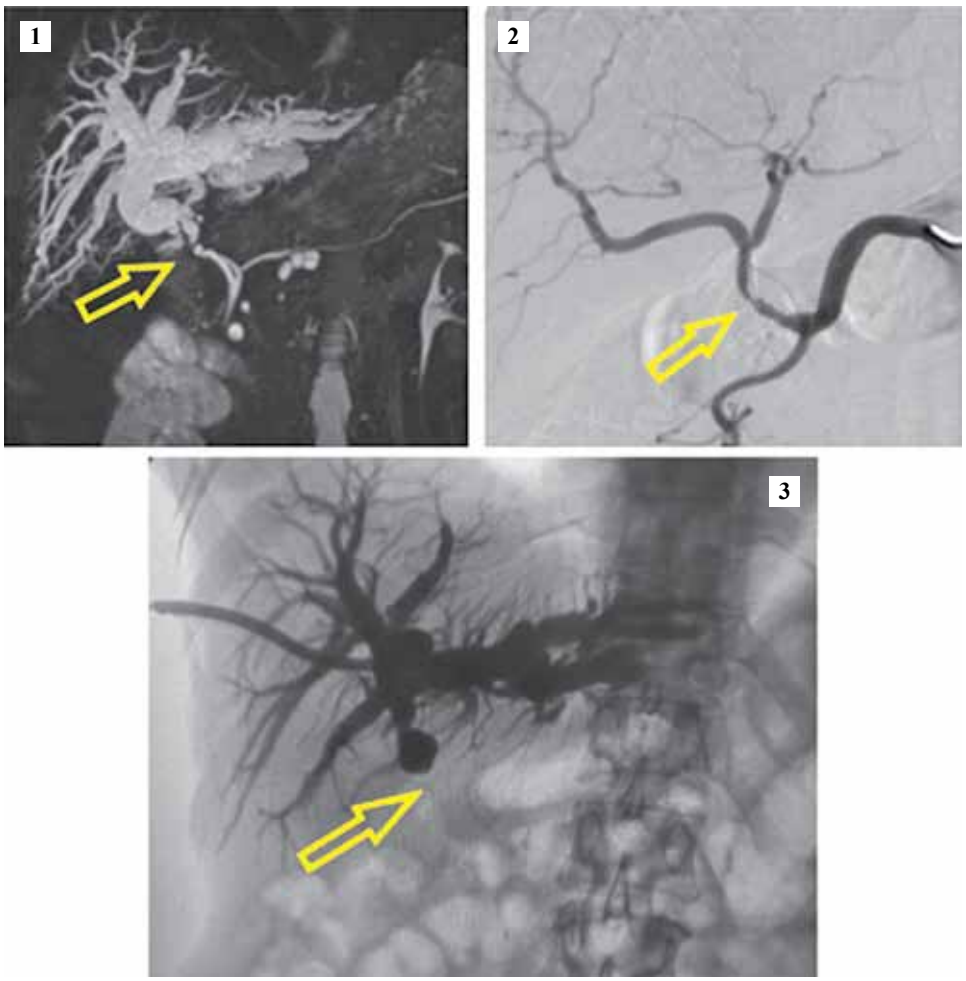

Fig. 2. Examination, percutaneous, transhepatic external drainage: 1, Magnetic resonance cholangiography (yellow arrow shows the stricture zone); 2, Celiacography (yellow arrow indicates the restenosis zone in the area of the previously installed stent); 3, Control antegrade cholangiography through external biliary drainage

