

# Pancreatic Biopsy

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Antemortem diagnosis of pancreatic disease is a challenge. Histopathology remains the gold standard of diagnosis for pancreatic neoplasia and pancreatitis. Pancreatic biopsy provides a definitive diagnosis of pancreatitis, assuming a representative sample is obtained. An open or laparoscopic approach can be made to collect samples.

Open approaches require only standard surgical equipment and allow easy manipulation of tissue and visualization of the entire pancreas (important when sampling focal disease involving the left limb). However, open surgery results in greater tissue injury and pain compared with a laparoscopic approach and may not be favored by some clients or in some cases.

Studies in both human and veterinary medicine have demonstrated laparoscopic procedures to have less tissue trauma and systemic inflammation, lower pain indices, and reduced patient convalescence when compared with analogous procedures performed using an open approach. This decrease in the healing and inflammatory demand postoperatively may be

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## What You Will Need

### Guillotine Biopsy via Laparotomy

- Basic surgery pack (ie, needle holders, DeBakey thumb forceps, mosquito hemostats, Metzenbaum scissors)

### Laparoscopic Biopsy

- Videolaparoscopy tower (A), camera (B), insufflation tubing (C), and light cable (D)
- 2 5-mm trocars and cannulas (E)
- 5-mm laparoscopic clamshell biopsy forceps (F)
- 5-mm laparoscope 0° (G)
- 5-mm laparoscopic blunt probe (H)

### Both Methods

- Sterile sample cups for separate diagnostic samples (histopathology, culture)
- Culture media
- 10% formalin for histopathology
- Microscope slides for impression cytology



particularly important in patients with delayed healing from metabolic derangements, such as hypoproteinemia, secondary to their pancreatic disease. While this approach provides a magnified, illuminated view of the right limb of the pancreas, the left limb of the pancreas is difficult to evaluate laparoscopically and may require dissection of the omental bursa and repositioning of the patient (beyond the scope of this article). In addition, laparoscopy requires the use of specialized equipment and may take slightly longer to perform for learning practitioners; however, once the procedure can be completed with confidence, the time required can be comparable with that for an open method.

When biopsying the pancreas, if not targeting a specific lesion, the distal aspect of the right or left limb of the pancreas is preferred to decrease the risk for damaging important vascular and pancreatic structures. Care should be taken to avoid major blood vessels (eg, caudal pancreaticoduodenal artery and its branches).

Pancreatic biopsy is a safe procedure. Despite concerns for adverse sequelae after pancreatic biopsy, studies suggest that significant clinical or biochemical abnormalities are uncommon postoperatively.<sup>1-4</sup> Patients should be monitored closely for signs of pancreatitis.

**STEP-BY-STEP ■ GUILLOTINE METHOD VIA LAPAROTOMY**

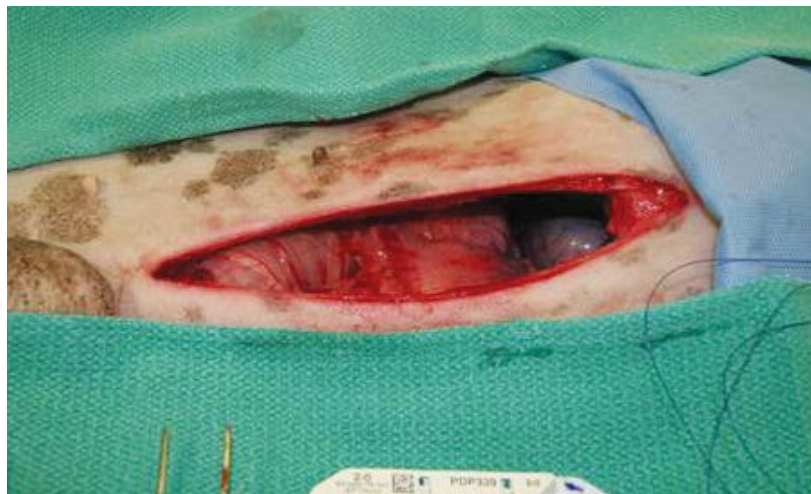
**STEP 1**

Place patient in dorsal recumbency position and follow standard aseptic preparation.



**STEP 2**

**Surgical approach.** If only the pancreas is to be evaluated, a midline cranial abdominal approach can be made. Neoplasia is a differential diagnosis for pancreatic disease, and it is usually advisable to explore the entire abdomen to evaluate for evidence of pathology in other organs.

