

Complications of percutaneous liver biopsy in living donor liver transplantation

Two case reports

King-Wah Chiu, MD^{a,b,c,*}, Ting-Lung Lin, MD^{a,b,d}, Chee-Chien Yong, MD^{a,b,d,*}, Chih-Che Lin, MD^{a,b,d}, Yu-Fan Cheng, MD^{a,b,e}, Chao-Long Chen, MD^{a,b,d}

Abstract

Rationale: According to previously published studies, major complications arising from a percutaneous liver biopsy are rare and occur in less than 0.1% of cases. This report describes an approach to percutaneous liver biopsy that can help avoid damage to the liver in a living donor liver transplantation (LDLT) setting.

Patient concerns: *Case 1:* In the first case a donor percutaneous liver biopsy (PLB) of both lobes of the liver was performed for pre-LDLT evaluation. The ultrasonography (US)-guided epigastric right-angle approach and an automatic one-handed cocking disposable 18G biopsy gun was used to puncture the left liver lobe to determine the presence of fatty liver. A penetrating liver injury occurred, accompanied by massive bloody ascites (about 700 cc) and subcapsular hematoma at the left lateral segment. The bleeding was managed by bi-polar coagulation during the transplant and the following liver donation procedure proceeded smoothly without any subsequent complications. *Case 2:* In the second case, selective right lobe PLB for clinical assessment after LDLT was performed in the recipient. Hemorrhagic shock occurred following a puncture of the right posterior branch of the right hepatic artery when using the biopsy-gun via the right lateral intercostal approach.

Diagnoses: Extravasation was documented by angiography and emergent transhepatic arterial embolization was performed.

Intervention: Extravasation was documented by angiography and emergent transhepatic arterial embolization with glue:lipiodol (1:4) was performed to stop bleeding.

Outcomes: The recipient survived after medical management.

Lessons: To prevent complications, the right-angle approach of PLB may be changed to an oblique angle using a one-fire biopsy-gun. Use of a manual Menghini's needle should be considered for left lobe liver biopsies. Since US-guided manual Menghini's needle for PLB can be observed with the needle tip inserted in the liver, needle-mediated compromising of the major vessels or biliary tree can be prevented, and it does not penetrate the liver again. A superficial puncture less than 0.5 cm away from the liver surface should be made during right lobe liver biopsy. This approach can help to avoid damage to the hepatic artery.

Abbreviations: LDLT = living donor liver transplantation, PLB = percutaneous liver biopsy, US = ultrasonography.

Keywords: biopsy gun, complications, living donor liver transplantation, percutaneous liver biopsy

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^a Chang Gung University, College of Medicine, Taiwan, ^b Liver Transplant Program, Kaohsiung Chang Gung Memorial Hospital, ^c Department of Internal Medicine, ^d Department of General Surgery, Kaohsiung Chang Gung Memorial Hospital, ^e Department of Diagnostic Radiology, Kaohsiung Chang Gung Memorial Hospital, Kaohsiung, Taiwan.

* Correspondence: King-Wah Chiu, and Chee-Chien Yong, Chang Gung University, College of Medicine, Liver Transplant Program, Kaohsiung Chang Gung Memorial Hospital, Department of Internal Medicine, Kaohsiung Chang Gung Memorial Hospital, 123 Ta-Pei Road, Niao-Sung, Kaohsiung 833, Taiwan (e-mails: c471026@ms6.hinet.net, ccyong3980@gmail.com).

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1. Introduction

Percutaneous liver biopsy (PLB) is an important technique for investigating liver conditions in both recipient/donor, adult/pediatric living donor liver transplantation (LDLT) patients. Ultrasonography (US)-guided liver biopsy is widely used, particularly for pediatric liver transplant biopsies.^[1] PLB is indicated for donor evaluation when the potential donor is suspected to have fatty liver disease, with a fat component >20%, as measured by computer tomography scanning.^[2] Herein, we present 2 cases of complications caused by PLB in a donor before and in a recipient after LDLT to reiterate the principles of liver puncture in different LDLT situations.

