



RESEARCH ARTICLE

THE RESULTS OF APPLYING TRANSJUGULAR INTRAHEPATIC PORTOSYSTEMIC SHUNT IN THE TREATMENT OF RECURRENT PORTAL GENESIS BLEEDING

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ABSTRACT

**Background:** One of the most significant developments in recent years relating to the treatment of bleeding varicose veins of the esophagus and stomach (VVES) at Portal hypertension (PH), is the introduction into practice of the new endovascular technique - transjugular intrahepatic porto-systemic shunt (TIPS). TIPS is minimally invasive method of creating a portosystemic shunt to decompress the portal venous system and method allows embolize tributaries (left gastric vein, short gastric vein) VVES and thereby reduce the risk of bleeding.

**Aim:** To study evaluation efficacy of the treatment of patients after TIPS with recurrent bleeding from VVES when endoscopic intervention were unsuccessful.

**Materials and Methods:** Analyzed the results of examination and treatment of 76 patients undergoing TIPS attempt was made. 18 patients were in the Department of Abdominal Surgery of 2<sup>nd</sup> Clinic of Tashkent Medical Academy (2014-2015), 58 - in the Chonnam National University Hospital (Republic of Korea) (2003-2013). In the 65 observations TIPS was successful. In 11 patients, due to technical difficulties (repeated exploratory puncture of the portal vein), TIPS failed. Of these, 8 patients had PH decompensated with refractory ascites. The technical success of the TIPS was 85.5%.

**Results:** In 58 patients underwent TIPS observations using bare metal stents and 7 cases -stent grafts. In all cases there was a reduction of the pressure gradient, with an average of  $21,1 \pm 4,5$  to  $11,5 \pm 1,8$  mm Hg. Worsening encephalopathy was observed in 15 patients (23.0%). In 5 cases, the progression of liver failure was observed. Mortality from progressing PN observed in 2 patients. In 48 cases, TIPS was performed to stop the bleeding when the endoscopic procedures were unsuccessful. Hemostasis by reducing portal pressure was 95.8% (46 cases). In 2 cases of bleeding after TIPS marked relapse in the early period of shunt thrombosis. Patients were subjected to endovascular recanalization shunt. In 5 (8.0%) patients revealed thrombosis of intrahepatic stent and in 57 (89.2%) - portosystemic shunts were passable. Recurrent bleeding from VVES noted in 3 (4.8%) patients, which was the cause of death in one case. The growth of ascites was observed in 1 (1.6%) patients.

**Conclusion:** We concluded that the main method of stop recurrent bleeding from VVES in patients with portal hypertension is TIPS. High mortality after implementation of public emergency operations at an altitude of bleeding stresses the need for the introduction of TIPS in the minutes introducing patients to emergency surgery. Moreover, TIPS is a type of porto-systemic shunt and cannot be considered a definitive treatment for patients with liver cirrhosis complicated with portal hypertension.

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INTRODUCTION

Portal hypertension (PH) is a complication of liver cirrhosis (LC), which expressed by a pathological increase of portal pressure gradient, causing a number of effects that threaten the patient's life. One of these, as well as the most severe complication of PH is varicose veins of the esophagus and stomach (VVES), the development of which bleeding is

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considered one of the most difficult problems of modern medicine. In many cases, the first episode of VVES bleeding occurs within the first or second year, when it is detected in 25-65% of cases, is the direct cause patient death (Bianet *et al.*, 2013; Bonnel *et al.*, 2014). If you can stop the bleeding by conservative measures first, then the probability of recurrence within the first 10 days is more than 50%, with the highest risk of re-bleeding in the first 72 hours, and during the first year - 70%. Mortality in each episode of bleeding increases and reaches 50-80% of (Bai *et al.*, 2014; Bonnel *et al.*, 2014). One of the most significant developments in recent years relating to the treatment of bleeding VVES at PH, is the introduction into practice of the new endovascular technique - transjugular

intrahepatic porto-systemic shunt (TIPS). TIPS is percutaneous, minimally invasive method of creating a portosystemic shunt to decompress the portal venous system and method allows embolize tributaries (left gastric vein, short gastric vein) VVES and thereby reduce the risk of bleeding. In our study, we analyzed the results of treatment of patients after TIPS with recurrent bleeding from VVES when endoscopic intervention were unsuccessful.