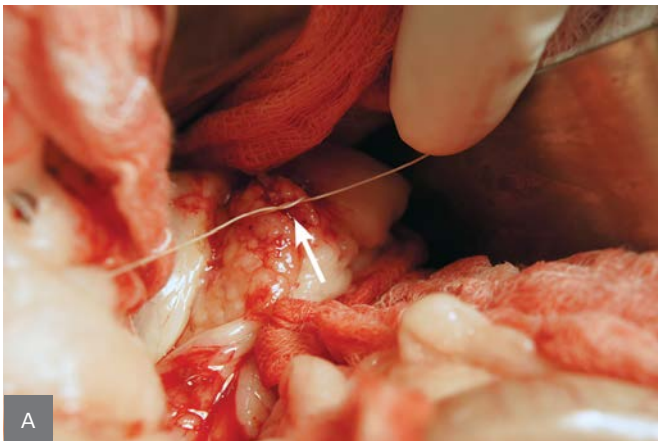


**Cranial abdominal approach to the pancreas.**

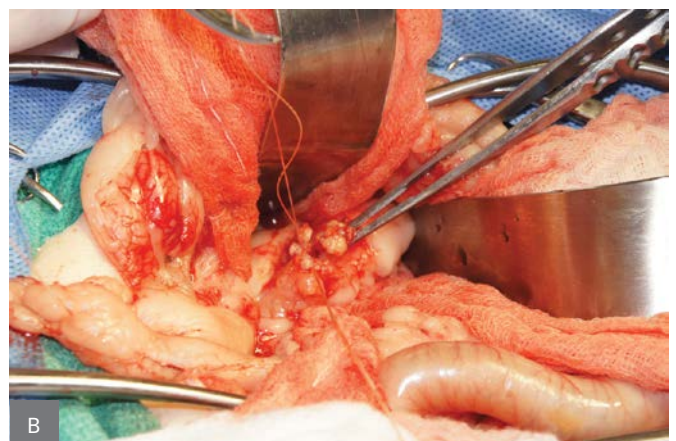
### STEP 3

**Exploration and pancreatic biopsy.** Evaluate the abdominal viscera and peritoneal surfaces. Abnormal tissue should be sampled for histopathology. The right pancreatic limb is contained within the mesentery of the duodenum, which is used for indirect manipulation of the pancreas. Expose the pancreas and evaluate for gross abnormalities. Isolate a 5-mm area of the pancreatic lesion or distal right limb (if diffuse disease), and place an encircling ligature in guillotine fashion (similar to liver biopsy; **A** and **B**).

Alternatively, the omental bursa can be opened and the epiploic foramen entered to access the left pancreatic limb for biopsy. To gain access to the left pancreatic limb, retract the stomach ventrally, using an assistant's fingers or a pair of atraumatic Babcock forceps. The entire pancreas (left limb, angle, and right limb) can be revealed if the spleen is retracted in a ventral and cranial direction. Once the desired pancreatic location has been selected, tighten the ligature to crush the pancreatic parenchyma and to ligate small pancreatic vessels. If diffuse pancreatic disease is present, use the distal tip of the left limb for sampling to avoid pancreatic ducts. Collect the biopsy specimen transecting tissue distal to the ligature with a scalpel blade.



**A** Guillotine suture being placed (arrow). Handle biopsy sample gently to avoid crushing.



**B** Pancreatic biopsy has been removed and no bleeding is observed.

### STEP 4

**Control hemorrhage and close.** Hemorrhage is typically avoided because of the encircling ligature. If residual bleeding occurs, it can be controlled using 3 to 5 minutes of steady digital pressure or a plug of hemostatic gelatin foam. Evaluate the abdomen for hemorrhage. Close the abdomen routinely.

**Author Insight**  
Large malleable retractors and laparotomy sponges are useful to retract the visceral surface of the stomach to improve exposure during biopsy of the left pancreatic limb.

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**STEP-BY-STEP ■ CLAMSHELL BIOPSY FORCEPS METHOD VIA LAPAROSCOPY**

**STEP 1**

**Position patient.** Reverse Trendelenburg position (ie, dorsal recumbency, body tilted with head up and feet lower than head, at approximately 15 degrees) with leftward obliquity is the authors' preferred position for descending limb pancreatic biopsy.

Many endoscopists, however, prefer a right lateral approach as it provides an immediate view of the pancreas. The major disadvantage of the right lateral approach is the lack of ability to view the entire liver, which is often indicated

given the possibility of concomitant inflammatory or neoplastic disease and limitations of ultrasonography.

The approach described here can provide excellent visualization of the duodenum, liver, extrahepatic biliary system, right kidney, and right limb of the pancreas. The left limb of the pancreas is challenging to view laparoscopically and should not be attempted without significant training and experience.



**Reverse Trendelenburg and left lateral oblique position. Black lines represent the patient's position in reverse Trendelenburg and left lateral obliquity.**

**STEP 2**

**Surgical approach.** Place the initial port 1 to 2 cm caudal to the umbilicus. Port placement is achieved after making an incision through the skin no longer than the diameter of the cannula. Continue the incision to the linea alba. A Veress needle, 5-Fr catheter, or Hasson method can be used to achieve pneumoperitoneum.

