Sustained Bacteremia Associated with Transjugular Intrahepatic Portosystemic Shunt (TIPS)

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Transjugular intrahepatic portosystemic shunt (TIPS) has become a routine procedure in the treatment of complications of portal hypertension. Currently, the accepted indications for TIPS are acute and recurrent variceal bleeding that is unresponsive to medical therapy and sclerotherapy [1]. Reports of several studies that document the efficacy of TIPS in these situations have led to its widespread use [2].

The TIPS procedure involves creation of a portosystemic tract within the liver parenchyma. This is done percutaneously via the jugular vein with fluoroscopic guidance. Patency of the tract is maintained by placement of an expandable metal stent made of a super-alloy monofilament wire (figure 1).

Infectious complications of this procedure have been reported infrequently. One series described post-TIPS fever in ~10% of patients [3]. There are few data, however, that address late infectious complications, such as stent infection with or without associated bacteremia [4, 5]. We undertook this study to determine the incidence of sustained bacteremia attributable to TIPS infection, and to describe the epidemiology, clinical spectrum, and outcome of TIPS-related bacteremia.

Methods

A radiology database was reviewed to identify all patients who underwent TIPS placement at Thomas Jefferson University Hospital from 30 January 1992 to 30 January 1999. Microbiology and discharge databases were then used to identify those patients who underwent TIPS and subsequently developed bacteremia. Sustained bacteremia was defined as 2 cultures of blood, drawn >12 h apart, that were positive for the same organism; or all of 3, or a majority of 4 or more blood cultures that were positive for the same organism (first and last cultures drawn at least 1 h apart) [6]. A case patient was defined as one with sustained bacteremia who had no other identifiable source of bacteremia despite a thorough evaluation. Demographic and clinical data were collected from the review of charts.

Results

A total of 99 TIPS were performed at Thomas Jefferson University Hospital from 30 January 1992 to 30 January 1999. The Boston Scientific Wallstent (Boston Scientific, Natick, MA), the only FDA-approved stent for TIPS, was used for all procedures. Techniques of the procedure remained constant throughout the study period. Antibiotic prophylaxis (cefotaxime and vancomycin) was generally administered before the procedure. Of the patients who received TIPS, 65 (65%) were male; the median age of patients was 57 years (range, 19–80 years), and the median duration of follow-up was 3.8 years (range, 0.1–7 years).

Of the 99 patients, 35 developed bacteremia after receiving the TIPS. Twenty patients did not meet the definition for sustained bacteremia and were excluded. Five patients developed bacteremia after liver transplantation and were excluded, since the stent is removed at the time of transplant. Ten patients developed sustained bacteremia, 5 of whom had probable sources of bacteremia identified (central line infection, hepatic abscess, peritonitis, empyema, and osteomyelitis). Five patients had sustained bacteremia without an identifiable focus of in-
infection (case patients). These 5 were all male, and their median age was 64 years (range, 51–70 years). They had a median of 4 positive blood cultures (range, 3–12 positive cultures). They developed bacteremia a median of 100 days after TIPS was performed (range, 6–732 days). Bacteremia resolved a median of 3 days after initiation of antibiotics (range, 1–5 days). Table 1 summarizes the clinical and microbiologic characteristics of the case patients.

Extensive evaluation was negative for potential sources of infection for each case patient; evaluation included transesophageal echocardiography, abdominal imaging, paracentesis, chest radiography, urine culture, and central venous catheter tip culture. For 3 of these patients, ultrasonography of the TIPS stent at the time of bacteremia revealed a patent stent; 2 patients had stents completely occluded by thrombus, which required placement of a second adjacent stent.

Patient 1 (Enterococcus faecalis) received 2 weeks of iv vancomycin and gentamicin therapy and was discharged to his home. He returned to our facility 3 years later with an occluded TIPS stent but no further evidence of bacteremia. Patient 2 (Gemella morbillorum) received 2 weeks of iv vancomycin, was discharged to home, and was lost to follow-up. Patient 3 (Staphylococcus aureus) received iv vancomycin, but died of multiorgan failure 5 days after the institution of antibiotic therapy. Five sets of cultures of blood obtained before death were negative. Patient 4 (Lactobacillus acidophilus) received 6 weeks of iv ampicillin and gentamicin therapy; 2 sets of surveillance blood cultures performed 2 weeks after completion of antibiotic therapy were negative. He died of hepatorenal syndrome ~1 year later, without evidence of recurrent bacteremia. Patient 5 (L. acidophilus) received 4 weeks of iv ampicillin therapy, with multiple negative blood cultures both during and after completion of therapy; he died of multiorgan failure 2 weeks after completion of therapy.