## MATERIALS AND METHODS

Analyzed the results of examination and treatment of 76 patients undergoing TIPS attempt was made. 18 patients were in the Department of Abdominal Surgery of 2<sup>nd</sup> Clinic of Tashkent Medical Academy (2014-2015), 58 - in the Chonnam National University Hospital (Republic of Korea) (2003-2013). In the 65 observations TIPS was successful. In 11 patients, due to technical difficulties (repeated exploratory puncture of the portal vein), TIPS failed. Of these, 8 patients had PH decompensated with refractory ascites. The technical success of the TIPS was 85.5%. Among the patients studied was 48 men, women - 17. The age of patients ranged from 33 to 74 years (mean 54.6 years). In 64 patients the cause of PH was cirrhosis of different etiology (alcoholic genesis at 19, viral - in 45), primary biliary cirrhosis - in 1 patient. In 63 patients had a history of episodes of bleeding from esophageal varices, which are stopped by the EL. The severity of hepatic impairment was evaluated by Child-Pugh: Class A was diagnosed in 15 patients, in the - in 27, C - at 23. In all cases, patients performed the first stage of endoscopic methods of hemostasis. However, due to the high risk of bleeding (18 patients) and patients rebleeding produced TIPS. All patients TIPS performed with the use of stents with a diameter of 8-10 mm and a length of 6-10 cm. Patients up to TIPS in 63 cases performed endoscopic ligation (EL) and sclerotherapy (ES) of VVES, 4 patients - endovascular reduction of splenic blood flow.

### Indications for TIPS were:

- Recurrent bleeding after endoscopic interventions on VVES (48 observations, while 17 of them had ascites resistant to diuretic therapy);
- Repeated episodes of bleeding from VVES (16 cases);
- Resistance and the presence of ascites VVES high risk of bleeding (1 case).
- Contraindications to conduct TIPS were cardiopulmonary insufficiency, space-occupying lesions of the liver, jaundice, thrombosis of hepatic veins and portal vein, severe coagulopathy.
- All patients included in the study, carried out clinical examinations (laboratory tests, ultrasound of the abdominal cavity with duplex scanning portal blood flow, gastroscopy).
- In 11 cases performed isolated TIPS and in 54 cases - with embolization of VVES (Table-1).

Skeletal position liver gate according roentgenometer was variable and covered the area from Th 9 - L 1, making this method of orientation of little use and unsafe. Get a picture of the intrahepatic portal vein in the venous phase succeeded in

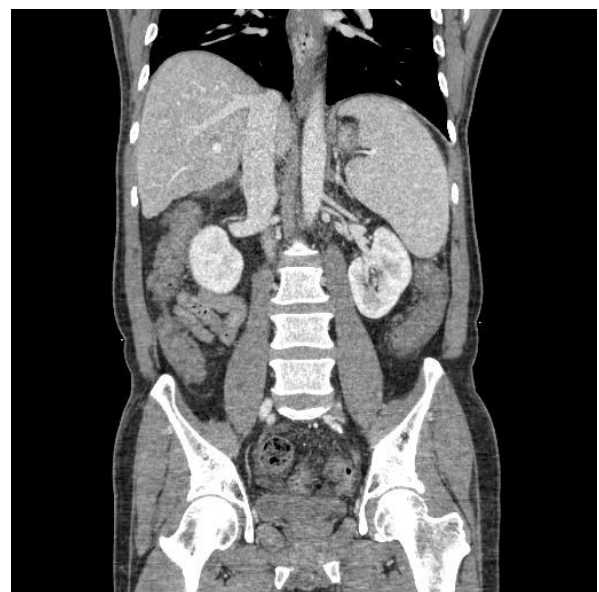
76.9% (50 cases) of patients with the use of digital subtraction angiography.

