

Open & Laparoscopic Liver Biopsy

J. Brad Case, DVM, MS, DACVS

W. Alexander Alvarez, DVM

University of Florida

Liver biopsy is indicated when clinical signs, biochemical markers, and/or diagnostic imaging suggest hepatic disease. Biopsy allows definitive diagnosis of neoplastic, infectious, inflammatory, vascular, and mineral storage disease processes. With careful attention to patient evaluation and preparation, it can be performed safely in most animals. Complete blood count, serum chemistry panel, coagulation panel, urinalysis, and abdominal ultrasonography are often performed before biopsy.

In addition to general systemic health, coagulation ability should be evaluated. Although many animals with liver disease may have primary and/or secondary hemostatic abnormalities, liver biopsy can usually be performed safely, provided the clinician uses sound judgment and methodology.

Patients with significant coagulation abnormalities may benefit from plasma administration immediately before or the night before the surgical procedure. Dogs with von Willebrand factor deficiency should be pretreated with cryoprecipitate, plasma, or arginine vasopressin. Vitamin K can also be administered before the procedure. Medical textbooks may provide specific recommendations.

Liver Biopsy Techniques

Hepatic biopsy can be performed via laparotomy, laparoscopy, or percutaneously. Percutaneous needle biopsy should be used and interpreted with caution, however, as morphologic diagnosis via percutaneous biopsy may be inaccurate in a significant proportion of patients and controlled hemostasis is not possible.

Conversely, laparotomy and laparoscopy can expose most of the hepatic parenchyma, allowing for biopsy in most regions of the liver. While laparotomy is simple and requires no advanced instrumentation, it necessitates a large incision and is associated with greater patient morbidity as compared with laparoscopy. Laparoscopic liver biopsy is a safe and minimally invasive method of collecting diagnostic samples while reducing tissue trauma and patient morbidity.

Many liver biopsy techniques have been described. This article offers a quick reference on obtaining a liver biopsy sample using the Baker punch method via laparotomy and the clamshell technique via laparoscopy.

Patient Positioning

For Baker punch biopsy, the patient should be in dorsal recumbency and the abdomen prepared using standard aseptic technique. If only the liver is to be biopsied, then a more limited cranial celiotomy approach may be taken. Neoplasia is a common differential for hepatic disease, so exploring the entire abdomen to evaluate for pathology in other organs (eg, lymph nodes) may be indicated.

Dorsal positioning is also preferred for laparoscopic biopsy because it allows visualization of all liver lobes and spares injury to abdominal musculature.

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What You Will Need

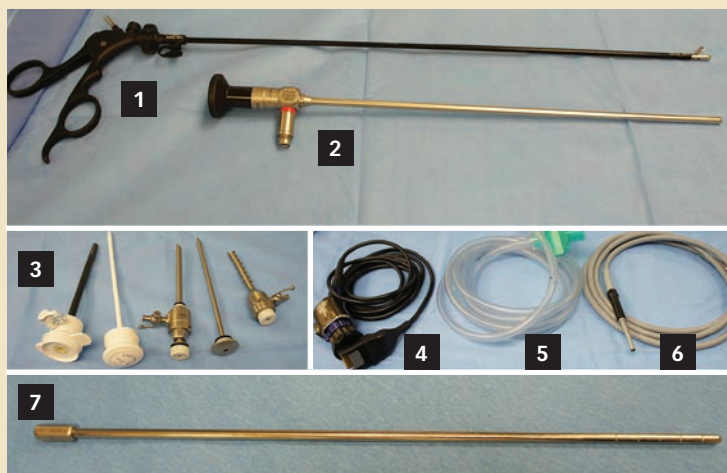
Supplies for Both Methods

- Sterile sample containers
- 10% formalin for histopathology
- Microscope slides for impression cytology
- Absorbable gelatin sponge

Baker Punch Biopsy

- 4- to 5-mm Baker biopsy punch
- General surgery pack
- Balfour retractor

Laparoscopic Biopsy Equipment



A 5-mm laparoscopic clamshell biopsy forceps (1), 5-mm laparoscope 0° (2), 5-mm trocar (3), camera (4), insufflation tubing (5), light cable (6), 5-mm laparoscopic blunt probe (7).



