“Tips and tricks for TIPS”

Prof. Dr. Boris Radeleff,
University of Heidelberg
Disclosure

Speaker name: Boris Radeleff

I have the following potential conflicts of interest to report:

- [x] Consulting: BSCI, Cook
- [ ] Employment in industry
- [ ] Stockholder of a healthcare company
- [ ] Owner of a healthcare company
- [ ] Other(s)

- [ ] I do not have any potential conflict of interest
Agenda

• Which material for the TIPS tract?
• Immediate TIPS after first oesoph. variceal bleeding?
• Hepatic encephalopathy after TIPS – what now?
• Budd-chiari: go for TIPS?
Our Problem in BMS-TIPS was the Re-Stenosis
GORE VIATORR™ TIPS Endoprosthese
Creation of Transjugular Intrahepatic Portosystemic Shunts with Stent-Grafts: Initial Experiences with a Polytetrafluoroethylene-covered Nitinol Endoprosthesis

PURPOSE: To evaluate the safety and performance of a recently developed expanded polytetrafluoroethylene (ePTFE)-covered nitinol stent-graft to create trans-

GASTROENTEROLOGY 2004;126:469–475

Improved Clinical Outcome Using Polytetrafluoroethylene-Coated Stents for TIPS: Results of a Randomized Study

CHRISTOPHE BUREAU,* JUAN CARLOS GARCIA–PAGAN,+ PHILIPPE OTAL,§ GILLES POMIER–LAYARGUES,‖ VALÉRIE CHABBERT,§ CARLOS CORTEZ,+ PIERRE PERREAULT,‖ JEAN MARIE PÉRON,* JUAN G. ABRALDES,+ LOUIS BOUCHARD,‖ JOSÉ IGNACIO BILBAO,‖ JAUME BOSCH,+ HERVÉ ROUSSEAU,§ and JEAN PIERRE VINUEL*
Heidelberg Results:
10 years

Study intervall 108 months


Studygroup 1: (BMS, Palmaz, Johnson & Johnson, USA)
116 patients (avg. age 57.0±11.1 years)

Studygroup 2: (Stentgrafts, Viatorr, Gore, USA)
58 patients (avg. age 53.5±16.1 years)
PTFE-covered Viatorr:

• Improvement of the primary patency rate (62.4 vs. 43.9%*)
• 1. TIPS-revision is later necessary (288.3 vs. 180.1 days*)
• Lower number of necessary TIPS-revisions (0.7 vs. 1.2*)

Trend for the Viatorr vs. the BMS for improved clinical results without an higher rate of hepatic encephalopathy (37.5% vs. 36.5%)

*statistical significant difference (p<0.05)
4 x Tips & Tricks

- Unstented hepatic veins are a potential problem...
- What is your goal PSG using PTFE-Stentgraft?
- Don‘t lower the PSG too much
- Identify the best patients
Nearly all patency loss in trials was in unstented hepatic veins.
A Target PSPG below 12 mmHg but above 10 mmHg after TIPS is Optimal

![Graph showing Porto-Systemic Pressure Gradient (mm Hg)](image)

- Porto-Systemic Pressure Gradient (mm Hg)
- 12 mmHg
- 10 mmHg

Bleeding, Ascites, HE, No Events

GORE® VIATORR® TIPS Endoprosthesis:

Follow strict pre- & post-dilatation strategy & best diameter
GORE® VIATORR® TIPS Endoprosthesis with controlled Expansion

10 mm VIATORR® devices

8-10 mm VIATORR® w/ CX devices
Early TIPS vs medical treatment in patients with HVPG > 20 mmHg

Probability of survival

Monescillo et al., Hepatology 2004; 40:793
Agenda

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• Budd-chiari: go for TIPS?
Early Use of TIPS in Patients with Cirrhosis and Variceal Bleeding

Juan Carlos García-Pagán, M.D., Karel Caca, M.D., Christophe Bureau, M.D.,
Wim Laleman, M.D., Beate Appenrodt, M.D., Angelo Luca, M.D.,
Juan G. Abraldes, M.D., Frederik Nevens, M.D., Jean Pierre Vinel, M.D.,
Joachim Mössner, M.D., and Jaime Bosch, M.D., for the Early TIPS
(Transjugular Intrahepatic Portosystemic Shunt) Cooperative Study Group

Screening and randomisation of patients

359 Patients were admitted for acute variceal bleeding

296 Were excluded
- 18 Declined to participate
- 72 Were in Child–Pugh Class A
- 40 Were in Child–Pugh Class B, but did not have active bleeding at endoscopy
- 18 Had Child–Pugh score >13 points
- 22 Had isolated gastric variceal bleeding
- 18 Had previous TIPS or drugs+EBL
- 17 Were older than 75 yr
- 34 Had hepatocellular carcinoma
- 20 Had portal-vein thrombosis
- 9 Had renal failure
- 6 Had prehepatic portal hypertension
- 22 Had other reasons