**Table 1. Distribution of patients according to the degree of hepatic insufficiency (HI)(Child - Pugh) and degree of VVES (N. Soehendra, K. Binmoeller)**

|                                      | TIPS      | TIPS and VVES embolization | Total |
|--------------------------------------|-----------|----------------------------|-------|
| The degree of HI on the Child - Pugh |           |                            |       |
| class A                              | 3 (13.8%) | 12 (14.7%)                 | 15    |
| class B                              | 5 (54.2%) | 22 (51.0%)                 | 27    |
| class C                              | 3 (32.0%) | 20 (34.2%)                 | 23    |
| Degree of VVES                       |           |                            |       |
| GEV-1, GEV-2                         | 9         | 49                         | 58    |
| IGV-1                                | 2         | 5                          | 7     |



**Fig. 1. MSCT angiography topical portal vein location**



**Fig. 2. MSCT angiography topical hepatic vein location**

In some cases, it marked difficulty visualizing the portal vein ultrasonography, which was due to the accumulation of ascites

fluid in the abdominal cavity. In this regard, 58 observations were performed MSCT angiography of the venous phase. In 24 cases, due to the pronounced ascites patients prior to the installation of MSCT performed paracentesis with the removal of ascites. The method allowed simulating the process of implementing TIPS: to determine the location of the intrahepatic portal and hepatic veins (Figure 1, 2). The direction and traction angle of the puncture needle, an exemplary stent placement level and reduce the number of failures.

**RESULTS AND DISCUSSION**

The main objective of TIPS is unloading gantry bed and reduction of VVES and, consequently, stop the bleeding and the prevention of them. In 58 patients underwent TIPS observations using bare metal stents and 7 cases -stent grafts (Fig. 3, 4).



**Fig.3. Conglomerate varicose veins in the gastric cardia**



**Fig.4. Embolization of the left gastric vein and implantation bare metal stent**

The operation ended with the reference measurement porto-systemic gradient. It has been found that when a successful

bypass 5-10 minutes after stenting in portal vein pressure decreased by an average of 25-30%. In all cases there was a reduction of the pressure gradient, with an average of  $21,1 \pm 4,5$  to  $11,5 \pm 1,8$  mm Hg. After TIPS observed following complications: 2 cases - puncture of the carotid artery, 4 - puncture of the bile duct, 2 -shunt thrombosis, 1 - pulmonary embolism with fatal outcome in the first day after surgery. The cause of thrombosis, we think, subintimal injection of contrast agent in the splenic vein and the inferior mesenteric. Using taper catheters with hydrophilic wires thus reducing intraoperative graft thrombosis up to 96.9%.The use of ultrasound to determine the vascular structures of the neck, allowed confidence punctured jugular vein in the other (63) cases. In 8 (12.3%) patients in the postoperative period noted an increase in temperature above  $38^{\circ}C$  in 5 (7.7%) patients had severe pain in the abdomen. Conducting additional conservative measures will eliminate the negative aspects of the intervention. Postoperatively, worsening encephalopathy was observed in 15 patients (23.0%). With the accumulation of clinical experience, prevention of complications, including preparations of lactulose, a non-absorbable antibiotic rifaximin group and preparations L-ornithine-L-aspartate, it became mandatory. Dysfunction of Porto-systemic shunt, which flows in the form of its thrombosis or obliteration, is not observed. In 5 cases, the progression of liver failure was observed (Table Number 2). It was shown increase of bilirubin and liver enzymes, the development of renal insufficiency, edema-ascitic syndrome, but in the control duplex scanning revealed a functioning intrahepatic shunt. Mortality from progressing PH observed in 2 patients. In 48 cases, TIPS was performed to stop the bleeding when the endoscopic procedures were unsuccessful. Hemostasis by reducing portal pressure was 95.8% (46 cases). In 2 cases of bleeding after TIPS marked relapse in the early period of shunt thrombosis. Patients were subjected to endovascular recanalization shunt.

**Table 2. The nature of the complications in the early postoperative period after TIPS**

| Complication                               | TIPS |           |
|--|------|-----------|
|  | abs. | %         |
| Thrombosis of the portal vein              | 2    | 3.1       |
| Recurrence of bleeding                     | 2    | 3.1       |
| The progression of liver failure           | 5/2  | 7.7 / 3.1 |
| Puncture of the pelvis of the right kidney | 2    | 3.1       |
| hematoma of the liver                      | 3    | 4.6       |
| Puncture of the bile ducts                 | 2    | 3.1       |
| Pulmonary embolism                         | 1/1  | 1.5 / 1.5 |
| Mortality                                  | 3    | 4.6       |

