Evaluation of Safety and Efficacy of Liver Biopsy Following Liver Transplant

Mahir Kırnap,1 Aydincan Akdur,1 Nihan Haberal Reyhan,2 Cüneyt Aytekin,3 Ali Harman,3 Sedat Yıldırım,1 Gökhan Moray,1 Mehmet Haberal1

Abstract

Objectives: Liver biopsy is a diagnostic tool for liver pathology after liver transplant. However, biopsy can cause life-threatening complications. There is limited knowledge about efficacy and complications of liver biopsy after liver transplant. Our aim was to evaluate the risk and benefit of liver biopsy after liver transplant and quality of biopsy specimens.

Materials and Methods: We retrospectively analyzed all liver biopsies performed after liver transplant between January 2000 and October 2014. All patients were monitored for minimum 24 hours after biopsy.

Results: We performed 245 liver biopsies in 159 liver transplant patients. Fifteen biopsies (6%) were nondiagnostic. In the samples, there were 102 cases (41%) of acute rejection, 79 cases (35%) of cholangitis, and 49 cases (20%) of cholestasis observed. Complications after biopsy were seen in 23 patients (9%) and biopsies. There were 7 patients who had severe abdominal pain followed by fever. We diagnosed 4 patients who had intercostal/subcapsular bleeding and 12 patients who had vasovagal reaction. All patients were treated with analgesic agents and monitored for 24 hours. No blood transfusion or surgery was required.

Conclusions: Liver biopsy after liver transplant is an invasive diagnostic tool for liver pathology. However, it can be used safely in experienced centers.

Key words: Complication, Hepatic failure, Treatment, Vasovagal reaction

Introduction

Liver biopsy is a diagnostic tool for liver pathology after liver transplant. Since the 1980s, the number of image-guided percutaneous procedures, including tissue biopsies and fluid aspirations, has markedly increased despite the advances in imaging techniques and serologic investigations. In many liver diseases, liver biopsy still is the best option to make the diagnosis, determine prognosis, and assist in determining the treatment plan. The increased popularity of liver biopsy is because it is less invasive and has lower risk than surgery, has high diagnostic accuracy, and is cost effective.1,2

Although liver biopsy is an easy procedure for hospitalized patients and outpatients, some complications or technical failures may occur in 5% patients, including pain that causes hospital admission, bleeding that necessitates transfusion or surgery, pneumothorax, failure to obtain tissue, and obtaining other tissues.3-5 However, attempts should be made to increase safety and decrease complications of liver biopsy.2,5 There is a statistically significant decrease in the complication rate of liver biopsy when performed with ultrasonography guidance.6-8 However, biopsy can cause life-threatening complications. There is limited knowledge about the efficacy and complications of liver biopsy following liver transplant.

Ultrasound-guided percutaneous random core needle biopsy of the liver is considered a safe and effective procedure.9 The procedure is important in the characterization and treatment of patients...
with liver disease, and it is used routinely to assess rejection in liver transplant recipients. Therefore, data regarding efficacy and safety are becoming more important in achieving national patient safety goals.

Our aim was to evaluate the complications and quality of biopsy specimens obtained by percutaneous liver biopsy using a commercially available biopsy needle in patients after liver transplant who were scheduled for treatment in our center.

Materials and Methods

Patients
We retrospectively analyzed all liver biopsies performed after liver transplant between January 2000 and October 2014. All patients were monitored for minimum 24 hours after biopsy. There were 245 liver biopsy procedures in 159 patients that were performed under real-time ultrasonography guidance. In these 245 procedures, 125 biopsies (51%) were performed in men and 120 biopsies in women (49%).

Biopsy protocol
All ultrasound-guided percutaneous random core needle biopsies of the liver in our institution were performed using a standardized protocol and guidelines (Figure 1). These guidelines adhered to the practice guideline for the performance of image-guided percutaneous needle biopsy. Patients undergoing percutaneous biopsy were required to have an international normalized ratio < 1.5 and platelet count > 50 ×10⁹/L. When the platelet count was < 50 ×10⁹/L, patients received transfusion before and during the procedure.