63 Underwent randomization

31 Were assigned to receive drugs+EBL and were included in the analysis

32 Were assigned to receive early TIPS and were included in the analysis

Garcia-Pagan et al., NEJM 2010, 362;25

The Benefit of TIPS / Early TIPS vs Drug & EBL freedom from bleeding
Table 2. Summary of Efficacy Measurements.*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pharmacotherapy–EBL Group (N=31)</th>
<th>Early-TIPS Group (N=32)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite end point reached (no. of patients)</td>
<td>14</td>
<td>1</td>
<td>0.001</td>
</tr>
<tr>
<td>Child–Pugh classification†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class B</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Class C</td>
<td>9</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Treatment failure at 5 days‡</td>
<td>4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Rebleeding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;5 days–6 wk</td>
<td>7</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>&gt;6 wk–1 yr</td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Minor rebleeding (no. of patients)</td>
<td>3</td>
<td>1</td>
<td>0.35</td>
</tr>
<tr>
<td>Gastric ulcer</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Portal hypertensive gastropathy</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Varices</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Post-EBL ulcer</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Days in intensive care unit (no.)</td>
<td>8.6±9</td>
<td>3.6±4</td>
<td>0.01</td>
</tr>
<tr>
<td>Orthotopic liver transplantation (no. of patients)</td>
<td>7</td>
<td>4</td>
<td>0.57</td>
</tr>
<tr>
<td>Death (no. of patients)</td>
<td>12</td>
<td>4</td>
<td>0.01</td>
</tr>
<tr>
<td>Child–Pugh classification</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class B</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Class C</td>
<td>10</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cause of death</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recurrent bleeding</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sepsis</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Liver failure</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Hepatorenal syndrome</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Time in hospital (% of follow-up)</td>
<td></td>
<td></td>
<td>0.014</td>
</tr>
<tr>
<td>Median</td>
<td>15</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Interquartile range</td>
<td>5–100</td>
<td>2–13</td>
<td></td>
</tr>
</tbody>
</table>

Early PTFE-TIPS vs. Drug+EBL.
Freedom from acute variceal bleeding or rebleeding

Garcia-Pagan et al., NEJM 2010, 362;25
Early PTFE-TIPS vs. Drug+EBL

Overall survival

*7 patients in the STD group were treated with TIPS as rescue therapy: 4 (57%) died early after (all Child C)

Garcia-Pagan et al., NEJM 2010, 362;25
Early TIPS. Post RCT Surveillance Study
Rx Failure And/Or Prevention Of Rebleeding

Garcia-Pagán et al. J Hepatol 2012

<table>
<thead>
<tr>
<th>Time (months)</th>
<th>Medical group</th>
<th>Early-TIPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>45</td>
<td>26</td>
</tr>
<tr>
<td>6</td>
<td>30</td>
<td>16</td>
</tr>
<tr>
<td>12</td>
<td>26</td>
<td>14</td>
</tr>
<tr>
<td>18</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>24</td>
<td>11</td>
<td>5</td>
</tr>
</tbody>
</table>

p<0.001
Baveno V

Treatment of Acute Bleeding

Current statement

“An early TIPS within 72 hrs (ideally < 24 hours) should be considered in patients at high-risk of treatment failure (e.g. Child-Pugh class C but <14 points or Child class B with active bleeding) after initial pharmacological and endoscopic therapy.”

(1b;A)
Agenda

• Which material for the TIPS tract?
• Immediate TIPS after first oesoph. variceal bleeding?
• **Hepatic encephalopathy after TIPS – what now?**
• Budd-chiari: go for TIPS?
Late Complication after TIPS

- **Old data:** Hepatic encephalopathy (HE) 23-50%\(^1\)

- **New data:** approximately 3–7 % of pat. with TIPS develop HE\(^2\)

- 30-50% of inpatient stay after TIPS are because of HE

  (but refractory to medical treatment are **only** 3-5%)

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\(^1\)Christof M. Sommer et al. Eur J Radiol. 2012 Sep;81(9):2273-8

\(^2\)Pereira K et al; Cardiovasc Intervent Radiol. 2016 Feb;39(2):170-82
A Technique for Controlled Partial Closure of a Transjugular Intrahepatic Portosystemic Shunt Tract in a Patient with Hepatic Encephalopathy

Study design:

Six patients

- 3 male; 3 female
- mean age 60 years
- clinical indication:
  hepatic encephalopathy & acute liver failure

Etiology liver cirrhosis

- hepatitis
- alcohol
- idiopathic

### Results

<table>
<thead>
<tr>
<th>Success</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>technical</td>
<td></td>
</tr>
<tr>
<td>hemodynamic</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PSG (mean)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5.7 mmHg (3-12)</td>
<td>before TIPSS reduction</td>
</tr>
<tr>
<td>14.3 mmHg (7-21)</td>
<td>after TIPSS reduction</td>
</tr>
<tr>
<td>8.7 mmHg (2-16)</td>
<td>increase</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>30-d mortality</th>
<th>6-months survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>33% (n=2*)</td>
<td>66% (n=4**)</td>
</tr>
</tbody>
</table>

In 2 patients, an additional balloon dilatation was performed to modify PSG.