TIPS to evaluate the results, patients were re-examined in the scheduled order at specified time intervals (1, 3 and 18 months after surgery). During hospitalization, patients received courses of conservative therapy (hepatoprotectors, diuretics and  $\beta$ -ATOR unit if indicated, lactulose, symptomatic therapy).In addition, the complex passed clinical examination, including laboratory tests, ECG, endoscopy. To assess stent patency we used color duplex scanning at 48 hours after TIPS. In the future, ultrasound was performed at intervals of 3 months in the first year after TIPS, and 6 months in the second year. In the group of patients after TIPS, we analyzed the frequency of recurrent bleeding, mortality and its causes, dynamics as cites, number of stents passable at certain intervals, the degree and

extent of VVES. In the immediate postoperative period in terms of 62 patients were observed up to 1 month. On the 26<sup>th</sup> day of the dead, one patient with liver cirrhosis Class C of the progression of hepatocellular insufficiency. In 5 (8.0%) patients revealed thrombosis of intrahepatic stent and in 57 (89.2%) - portosystemic shunts were passable. Recurrent bleeding from VVES noted in 3 (4.8%) patients, which was the cause of death in one case. The growth of ascites was observed in 1 (1.6%) patients. This fact points to the high efficiency of TIPS in the treatment of patients with bleeding VVES when other less invasive interventions are unsuccessful. In the long-term period up to 24 months, we were able to track the results in 60 patients. To 7 patients in the ASAN HOSPITAL (South Korea) was performed orthotopic liver transplantation. In the period from 3 to 24 months from the progression of hepatocellular insufficiency died 7 (11.6%) patients. Stent thrombosis is diagnosed in 9 (15.0%) of patients with bleeding from VVES noted in 6 (10.0%) patients. During the period of observation shunt patency was satisfactory in 44 (73.3%) patients. The progression of hepatic encephalopathy was detected in 5 (8.3%) patients. Conducted conservative measures allowed to stop the phenomenon of encephalopathy and had no impact on the quality of life of patients after discharge from hospital.

Thus, TIPS is an effective method of decompression of portal hypertension and embolization VVES tributaries. Minimally invasive techniques, the minimum number of complications and rapid rehabilitation period TIPS displays on the first flank with unsuccessful attempts to stop the bleeding endoscopically. Implementation of open surgical procedures at an altitude of bleeding or ineffective endoscopic procedures entails many complications and mortality reaches 18% to 61%, especially in patients with HI class C. Extra peritoneal access overlay portosystemic shunt - TIPS allows you to stop the bleeding and get positive results minimum mortality in all stage liver failure. Certainly, death rate in patients with HI is very high and reaches 13% to 34%, but this method allows compensating the phenomenon Mo some time and remaining on the waiting list of the donor organ.

Technical complications during TIPS can be included subcapsular hematoma, puncture of the biliary tract and gall bladder, the parenchyma of the right kidney, which occurs 13% of cases (Patidar *et al.*, 2014). The main cause of damage to a number of bodies are a multiple searches of the right branch of the portal vein. In our observation, technical complications were observed in 10.8% of cases. Because of MSCT-angiography, technical success of the TIPS was 85.5%. The results of early postoperative period TIPS is directly dependent on the initial state of hepatic insufficiency on the Child-Pugh. In our follow-up after TIPS mortality was 4.6%, and all patients had decompensated Mon - class S. From Mon progression during 1 to 24 months, 8 patients died. In the long-term stent stenosis rate due to intimal hyperplasia inner according to the authors ranged from 18% to 31% (Vasatova *et al.*, 2013). This is turn leads to the development of recurrent bleeding from VVES, the growth of ascitic syndrome. In our observation of stent patency at 24 months was 83.0%, which led to a significant improvement in long-term survival after TIPS in 44 patients.

## Conclusion

1. The main method of stop recurrent bleeding from VVES in patients with portal hypertension is TIPS.
2. High mortality after implementation of public emergency operations at an altitude of bleeding stresses the need for the introduction of TIPS in the minutes introducing patients to emergency surgery.
3. TIPS is a type of porto-systemic shunt and can not be considered a definitive treatment for patients with liver cirrhosis complicated with portal hypertension.
4. Improving the long-term results of treatment in patients with portal hypertension may be after a liver transplant, but the TIPS application allows the patient to prolong life and to remain on the waiting list especially when the hepatic insufficiency class C.

## Consent

It is not applicable.

## Ethical approval

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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## Competing interests

Authors have declared that no competing interests exist.

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