

Ultrasound-guided percutaneous core needle liver biopsy

Backgrounds and Indication: Ultrasound (US)-guided percutaneous liver biopsy is an accurate, safe, and widely accepted technique for the tissue diagnosis of hepatic parenchymal disease or various hepatic lesions. US has a number of advantages including wide availability, portability, lack of ionizing radiation, relatively short procedure time, real-time visualization of the biopsy needle and target lesion during the procedure, ability to guide the procedure in almost any anatomic plane, fewer false-negative biopsies, and relatively lower costs.

Contraindication: US-guided percutaneous core needle biopsy should be avoided in patients with uncorrectable coagulopathy or in the absence of a safe needle path and in uncooperative patients with uncontrolled movement or irritability. For in-patients who are receiving anticoagulation therapy, such as aspirin, biopsy can be performed at least five days after the withdrawal of aspirin.

Process

1. **Pre-biopsy preparation:** Perform common coagulation tests before biopsy, including prothrombin time, activated partial thromboplastin time, and platelet count. Advised to fast for at least 6 hours before the procedure. Recommend the route for IV access in patients with high of bleeding or anxiety.
2. **Selecting the biopsy needle:** In general, an 18-gauge needle (fully automated and semi-automated) with an automated biopsy gun. Coaxial biopsy has been suggested as a useful method for obtaining multiple samples without re-puncturing the capsule of the target organ. The needle length should be chosen according to the distance of the target lesion from the skin along the expected biopsy route, considering the fact that long needles are difficult to control during biopsies.
3. **Planning an optimal approach path:** The feasibility of the anticipated biopsy route defined using CT or MR images must be confirmed by US before biopsy to determine the safest needle path to the target lesions for avoiding important abdominal organs and major vessels. If major vascular structures lie in the course of the planned biopsy path, the probability of major bleeding due to vascular injuries is high. The patient's position and respiration need to be changed to allow identifying the lesion.
4. **Technical strategies for clear visualization of the biopsy needle:** The biopsy needle should be parallel to the long axis of the transducer to ensure clear visualization of the entire needle shaft.
5. **How to effectively control the biopsy needle:** First, pierce the surface of the solid organs and

the bowel wall as orthogonally as possible; Second, advance the needle forcibly and quickly with no hesitation. When approaching the target, the needle should be readjusted to ensure proper inclination and positioning.

6. **Post-biopsy management:** Immediately after the core tissue is extracted, color Doppler US should be carefully performed to check for any significant post-biopsy bleeding. A linear track of color flow along the biopsy trajectory (“patent tract” sign) strongly suggests the possibility of clinically significant post-biopsy bleeding, especially if it persists even five minutes after biopsy

Technical consideration: Both the subcostal and intercostal approaches are used with the patients in the supine position. For a focal hepatic lesion, the approach route should be determined according to the location of the lesion within the liver. The presence of ascites should not be a contraindication for liver biopsy, and drainage of ascitic fluid should be considered before the procedure only in cases with massive ascites

Complications: Complications may occur such as pain, bleeding, inadvertent organ injury, and possible tumor seeding along the needle path. Bleeding is the most common major complication. The echogenicity of fresh blood is similar to that of surrounding solid organs, such that bleeding may be easily overlooked during the procedure. If a hemorrhage occurs, percutaneous embolization may be required depending on the severity of the bleeding. Malignant seeding of the needle tract is not common, ranging from 0% to 5.1%. Nevertheless, the number of needle passes should be limited to as few as possible in order to minimize the risk of tumor seeding.