2. Case presentations

2.1. Case 1

A 27-year-old male potential donor with evidence of fatty liver disease underwent PLB on both lobes as part of donor evaluation before LDLT. His platelet count was within normal limits and he had no coagulopathy or splenomegaly. A US-guided epigastric right-angle approach and an automatic one-handed cocking disposable 18G biopsy-gun was used to puncture the left lobe of

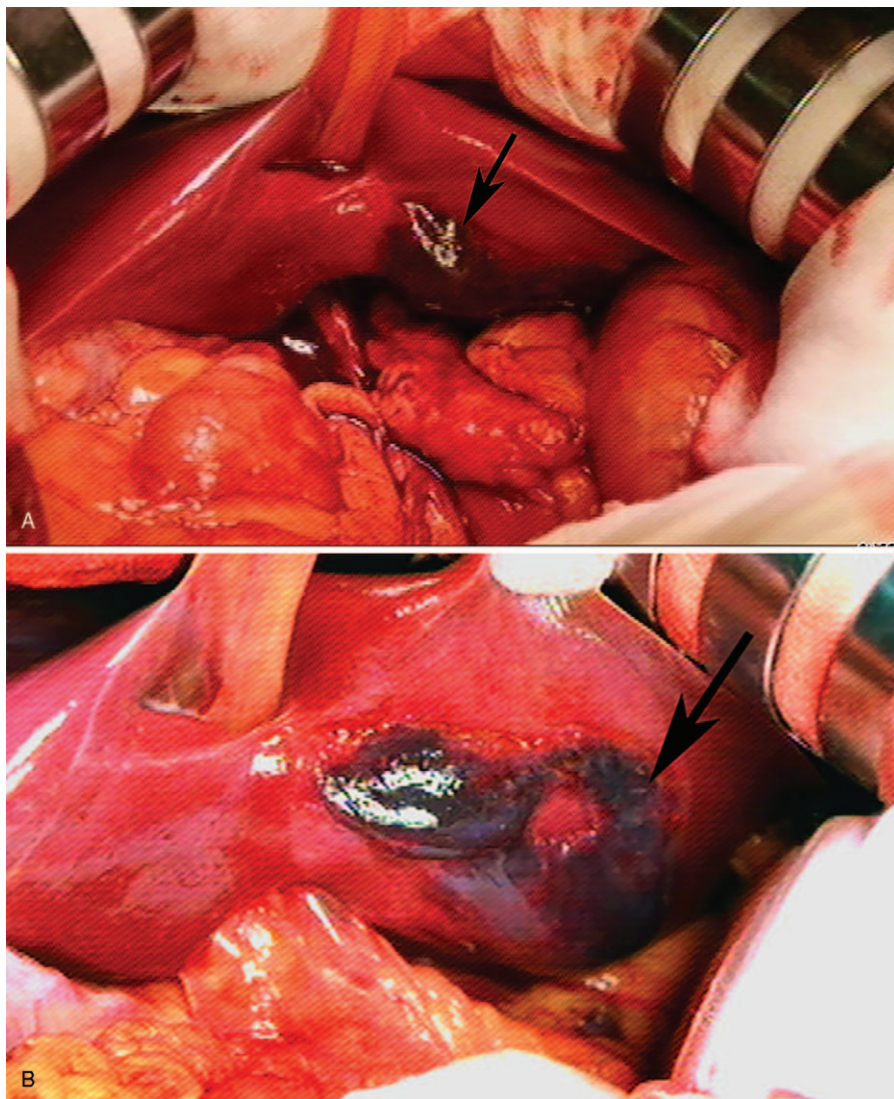


Figure 1. (A) Massive bloody ascites (approximately 700 cm³) in the abdominal opening caused by a previous liver biopsy. (B) A subcapsular hematoma at the left lateral segment of the liver with a biopsy needle penetrating the wound.

the liver to check for fatty liver disease. Subsequent complications due to a penetrating injury to the liver developed, along with massive bloody ascites (about 700 cm³; Fig. 1A) and subcapsular hematoma (Fig. 1B) at the left lateral segment of the liver. This occurred 7 days after biopsy when the abdomen was opened during liver donation surgery. The bleeding was managed by bipolar coagulation during the operation and the following liver donation procedure proceeded smoothly without any subsequent complications.