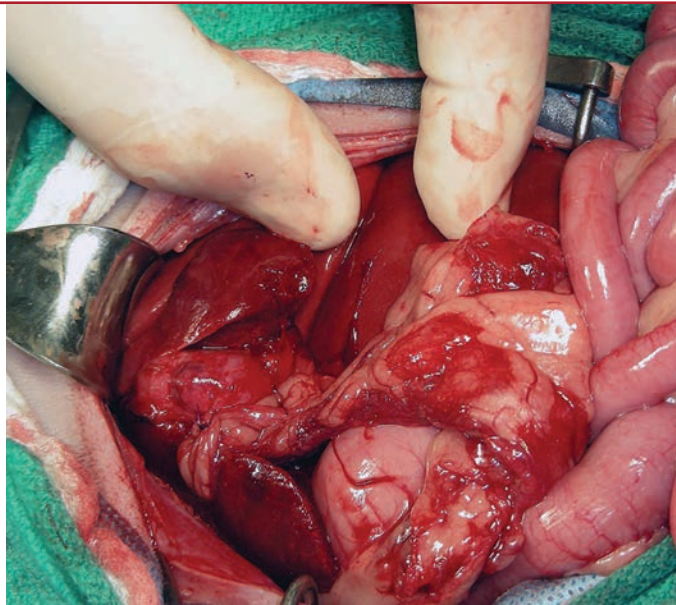
B Videolaparoscopy tower, including monitor (1), video capture (2), CO₂ insufflator (3), xenon light source (4).

Step-by-Step ■ Baker Punch Biopsy via Laparotomy

Step 1

Perform a midline laparotomy from the caudal margin of the xiphoid process to the umbilicus. Excise the falciform fat to improve liver exposure. Place a self-retaining Balfour retractor. Evaluate abdominal viscera and peritoneal surfaces, and sample abnormal tissue for histopathology.

Author Insight The nondominant hand can be used to retract the ventral surface of the liver caudally to improve exposure during biopsy.



Step 2

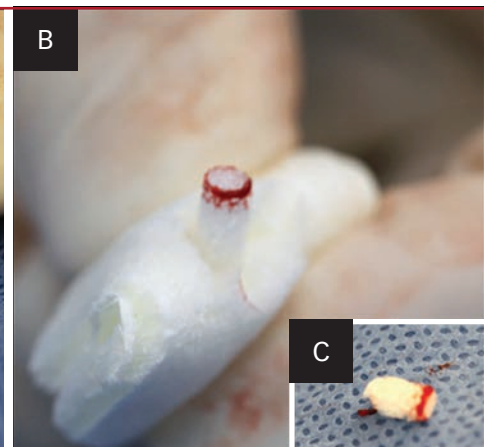
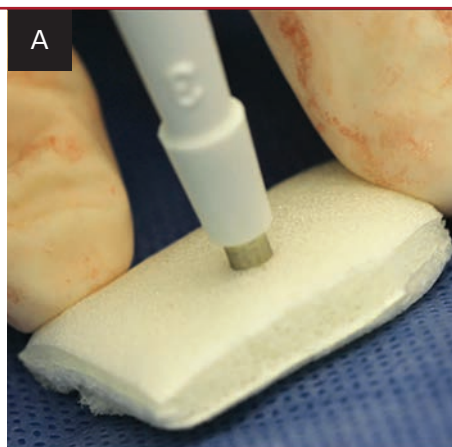
Expose the liver lobe or lesion to be biopsied. Then insert a 4- or 5-mm Baker biopsy punch into the lobe/lesion perpendicular to the surface, centered over the margin of normal and abnormal tissues, if possible. Hold the punch in place, penetrating the hepatic parenchyma, rotate the instrument ~180° axially, and then remove it. Grasp the sample gently with thumb forceps, and excise it using fine Metzenbaum scissors to transect the base. Repeat this step for multiple lesions or lobes as needed. Place biopsy samples in a sterile container.



Step 3

Control any mild, brisk hemorrhage at the biopsy site by applying steady digital pressure and/or placing a core of hemostatic gelatin foam into the biopsy site for 3–5 minutes; the gel foam will remain in the defect and be completely absorbed 4–6 weeks postprocedure. Perfectly sized hemostatic foam plugs can be fashioned to fit the biopsy site and improve hemostasis (A–C).

Evaluate the abdomen for hemorrhage or complications and close the abdomen routinely.

