



# Transjugular Liver Biopsy in the Real World

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## Abstract

Transjugular Liver Biopsy (TJLB) is usually performed on patients with contraindications to percutaneous biopsy. TJLB is indicated for patients with coagulopathy, ascites, peliosis hepatitis, morbid obesity, liver transplant, or for those undergoing a transjugular intrahepatic portosystemic shunt procedure. With advancements in both the technique and the relevant equipment, it has become possible for the procedure to be sufficiently organized. It is a procedure for high-risk patients, but the possible complications are low. Here we outline of the current TJLB technique.

**Keywords:** Transjugular liver biopsy; Indications; Complications

## Introduction

Liver biopsy is generally performed percutaneously, mainly upon the diagnosis of acute and chronic hepatitis [1]. However, percutaneous liver biopsy is generally contraindicated in those demonstrating ascites retention, or when there is a risk of unexpected bleeding complications (e.g., cases of liver disease of unknown cause or significant coagulation abnormalities). Transjugular Liver Biopsy (TJLB) can safely obtain liver tissue even in the above cases, and increasing the adoption of this procedure can be beneficial to the patient. Despite its advantages, TJLB is a complicated procedure, so it has not gained widespread use. In this article, we will explain the TJLB technique, including its complications and countermeasures.

## History of TJLB

Transjugular liver biopsy was first experimentally applied to dogs in 1964 [2]. Hanafee et al., [3,4] reported a method of performing transjugular percutaneous cholangiography.

Weiner et al., [5] reported the first clinical application of TJLB that was introduced to clinics in the early 1970s. After that, in 1973, Rösch et al., [6] started a full-scale clinical practice utilizing the procedure. Subsequently, TJLB is clinically performed in the real world.

A transjugular vein biopsy is a method of puncturing the liver parenchyma from the hepatic vein side through a catheter placed in the hepatic vein and collecting the tissue sample. TJLB is a technique that facilitates an important diagnosis, even for cases of ascites or those for which percutaneous liver biopsy is contraindicated due to bleeding tendency.

## Indication

McAfee et al., [7] reported that the usual indications for transjugular, rather than percutaneous, liver biopsy are the following:

1. Coagulation disorder (prothrombin time greater than 3 sec over control value and/or platelet count less than 60,000/cm<sup>3</sup>).
2. Massive ascites.
3. Desire to perform ancillary procedures, such as measurement of pressures or opacification of the hepatic veins and inferior vena cava.

Moreover, they reported that less common indications for transjugular liver biopsy include failed percutaneous biopsy, massive obesity, small cirrhotic liver (increased risk and lower success rate), and suspected vascular tumor or peliosis hepatitis.

## Diagnostic level

When carrying out TJLB, it is possible to obtain two additional parameters with little extra effort. Once a catheter is placed in a Hepatic Vein (HV), blood can be sampled directly from the HV for biomarker analysis and Hepatic Venous Pressure Gradients (HVPGs) can be measured.

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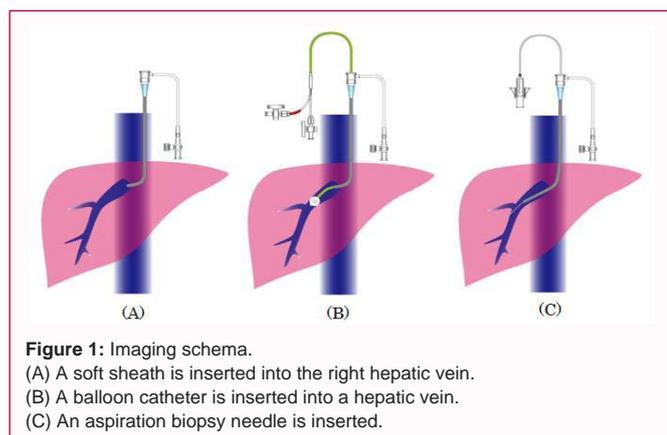
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The HVPG is well-established as a prognostic marker in cirrhotic patients, but there is little information on its usefulness in Acute Liver Failure (ALF) [8-10].

As Transjugular Liver Biopsy (TJLB) shows lower complication rates, obtains appropriate specimens for histology, and is practicable in patients with coagulopathy, it is commonly used instead of conventional percutaneous liver biopsy in ALF patients [11].

However, there is concern as to whether the acquired sample is adequate for accurate histological interpretation. When using the Quick-Core® Biopsy (Cutting Cannula) Needle Set (Cook Medical LLC), there have been cases where tissue crushing and portal vein area were not sufficient and diagnosis was difficult.