2.2. Case 2

A 57-year-old male was a recipient who had received a right lobe graft from a LDLT 2 years prior. He underwent selective right lobe PLB for pathological investigation because of abnormal serum alanine transaminase levels, which increased up to 369 U/L (NR 0-40). Initial hemorrhagic shock occurred when his hemoglobin level decreased from 12 to 8 g/dL and serum alanine transaminase level increased up to 5600 U/L,

accompanied by anuria. This was caused by a puncture of the right posterior branch of the right hepatic artery after using the same 18G biopsy-gun via the right lateral intercostal approach. Extravasation was documented by angiography (Fig. 2A) and emergent transhepatic arterial embolization was performed with glue:lipiodol (1:4), which successfully stopped the bleeding (Fig. 2B). The recipient survived after medical management.

3. Ethics

The study protocol conformed to the ethical guidelines of the Declaration of Helsinki and was approved by the ethics review committee of Chang Gung Memorial Hospital (number 201800589B0). Written informed consent was obtained from each participant. None of the transplant donors or recipients was from a vulnerable population. Informed written consent was obtained from the patient for publication of this case report and accompanying images.

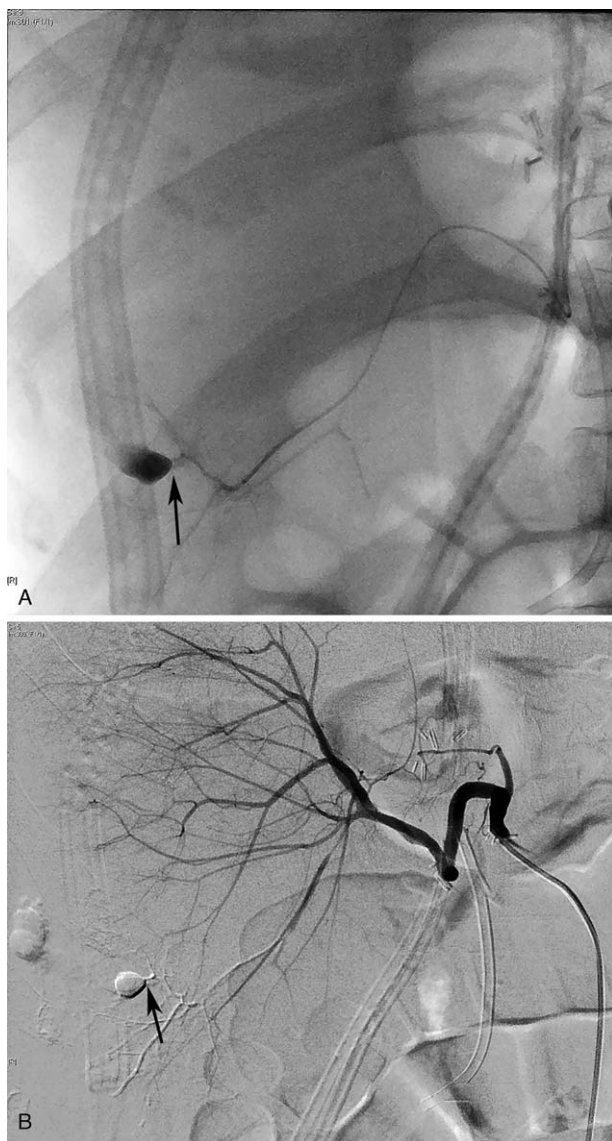


Figure 2. (A) Extravasation of contrast medium from the posterior branch of the hepatic vein seen in an emergent angiographic study. (B) Emergent transhepatic arterial embolization with glue:lipiodol (1:4) was performed and bleeding successfully stopped.