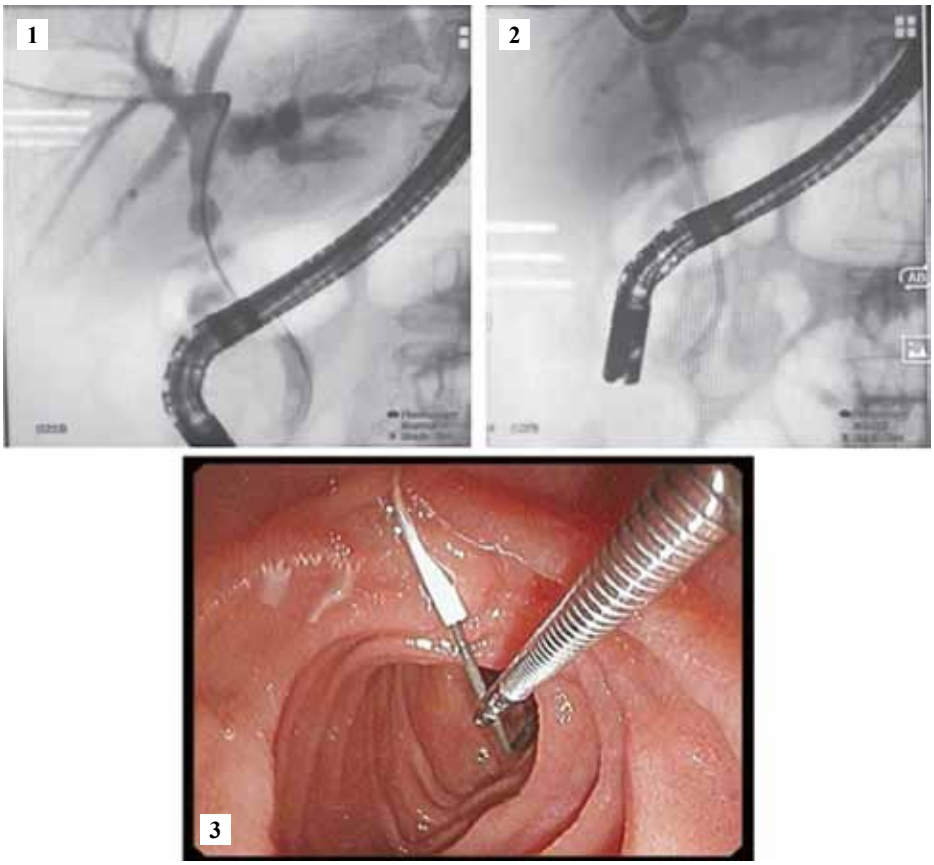

Fig. 3. Percutaneous transhepatic and endoscopic stenting of the biliary tract using the rendezvous technique: 1, recanalization of the constriction area and installation of a conductor; 2, installed plastic biliary stent; 3, endoscopic gripping of the conductor

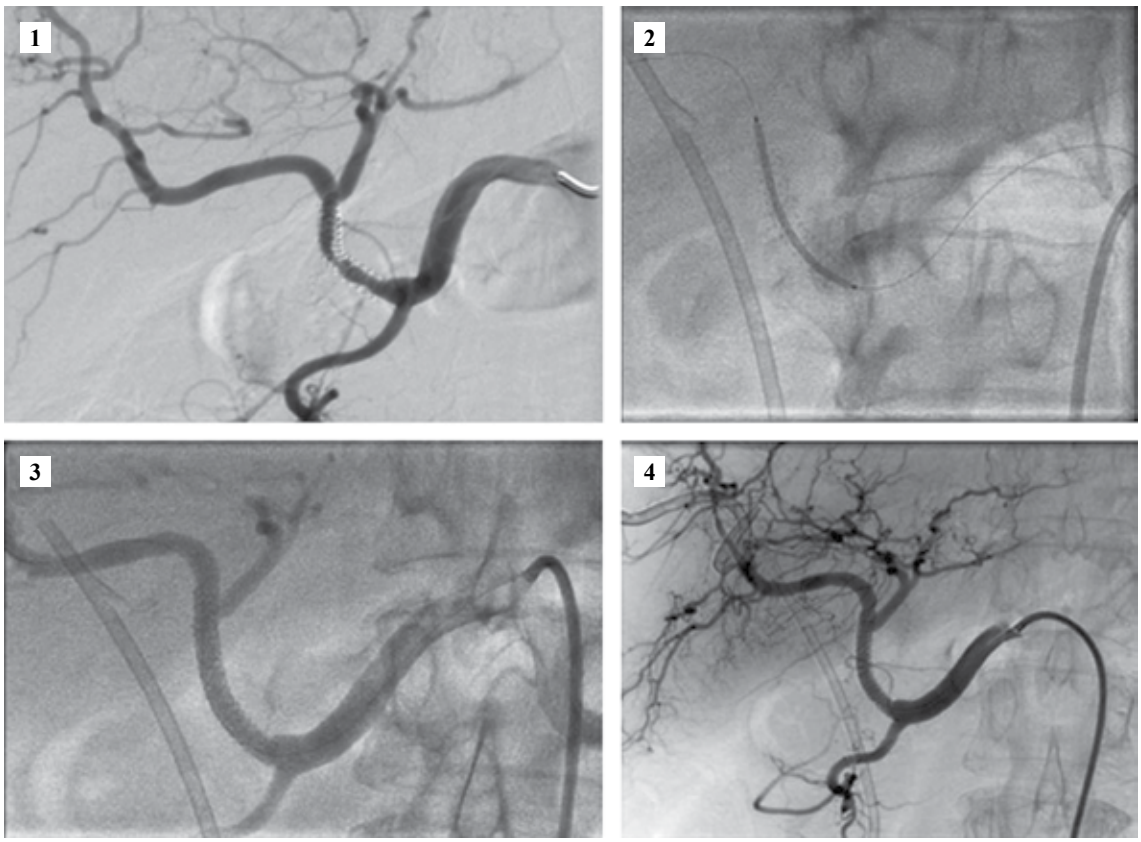

Fig. 4. Celiacography, balloon angioplasty and stenting of restenosis area: 1, restenosis of previously installed stent up to 80%; 2, balloon was inserted into the restenosis zone; 3, 4, stenting of the restenosis area with a 4.0 × 32 mm drug-eluting stent

CONCLUSION

Treatment of LT complications is a complex task that requires an integrated multidisciplinary approach and availability of a number of high-tech techniques at the transplantation center. Endobiliary and endovascular interventions provide ample opportunities in eliminating the consequences of impaired arterial blood flow in the liver transplant; in the long term, they can increase graft longevity. This clinical observation demonstrates the advantages and feasibility of staged minimally invasive correction of early and late combined complications of orthotopic LT.

The authors declare no conflict of interest.

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