Our group has found that the aspiration biopsy needle is significantly useful than the Quick-Core® cutting Biopsy needle. The initial results of the aspiration biopsy needle are shown in Table 1. Compared with the Quick-Core® Biopsy Set, the aspiration biopsy needle indicated a reduction in the time for implementation, a decrease in fragmentation, sufficient tissue length, and enough triads to capture the portal region, with no cases that were problematic in diagnosis [12]. We believe that using an aspiration-type instead of a cutting-type of biopsy needle reduces the damage to the liver and sampled tissues, making it a safe and stable instrument for biopsy.

### TJLB New Method

TJLB is not generally used because it is stressful that controls the sheath of the inner metal sheath, which is very hard inside the heart, and difficulty in approaching the smooth hepatic vein can sometimes occur. The risk of complications such as arrhythmia is high due to difficulty in the operation when passing through the heart. Therefore, our groups next performed TJLB with the soft sheath (8 Fr 50 cm LRV) manufactured by Terumo Co., Japan) that was used in the measurement of hepatic venography and hepatic venous pressure, as a guide [13]. Our groups conducted a comparison and examined the problems and the current situation of TJLB for sheath use including time reduction and invasion.

The subjects were 101 cases treated using TJLB from April 2003 to November 2011: 41 cases using the existing Cook Teflon-made TJLB sheath (7.0 Fr, 49 cm) and 60 cases using a combination of the soft sheath from Terumo Co., Ltd. 8 Fr 50 cm LRV and this new aspiration needle. Figure 1 shows an imaging schema obtained by Terumo's 8 Fr 50 cm LRV soft sheath and aspiration biopsy needle. There were no significant differences in clinical characteristics between the two groups of case subjects, but the average operation time for TJLB using

**Table 1:** Biopsy Specimens obtained in Successful Attempts.

	New Device (n_=18)	Quick-Core® Biopsy Needle (n_=12)
Tissue Length (mm)	15.3 ± 5.1 (10-21)	6.8 ± 2.1 (3-10)
Number of portal triads	6.5 ± 1.2	3.5 ± 0.6
Number of fragments	0/18 (0 %)	3/12 (25 %)
Number of passes	1.1 ± 0.2	1.8 ± 0.8
Minutes (min)	28.5 ± 7.9	45.1 ± 9.9

**Table 2:** Clinical characteristics of patients receiving TJLB.

	Cook (n=41)	New Method (n=60)	
Age	51.85 ± 19.32	57.87 ± 12.35	p=0.069
Gender (M:F)	20:21	29:31	p=0.998
Minutes	26.93 ± 7.94	20.12 ± 4.52	p<0.05

the soft sheath was significantly shorter 20.12 ± 4.52 min, compared to 26.93 ± 7.94 min using the metal sheath made by Cook Teflon (Table 2, p<0.05). Furthermore, there is less risk of arrhythmia.

Although it is necessary to respond to each procedure on a case-by-case basis, securing further safety data on TJLB, as well reliable improvements to the technique, are necessary for future clinical studies.

### Complications

The complication rates are low and range between 1.3% and 6.5% [14]. The frequency of occurrence of high bleeding/death is reported as 0.01% to 0.02% in TJLB, which is lower than the frequency of 0.16% to 0.32% for percutaneous liver biopsy [14]. Most complications are minor and include either bleeding at the puncture site, or abdominal pain related to the presence of a small hematoma distending the liver capsule. In general, complication rates are lower during TJLB when compared to a percutaneous or mini-laparoscopy approach [15]. McGill et al., [16] found that among 9212 liver biopsies, 0.24% was complicated by nonfatal hemorrhage and 0.11% by fatal hemorrhage.

Fever, arrhythmia, cervical hematoma, pneumothorax, cervical pseudoaneurysm, biliary bleeding, and intra abdominal bleeding are pointed out as complications [17].

Rad et al., [18] recommended that neck puncture should be performed under ultrasound guidance. Their study revealed that no damage to the carotid, endothelium of internal jugular vein, or neck hematoma was observed. After biopsy, when bleeding is suspected, it is imaged from the catheter, and when leakage is confirmed in the abdominal cavity, it is necessary to embolize the fistula with Gelfoam.

### Conclusion

TJLB is a more cumbersome procedure compared to percutaneous liver biopsy, and the price of the puncture needle kit is also high, therefore it is not the preferred choice. However, TJLB's adaptation examples are considered potentially latent, and mastery of this procedure is starting to surpass that of the transjugular intrahepatic portosystemic shunt procedure. Transjugular liver biopsy is considered to be safe and well tolerated, and should generally be the first-line option for patients in whom the percutaneous approach is contraindicated.

### Financial Disclosure

The authors declare that they do not have a current financial arrangement or affiliation with any organization that may have a

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