4. Discussion

There are several studies that describe the application of PLB in LDLT, but there are few details exploring left lobe liver biopsy.^[3-7] In fact, left lobe PLB is more difficult and riskier due to the possibility of major complications compared with right lobe interventional procedures.^[8] In particular, a small left lobe liver volume or a left lobe liver that does not cross the mid-line of the abdomen is generally acceptable as part of the normal variation. Therefore, almost all the surgeons who perform liver biopsies prefer a right lobe liver approach, except in specific clinical cases that require a left lobe liver biopsy. US-guided PLB is the most useful procedure for accessing the liver and is safe for liver interventional punctures. In our current case, PLB was conducted on both lobes for potential donor evaluation. Unfortunately, a penetrating biopsy track through the whole left lateral segment of the liver caused internal bleeding following PLB. It was determined that the biopsy-gun fired a length that was longer than the lower

aspect of the left lateral segment. The operator attempted prevent left posterior portal vein damage, however this complication also occurred. In our experience, the right-angle approach of PLB may be changed to an oblique angle using a firing biopsy gun. Use of a manual Menghini's needle should also be considered for left lobe liver biopsies in the future.^[8-10] Since a US-guided manual Menghini's needle for PLB can be seen with the needle tip inserted in the liver, it can prevent the needle from compromising the portal vein, hepatic vein, or biliary tree and it does not penetrate the liver again.

A possible major complication may occur during biopsy of the right lobe, as exhibited by the recipient of our liver transplantation program. In general, the volume of the right lobe is much greater than the left. Performing PLB on the right lobe is less likely to cause major complications, except when using a deeper liver tissue approach. This is because major structures, including the right portal vein, hepatic artery and the 1st and 2nd generation of the biliary tract are located at an area that is 5 to 10 cm around the porta hepatis. Therefore, liver puncture can be safely performed at segments 5-6 and the one-handed automatic biopsy-gun should be fired 0.5 cm away from the liver surface in order to avoid deeper structural damage. The manual Menghini's needle can also be safely used under US-guided PLB for the right lobe as an interventional approach for the recipient.

The limitation of this case report is that it can only reflect experiences from a single liver transplantation center. Although complications are rare in the liver transplantation setting, the operator should keep in mind not only potential benefits to the recipient but also that it is important for the living donor to have a safe, complication free liver biopsy procedure. Penetrating damage of the left lobe liver biopsy from a potential donor has not been previously published in the world. In conclusion, the one-fire method of liver puncture used with a one-fire biopsy-gun is faster and deeper. A manual Menghini's needle or an oblique angle approach can be considered when performing biopsies of the left lobe of the liver. For a right lobe liver biopsy, a superficial puncture less than 0.5 cm away from the liver surface can be conducted to avoid hepatic artery damage.

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Author contributions

Conceptualization: King-Wah Chiu, Chee-Chien Yong, Chao-Long Chen.

Data curation: Ting-Lung Lin, Chao-Long Chen.

Formal analysis: King-Wah Chiu, Chih-Che Lin.

Investigation: King-Wah Chiu, Ting-Lung Lin, Chee-Chien Yong, Chih-Che Lin, Yu-Fan Cheng, Chao-Long Chen.

Methodology: Yu-Fan Cheng.

Project administration: King-Wah Chiu, Chee-Chien Yong.

Supervision: King-Wah Chiu.

Visualization: Yu-Fan Cheng.

Writing – original draft: King-Wah Chiu.

Writing – review & editing: King-Wah Chiu.

King-Wah Chiu orcid: 0000-0003-2108-6539

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