Table 1. Clinical and microbiologic characteristics of patients with sustained bacteremia associated with receiving a transjugular intrahepatic portosystemic shunt (TIPS).

<table>
<thead>
<tr>
<th>Patient no.</th>
<th>Liver disease</th>
<th>Child class</th>
<th>Reason for TIPS</th>
<th>Performed emergently</th>
<th>Antibiotic prophylaxis</th>
<th>Days after TIPS placed</th>
<th>Organism</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alcohol related</td>
<td>A</td>
<td>GI bleeding</td>
<td>Y</td>
<td>N</td>
<td>60</td>
<td>Enterococcus faecalis</td>
</tr>
<tr>
<td>2</td>
<td>Sclerosing cholangitis</td>
<td>A</td>
<td>GI bleeding</td>
<td>Y</td>
<td>Y</td>
<td>6</td>
<td>Gemella morbillorum</td>
</tr>
<tr>
<td>3</td>
<td>Hepatitis B and C, alcohol related</td>
<td>B</td>
<td>Ascites</td>
<td>N</td>
<td>Y</td>
<td>100</td>
<td>Staphylococcus aureus</td>
</tr>
<tr>
<td>4</td>
<td>Hepatitis C, alcohol related</td>
<td>C</td>
<td>Ascites</td>
<td>N</td>
<td>Y</td>
<td>146</td>
<td>Lactobacillus acidophilis</td>
</tr>
<tr>
<td>5</td>
<td>Alcohol related</td>
<td>C</td>
<td>GI bleeding</td>
<td>Y</td>
<td>Y</td>
<td>732</td>
<td>L. acidophilus</td>
</tr>
</tbody>
</table>

NOTE. Antibiotic prophylaxis, iv vancomycin and cefotaxime before placement of TIPS; emergent, TIPS placed within 24 h of presentation; GI, gastrointestinal.

Discussion

Given the paucity of data regarding TIPS stent infection, we evaluated 99 patients who underwent this procedure at our institution over a 7-year period. The estimated annual incidence of sustained bacteremia associated with TIPS placement was 7/1000 procedures performed. It is difficult to verify true stent infection without removal and microbiological evaluation of the stent itself, but the combination of sustained bacteremia and the absence of an alternate source of infection strongly supports stent infection.

The organisms isolated in these cases were predominantly of enteric origin. This finding was not surprising, since the gastrointestinal tract has previously been identified as an important source of bacteremia in patients with cirrhosis [7]. The presence of S. aureus was unexpected and probably is not related to insertion of the stent, given the long delay in onset of bacteremia.

The median interval between placement of TIPS and sustained bacteremia was >3 months. Other reports of possible TIPS stent infections have noted a similar time between the procedure and the onset of bacteremia [4, 5]. One explanation for this long interval may involve formation of thrombus within the stent, which results from collagen deposition and/or narrowing of the lumen of the stent [8]. The late development of stent infection may have resulted from a delay in deposition of sufficient amounts of collagen to interrupt flow, although only 2 patients had ultrasonographic demonstration of thrombus.

In all 5 cases, therapy consisted of appropriate iv antibiotics. Upon initiation of antibiotic therapy, bacteremia resolved quickly in all cases. However, the duration of therapy varied widely, ranging from 2 to 6 weeks. On the basis of these results,
it is difficult to make a recommendation regarding appropriate duration of antibiotic therapy in sustained bacteremia associated with TIPS. A conservative approach would be to provide treatment for TIPS infection that is similar to that for other endovascular infections involving prosthetic material, such as prosthetic-valve endocarditis [9].

This study has several limitations. It is retrospective and evaluates patients at a single institution. Technique, prophylaxis, and patient population may vary significantly at other institutions or regionally. Secondly, stent infection can only be confirmed with stent removal, either at autopsy or at liver transplantation. Neither were performed in any of our patients. Finally, the possibility of cardiac vegetations could not be entirely excluded. Although transthoracic echocardiography was negative for cardiac vegetations in these patients, these results do not entirely exclude the diagnosis of endocarditis.

The incidence of sustained bacteremia associated with TIPS infection appears low. However, it is likely that TIPS will be performed more frequently in the future. The number of complications from chronic liver disease, such as portal hypertension, is expected to increase during the next 10–20 years, mainly as a result of chronic hepatitis C infection [10]. Additional indications for using TIPS may also be forthcoming [1]. Therefore, more information will be needed to further define sustained bacteremia associated with TIPS, as well as to develop appropriate treatment recommendations for this entity.

References