In 1 patient a variceal embolisation after TIPSS reduction was performed.

*multiorgan failure and sepsis

**HE dropped to grade 0 (n=2) or 0-1 (n=2)

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TIPS for Budd-Chiari Syndrome: Long-Term Results and Prognostics Factors in 124 Patients

JUAN CARLOS GARCIA-PAGÁN,* MATHIS HEYDMANN,‡ SEBASTIAN RAFFA,* AURÉLIE PLESSIER,§ SARWA MURAD,‖ FEDERICA FABRIS,*, GIOVANNI VIZZINI,*, JUAN GONZALES ABRALDES,* SIMON OLLIFF,‡ ANTONIO NICOLINI,‖ ANGELO LUCA,*, MASSIMO PRIMIGNANI,† HARRY L. A. JANSSEN,‖ DOMINIQUE VALLA,§ ELWYN ELIAS,‡ and JAUME BOSCH* on Behalf of the BCS-TIPS Group
In conclusion, in experienced hands, TIPS is an extremely useful therapy for most BCS patients in whom medical treatment or recanalization fails. It may improve survival and should therefore be considered the treatment of choice.
HD Experiences with BCS-TIPS

• 20 patients with acute, sub acute or chronical BCS
• 12 patients with acute BCS, 8 sub acute or chronical BCS
• 16 female & 4 male pat.; age 34 ± 12 Jahre (14-60 y)
• 13 Pat. got a TIPS, 4 LTPL, 2 needed only a symptomatical therapy and 1 pat. died immediately due to liver failure
• TIPS patients needed 2.5 ± 2.4 revisions.
• 1 TIPS-pat. died due to his underlying haematological disease
HD Experiences with BCS-TIPS

- The surviving 12 patients after TIPS showed a stable liver function and don’t need a LTPL.
- All 4 patients after LTPL (as initial therapy) needed a Re-LTPL due to thrombembolic complications of the liver.
- The survival in the TIPS group was 92.3% and in the LTPL group 75% at a median follow-up of 4 and 11.5 years, respectively.

Alexandra Zahn et al. BMC Gastroenterology 2010, 10:25
HD Experiences with BCS-TIPS

- Rotterdam Score (S.D. Murad et al. 2004)
- Improved risk prediction by J.C. Garcia-Pagan.

Predictors for a liver-transplantation-free survival after TIPS: Serumbilirubin, age and INR.

BCS-TIPSs formula: age (years) $\times 0.08 + \text{Bilirubin (mg/dl)} \times 0.16 + \text{INR} \times 0.63 = \text{Score}$

Score >7, high probability for mortality after TIPS-procedure or need for a liver transplantation
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• Contraindications? News
# Table 2. Contraindications to Placement of a TIPS

<table>
<thead>
<tr>
<th>Absolute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestive heart failure</td>
</tr>
<tr>
<td>Multiple hepatic cysts</td>
</tr>
<tr>
<td>Uncontrolled systemic infection or sepsis</td>
</tr>
<tr>
<td>Unrelieved biliary obstruction</td>
</tr>
<tr>
<td>Severe pulmonary hypertension</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatoma especially if central</td>
</tr>
<tr>
<td>Obstruction of all hepatic veins</td>
</tr>
<tr>
<td>Portal vein thrombosis</td>
</tr>
<tr>
<td>Severe coagulopathy (INR &gt; 5)</td>
</tr>
<tr>
<td>Thrombocytopenia of ≤ 20,000/cm³</td>
</tr>
<tr>
<td>Moderate pulmonary hypertension</td>
</tr>
</tbody>
</table>

*HEPATOLOGY, January 2010*
Cardiac volume overload and pulmonary hypertension in long-term follow-up of patients with a transjugular intrahepatic portosystemic shunt


Aim
To evaluate the long-term cardiopulmonary outcome after TIPSS.

Methods
We evaluated cardiopulmonary parameters including echocardiography during long-term follow-up after TIPSS. Results at 1–5 years after TIPSS were compared to those of cirrhotic controls. Pulmonary hypertension (PH) diagnoses rates were included. Endothelin 1, thromboxane B₂ and serotonin were measured.

Conclusions
TIPSS placement is accompanied by long-term cardiovascular changes, including cardiac volume overload, and is associated with an increased rate of pulmonary hypertension. The need for regular cardiac follow-up after TIPSS requires further evaluation.
• Child-Pugh score >13 Punkte (HD 12)
• MELD >15 bis 18 (HD 24)
• Serumbilirubin >4.0 mg/dL (HD 3)
Other Influencing Factors

Salerno et al.
“Tips and tricks for TIPS”

Prof. Dr. Boris Radeleff,
University of Heidelberg