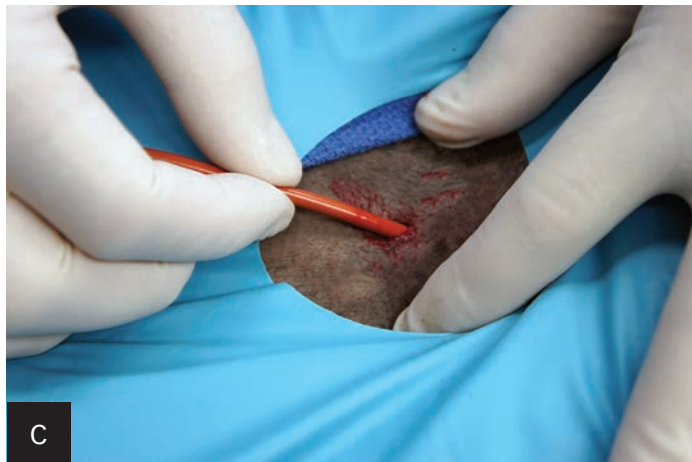
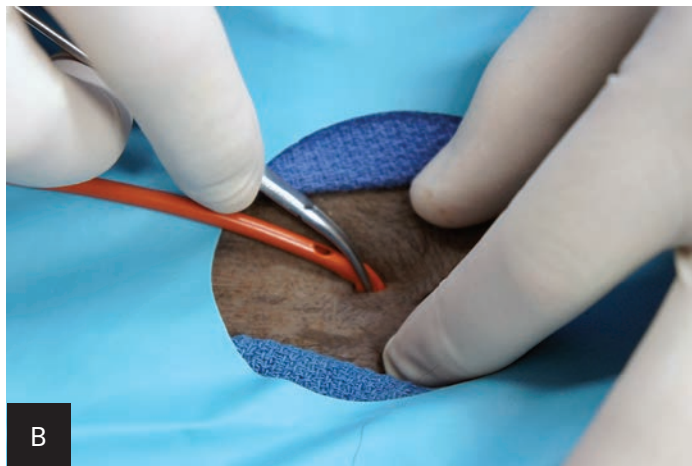


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Step-by-Step ■ Clamshell Biopsy via Laparoscopy

Step 1

Make an incision no longer than the inner diameter of the cannula through the skin 1–2 cm caudal to the umbilicus (A). Continue the incision to the depth of the linea alba. Through this incision, place the initial port 1–2 cm caudal to the umbilicus and use a Veress needle or the Hasson method (a variation of the Hasson method using a catheter is described here) to elicit a pneumoperitoneum. Place apposing stay sutures at the margins of the linea alba to allow ventral traction. In the same incision site, make a 2- to 3-mm-deep stab incision into the linea alba. Use a mosquito hemostat to insert the tip of an 8-Fr malleable catheter into the abdominal cavity (B), then flush 3 mL of sterile saline through the catheter to ensure that no resistance is felt; resistance indicates catheter malposition, most commonly in the falciform fat. If resistance is felt, withdraw and reinsert the catheter. Once the catheter is appropriately placed (C), attach CO₂ insufflation tubing to the catheter to pressurize the peritoneal cavity to a maximum of 10–12 mm Hg.



Step 2

For proper orientation, patient should be positioned in dorsal recumbency (A). When a pneumoperitoneum has been achieved, as indicated by a pressure reading of 10–12 mm Hg on the insufflator, remove the catheter and insert a blunt trocar–cannula assembly or threaded screw-in cannula via the original stab incision (B). In some cases, minimal extension (1–2 mm) of the incision may be needed to facilitate cannula insertion. Insert the laparoscope into the cannula and observe the peritoneum briefly to ensure that no iatrogenic trauma or hemorrhage has occurred. Then make a second incision and place a second 5-mm cannula under laparoscopic visualization 2–3 cm craniad and in a similar fashion to the initial port.

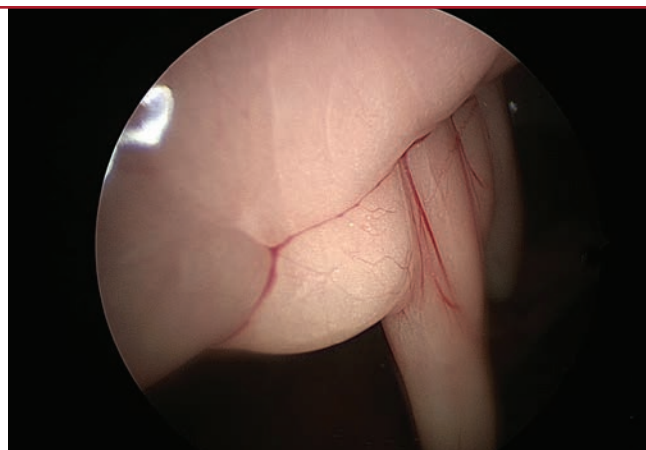


Author Insight Following initial port insertion, all subsequent ports (in this case only two are used) are placed under laparoscopic visualization (C). Once both ports have been placed, reduce the insufflation pressure to 8 mm Hg as this will reduce the cardiovascular and pulmonary effects of the pneumoperitoneum.

