Interventional radiologic procedures in liver transplantation

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Abstract  Postoperative biliary and vascular complications contribute significantly to morbidity and mortality in liver transplantation. Interventional radiologists are an integral part of the multidisciplinary team necessary for optimizing the management of these complications. During a 15-year period, 39 cadaveric and 25 living related liver transplantations were performed at the Chang Gung Memorial hospital, Taiwan. Of 64 liver transplant recipients, 9 (3 adult and 6 pediatric) underwent 13 interventional radiological procedures for the treatment of biliary sludge-casts (n = 2), bile duct occlusion or stenosis (n = 2), hepatic veins thrombosis (n = 1), hepatic veins stenosis (n = 1), portal vein stenosis with splenorenal shunting (n = 1), biloma (n = 1), and infected fluid collection or ascites (n = 4). Antegrade or retrograde interventional approach was used to successfully treat all biliary complications, and all percutaneous drainage procedures were effective in the control of intra-abdominal fluid collections. Portal vein stenosis was treated by balloon dilatation, and the associated splenorenal shunt was closed by metallic coil embolization via transhepatic catheterization of the portal vein. Hepatic vein stenosis was effectively treated by balloon dilatation and expandable metallic stent deployment via transfemoral and jugular venous approaches, respectively. Hepatic vein thrombosis was only partially lysed by transvenous streptokinase administration, and surgical thrombectomy was needed to achieve complete recanalization. The total success rate of the interventional procedures was 92% with no procedure-related complications. The overall survival rate in this series is 89%, and all patients who underwent living related liver transplantation maintain to date a 100% survival rate. We can conclude that interventional radiological procedures are very useful for managing biliary and vascular complications after liver transplantation. These techniques provide a cure in most situations, thus obviating the need for further surgical intervention or re-transplantation.

Keywords  Liver transplantation  ·  Postoperative complication  ·  Bile duct  ·  Hepatic vein  ·  Hepatic artery  ·  Portal vein

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Introduction

Liver transplantation has become an important option in the management of end-stage liver disease. The combination of recent improvements in operative technique, immunosuppression, and organ utilization has contributed to better posttransplant outcomes. However, biliary and vascular complications are still significant causes of graft failure in liver transplantation, especially in pediatric cases. The incidence of hepatic artery thrombosis has been reported to be 4% in adults and 12% in pediatric cases. In children under 1 year of age, the rate rises up to 30% and is the most common indication for retransplantation in this age group [8, 16, 18]. Reduced-size liver transplants are associated with increased rates of biliary complications, and it has been suggested that most of these complications can be handled non-operatively [1, 11]. Interventional radiologists are an integral part of the multidisciplinary team necessary in the optimization of the management of these complications [1]. In this study we report our experience with posttransplant vascular and biliary complications and their treatment, applying interventional radiological procedures.

Materials and methods

From March 1984 to May 1999, 64 liver transplantsations were performed at Chang Gung Memorial Hospital in Taiwan. These 39 cadaveric and 25 living related liver transplantsations were carried out in 27 adult and 37 pediatric recipients. The underlying diseases in the adult patients were Wilson’s disease (n = 12), hepatitis B cirrhosis (n = 5), hepatitis C cirrhosis (n = 4), hepatoma (n = 2), Budd-Chiari syndrome (n = 1), choledochal cyst (n = 1), autoimmune disease (n = 1) and primary biliary cirrhosis (n = 1). They underwent cadaveric whole liver transplantation (n = 26) and living related liver transplantation (n = 1). Among the 37 pediatric recipients, the indications for transplantation were biliary atresia (n = 33), glycogen storage disease (n = 3) and Wilson’s disease (n = 1). The liver transplantation procedures performed were: living related (n = 24), full-sized cadaveric (n = 5), reduced-size (n = 5), and split (n = 3). All patients with biliary atresia had undergone at least one Kasai operation in their early infancy. A total of 9 (3 adult and 6 pediatric) of the 64 liver transplant recipients underwent 13 interventional radiological procedures for the treatment of biliary sludge cast or stone (n = 2), bile duct occlusion or stenosis (n = 2), hepatic vein thrombosis (n = 1), hepatic vein stenosis (n = 1), portal vein narrowing with splenorenal shunting (n = 1), biloma (n = 1), and infected fluid collection or ascites (n = 4).

Results

Results per case are summarized in Table 1.

Biliary complications and intra-abdominal fluid collections

All the biliary complications were detected by Doppler ultrasound, while the exact location of the lesions was confirmed by computed tomography and cholangiogra-

<table>
<thead>
<tr>
<th>No. of</th>
<th>Complications</th>
<th>Sex /Age</th>
<th>Indication of LT</th>
<th>Type of LT</th>
<th>Interventional radiologic procedures</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Biliary sludge cast</td>
<td>F/18y</td>
<td>Wilson’s</td>
<td>OLT</td>
<td>Extraction of biliary sludge-casts through T tube</td>
<td>Survived 3 years Died of traffic accident Alive</td>
</tr>
<tr>
<td>2</td>
<td>Common bile duct stone</td>
<td>F/24y</td>
<td>Wilson’s</td>
<td>OLT</td>
<td>Extraction of common bile duct stone through T tube PTBD, dilatation external-internal drainage</td>
<td>Alive</td>
</tr>
<tr>
<td>3</td>
<td>Multiple biliary stenosis</td>
<td>F/1y2m</td>
<td>Biliary atresia</td>
<td>LRLT</td>
<td>1. PTBD, dilatation 2. Percutaneous biloma drainage</td>
<td>Alive</td>
</tr>
<tr>
<td>4</td>
<td>Bile duct occlusion</td>
<td>F/1y4m</td>
<td>Biliary atresia</td>
<td>LRLT</td>
<td>Percutaneous drainage</td>
<td>Alive</td>
</tr>
<tr>
<td>5</td>
<td>Intestinal perforation with infected fluid collection</td>
<td>M/2y5m</td>
<td>Biliary atresia</td>
<td>RSLT</td>
<td>Percutaneous drainage</td>
<td>Died of B cell lymphoma Alive</td>
</tr>
<tr>
<td>6</td>
<td>Intestinal perforation with infected fluid collection</td>
<td>M/2y7m</td>
<td>Biliary atresia</td>
<td>RSLT</td>
<td>1. Thrombolytic therapy 2. Percutaneous drainage</td>
<td>Died of sepsis</td>
</tr>
<tr>
<td>8</td>
<td>2. Splenorenal shunt</td>
<td>M/2y11m</td>
<td>Biliary atresia</td>
<td>SLT</td>
<td>1. Dilatation &amp; metallic stent deployment 2. Percutaneous drainage</td>
<td>Died of multiple organ failure Alive</td>
</tr>
<tr>
<td>9</td>
<td>1. Hepatic veins stenosis</td>
<td>M/17y</td>
<td>Wilson’s</td>
<td>LRLT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Massive ascites</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>