Treatment of portal hypertension – TIPS

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Introduction

- in 90% patients with liver cirrhosis develops portal hypertension (Europe and North America)

- 50% of liver cirrhosis is alcoholic, 25% is due to viral hepatitis, 25 % - metabolic and idiopathic liver diseases.
Portal hypertension

- Most dangerous complication of portal hypertension is bleeding from varices
- Other complications are ascitis, encephalopathy, hepatorenal syndrome.
The main indications for TIPS are complications of portal hypertension:

1. bleeding from varices
2. refractory ascitis
History of TIPS (1stage)

- In 1969 Rosch and Hanafee described the technique in laboratory animals. The intrahepatic tract between the portal vein and hepatic vein was created using Teflon dilators and the connection was kept patent with a plastic tube.

- In 1983 Calapinto presented a group of patients in whom the procedure had been carried out with balloons (mainly 12mm diameter) without inserting any devices for stabilising the venous connection.

- As expected the patency rate and results were poor.
History of TIPS (2 stage)

- The experimental studies carried out by Palmaz, with prosthesis designed by him, finally allowed to perform TIPS in a safe and efficient manner. (1986)

- The first human cases with metallic stents presented by Richter (1989).
History of TIPS (3 stage)

- The patency rate dramatically increased with Viatorr stent (2004)
Examination before TIPS

- Anamnestic data
- Clinical status
- Blood tests
- Ultrasound examination
- Endoscopic studies
- CT
- Invasive measurement of gradient between portal and hepatic veins
Ultrasound examination

• Vena cava inferior, hepatic veins, portal veins: maximal speed (5-25 cm/s in PH), diameter (>13 mm in PH), blood flow direction
• Portosistemic collaterals
• Tumors
• Evaluation of ascitis
The intrahepatic tract between the portal vein and hepatic vein is created using balloon catheter and the connection was kept patent with a stent.

**TIPS procedure**
TIPS procedure

Jugular vein puncture
TIPS procedure

diagnostic catheter (5F) in hepatic vein

(through jugular vein, v.cava superior, right atrium, v.cava inferior).
TIPS procedure

Diagnostic catheter is exchanged with stiff (metal) catheter. Puncture set is introduced through stiff catheter and branch of portal vein is punctured (ultrasound or x-ray (CO2 guidance))
TIPS procedure

A guidewire is introduced in to v.portal vein
TIPS procedure

On the guide wire a balloon catheter is introduced and dilated (6mm)
TIPS procedure

Deployment of viatorr stent
TIPS procedure
TIPS procedure

Postdilatation with 8 mm balloon
TIPS procedure
TIPS procedure
TIPS procedure

Budd-chiary patient, puncture from v.cava inferior
TIPS procedure

Budd-chiary patient, stentgraft between v.cava and v.porte
Viatorr stent
Viatorr stent

Advantages of Viatorr

- Patency rate from 46% to 92%*
- Bleeding recurrence from 11% to 6%*
- Encephalopathy from 32% to 22%*

Complications

During procedure

- Liver capsule perforation
- Rupture of portal vein during angioplasty
- Tromboembolic complication
- Fistula with hepatic artery, bile duct
Complications

Postprocedural

- Encephalopathy
- TIPS thrombosis
- Heart failure, pulmonary edema
Patient management after TIPS

- Ultrasound examination of shunt patency after 6 weeks, 3, 6, 12 months.
- Angiography is performed when shunt dysfunction is suspected.
- If shunt patent - consultation of gastroenterologist and ultrasound examination performed every 6 months.
### Ultrasound examination

<table>
<thead>
<tr>
<th>N</th>
<th>PARAMETERS</th>
<th>NORMAL</th>
<th>DISFUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flow speed and direction in portal vein</td>
<td>• high speed (Vmax &gt;35m/s)</td>
<td>• V max &lt; 2/3 than normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• hepatopetal</td>
<td>• can be hepatofugal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• can be pulsating</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>V max. In shunt’s portal part</td>
<td>• &gt; 60 cm/s</td>
<td>• &lt; 50 cm/s (stenosis in midle or distal part)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• &lt; 220 cm/s</td>
<td>• &gt; 250 cm/s (stenosis in portal part)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• no flow (oclusion)</td>
</tr>
<tr>
<td>3</td>
<td>V max. In whole shunt</td>
<td>• &gt; 60 cm/s</td>
<td>• &gt; 250 cm/s (stenosis)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• &lt; 220 cm/s</td>
<td>• no flow (oclusion)</td>
</tr>
<tr>
<td>4</td>
<td>Flow direction in portal vein</td>
<td>retrograde (to TIPS)</td>
<td>antegrade</td>
</tr>
</tbody>
</table>
Ultrasound examination
Materials and methods

38 patients underwent TIPS during 5 years in Kaunas Medical University hospital
20 males, 18 females
Age 52±12.5, range 22-68
Materials and methods

Patient were treated for:

1. Refractory ascites n=24
2. Variceal bleeding n=14
Materials and methods

Underlying diseases:

- Alcoholism n=14
- Hepatitis n=13
- Budd-chiari syndrome n=3
- Wilson disease n=2
- Other n=6
Results

- PSG (portal-systemic gradient) was significantly reduced from $24\pm6.1\text{ mmHg}$ to $6.8\pm2.9\text{ mmHg}$

- 30-day mortality rate was $1/24$ (4.2%) for refractory ascite

- 30-day mortality rate was $5/14$ (35%) for variceal bleeding.
Results

- The shunts disfunction were in 5 patients (only 1 with Viatorr). Successful reinterventions were performed in these patients.

- 2 patients were transplanted
Conclusion

• TIPS procedure is effective treatment of portal hypertension

• Use of dedicated stentgraft increases shunt patency and decreases reintervention rate.

• TIPS procedure is bridge to liver transplantation