Step 3

Evaluate the peritoneal cavity by pivoting the laparoscope in a clockwise manner around the port site. Insert the clamshell forceps, using the laparoscope to visualize and guide the forceps to the cranial abdomen.

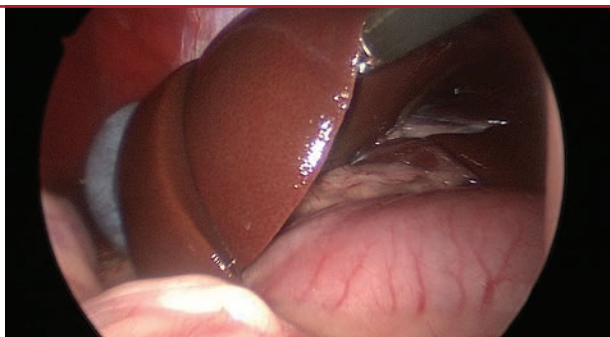
Author Insight The falciform terminates at the level of the umbilicus and can obscure the view of the liver, as shown here. Thus the initial camera port must be caudal to the falciform. The camera is easily maneuvered to the left or right of the falciform to obtain a clear view of the liver.



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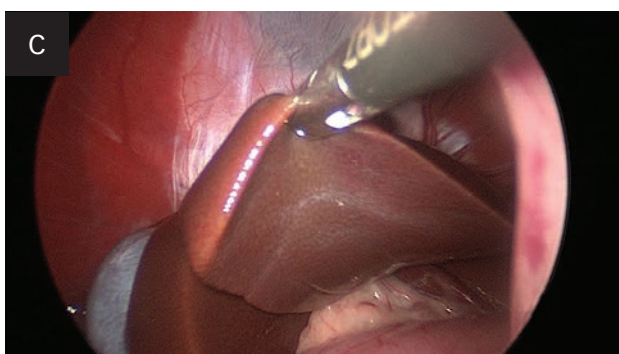
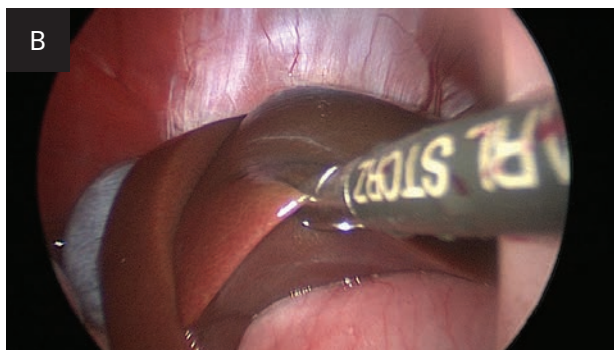
Step 4

Inspect the ventral and dorsal (shown here) surfaces of each liver lobe thoroughly, using a blunt probe for manipulation.



Step 5

Obtain samples from distinct lesions and/or different lobes for diffuse disease. Position the forceps (A), then close the instrument over the desired lesion/tissue (B); maintain pressure for 90 seconds. Gentle axial rotation of the forceps while applying pressure can help release parenchymal attachments. With the forceps closed, detach the sample by swiftly tugging caudally. Elevate the lobe to evaluate the dorsal surface (C). Observe the biopsy site for hemorrhage (D).



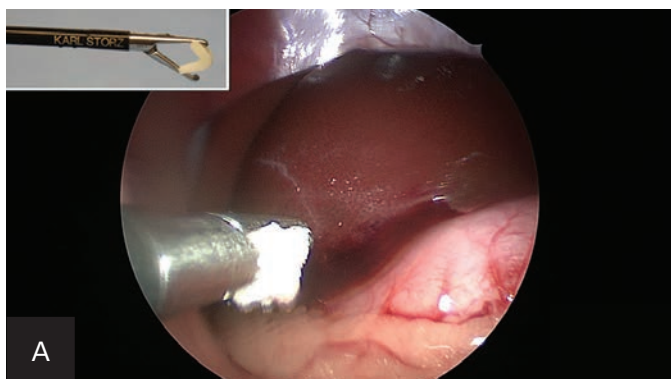
Author Insight Laparoscopic clamshell forceps are ideal for lesions on the liver margins but can be used to obtain mid-lobe biopsies as well.

Step 6

Fashion gel foam to roughly the size of the biopsy sample. Place this foam inside of the laparoscopic forceps and apply to the cut surface, pressing the foam against the biopsy site (A). Evaluate all biopsy sites for hemorrhage (B). Photographically document hemostasis and lesions. Liberate residual gas from the peri-

toneal cavity by removing the CO₂ hose and leaving the valve open. Remove all ports and close incisions routinely. ■ **cb**

See **Aids & Resources**, back page, for references & suggested reading.



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