Informed consent for the procedure was obtained from all patients. An access route to the liver was identified using ultrasonography, choosing a subcostal route whenever possible; an epigastric route into segment II, III, or IV, or a right subcostal route, was preferred to an intercostal route. Intravenous conscious sedation was given to all patients who were hemodynamically stable; conscious sedation was not given to hemodynamically unstable patients or patients who declined conscious sedation. All biopsies were performed after administration of local anesthetic (1% lidocaine mixed with epinephrine, 8 parts, and sodium bicarbonate, 2 parts) at the intended puncture site with a 25-gauge needle and along the needle tract with a 22-gauge spinal Boston Scientific needle. Any hemorrhage after the procedure was documented; diagnosis of hemorrhage after the procedure was made by ultrasonography or computed tomography (CT) in all cases. The CT scan or ultrasonogram was performed at the discretion of the attending radiology staff, only after a patient complained of pain or had unstable vital signs, and we do not know the number of patients who had asymptomatic hemorrhage. Infection was suspected and recorded as a complication when the patient had febrile symptoms or sepsis after the procedure.

Results
We performed 245 liver biopsies in 159 liver transplant patients. There were 15 biopsies (6%) that were reported as insufficient. All biopsy procedures were performed on liver transplant recipients who had elevated liver function tests at biopsy.

There were 102 biopsies (41%) that showed acute rejection, 79 biopsies (35%) with cholangitis, and 49 biopsies (20%) with cholestasis. Complications after biopsy were observed after 23 biopsies (9%). There were 7 patients who had severe abdominal pain that was followed by fever. We diagnosed 4 patients with intercostal/subcapsular bleeding and 12 patients with vasovagal reaction. All patients were treated with analgesic agents and monitored for 24 hours. No blood transfusion or surgery was required (Table 1).

Table 1. Complications of Liver Biopsy After Liver Transplant

<table>
<thead>
<tr>
<th>Complications</th>
<th>No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal pain</td>
<td>7</td>
</tr>
<tr>
<td>Fever</td>
<td>7</td>
</tr>
<tr>
<td>Intercostal/subcapsular bleeding</td>
<td>4</td>
</tr>
<tr>
<td>Vasovagal reaction</td>
<td>12</td>
</tr>
</tbody>
</table>

*N = 23 patients. Data reported as number.
Discussion

Although noninvasive imaging of the liver, such as CT and magnetic resonance imaging, can identify liver transplant rejection or other diffuse liver disorders, random percutaneous core needle biopsy of the liver is important to detect and characterize liver disease. Patients seen immediately before or after liver transplant often are anxious, and a procedure is important that is quick, safe, and requires minimal monitoring after the procedure.12

Although the liver has a rich vascular supply, complications associated with percutaneous liver biopsy are rare when the procedure is guided by ultrasonography. The most frequent major complications of liver biopsy after liver transplant are hemorrhage and biliary leakage. Other complications include hemobilia, organ injury, arteriovenous fistula, and septic shock. Piccinino and associates investigated 68,276 biopsies in 10 years, and the major complications were shock, pneumothorax, hemoperitoneum, and biliary peritonitis.12 In our study, no major complication occurred. In accordance with our study, the most frequent complaint after biopsy was pain at the biopsy site and/or pain at the right shoulder, probably due to irritation of the right hemidiaphragm.

According to previous studies, specialized cutting needles (ie, Tru-Cut) are associated with a higher complication risk compared with aspirating needles because they remain longer distance the liver during the procedure.12 However, as our study confirmed, ultrasonography-guided liver biopsy is safe and effective when performed by an experienced operator.

Some studies have recommended that the specimen should have a minimum length of 15 mm and should include 4 to 6 portal areas. However, other studies have suggested that the ideal specimen should have minimum length 40 mm and include minimum 2 pieces with a minimum 8 portal areas in each piece.13,14 In our study, the average biopsy specimen size was 17 mm and included a minimum 8 portal areas in each piece. Another important issue is the location of the biopsy. When the biopsy specimen was < 0.5 cm or a necrotic core was obtained, the biopsy was repeated.

In conclusion, outpatient ultrasonography-guided percutaneous liver biopsy with a specialized cutting (Tru-Cut) biopsy needle is an effective, safe, and cost-effective procedure that is performed primarily by radiologists. The percutaneous ultrasonography-guided liver biopsy after liver transplant should be performed in all indicated cases by an experienced operator. Liver biopsy after liver transplant is an invasive diagnostic procedure for liver pathology, but it can be used safely in experienced centers.

The results of our study confirm the safety of real-time, ultrasonogram-guided percutaneous biopsy of the liver. Although complications occurred in 9% procedures, most complications were minor and only 1 outpatient (< 0.2%) was subsequently hospitalized. Furthermore, many complications did not require further intervention. No deaths were attributed to the procedure.

References