Place apposing stay sutures at the margins of the linea. Use a number 11 blade to make a 2- to 3-mm deep stab incision into the linea alba. If a Veress needle is used, insert it through the incision, being sure to angle the tip approximately 30° caudal and to the right of midline to minimize risk of splenic puncture. If a Veress needle is not available, or if preferred, a modified Hasson method can be performed at this point, whereby the blunt trochar and cannula unit are placed into the incision into the abdomen at the same angle recommended for Veress needle placement. Alternatively, the catheter technique can be used. A mosquito hemostat is used to insert the tip of a 5-Fr malleable catheter into the abdominal cavity. Once the catheter is inserted, flush 3-mL sterile saline through the catheter to ensure that no resistance is felt (resistance is an indication of catheter malposition). If resistance is felt, withdraw the catheter and reinsert. Once saline is

**Author Insight**  
**Following initial port insertion, place all subsequent ports under laparoscopic visualization. Once both ports have been placed, reduce the insufflation pressure to 8 mm Hg to reduce cardiovascular and pulmonary effects of pneumoperitoneum.**

flushed without resistance, attach CO<sub>2</sub> insufflation tubing to the catheter to pressurize the peritoneal cavity to a maximum of 10–12 mm Hg. The same procedure is performed if using a Veress needle. Subsequent to pneumoperitoneum, remove the catheter (or Veress needle) and insert a blunt trocar-cannula assembly or threaded screw in cannula via the original stab incision. In some cases, minimal extension (1–2 mm) of the incision may be needed to facilitate insertion of the cannula.

Trocars should also be inserted in a caudolateral orientation to reduce the risk of splenic injury. Insert the laparoscope into the cannula and observe the peritoneum to ensure no iatrogenic trauma or hemorrhage has occurred. Place a second 5-mm instrument cannula under laparoscopic visualization 5 cm craniad in a similar fashion to the initial port.



**Correct orientation of the Veress needle during insertion.**



**Image of correct port position.**

### STEP 3

**Exploration and pancreatic biopsy.** Evaluate the peritoneal cavity by pivoting the laparoscope clockwise around the port site. Insert the blunt probe under laparoscopic visualization. The laparoscope is used to visualize and guide the probe into the cranial abdomen.

Inspect the liver and the gall bladder to document any secondary changes from the pancreatic disease. Evaluate the pancreas carefully, looking closely for evidence of nodules or masses. Use the blunt probe to manipulate the duodenum, omentum, stomach, or spleen as needed to improve visualization of the right pancreatic limb.

If distinct lesions are noted, plan to biopsy these areas. If no gross disease or if diffuse disease is present, plan to take 1 or 2 samples from the distal tip of the right pancreatic limb.



**Isolation of the distal right limb of the pancreas.**

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After determining an avascular location for biopsy, insert the clamshell biopsy forceps in place of the blunt probe.

Position the forceps to isolate the desired biopsy site, then close the forceps and maintain pressure for 60–90 seconds. Gentle axial rotation of the forceps will help release the biopsy sample from the parenchyma. A caudal tug on the sample while keeping the forceps closed will remove the sample. Observe the biopsy site for hemorrhage. Repeat this step as desired for sample collection.

**Author Insight**

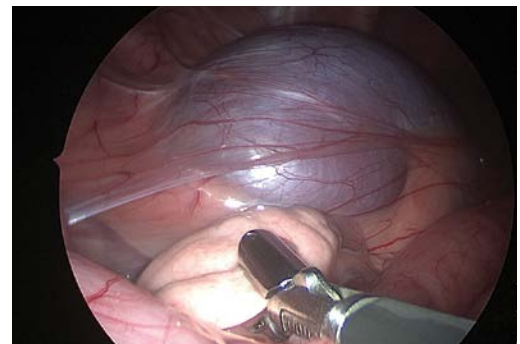
**If an avascular location at the tip of the right limb cannot be identified, consider an open approach with biopsy of the distal left limb.**

**Author Insight**

**The clamshell forceps can be held open and the lower jaw can be used to gently manipulate the pancreas into position for biopsy.**



A blunt probe is used to retract the duodenum, providing better exposure of the pancreas.



Clamshell biopsy forceps ready to engage chosen biopsy sample.

**STEP 4**

**Control hemorrhage and close.** Hemorrhage is typically minimal, and the biopsy site should be observed for 3 minutes to ensure hemostasis. If minor hemorrhage occurs, place a small piece of hemostatic foam into the biopsy site. Evaluate all biopsy sites for hemorrhage and photo-document hemostasis and lesions. Release residual gas from the peritoneal cavity prior to closure. Remove all ports and close incisions routinely. ■ **cb**

**References**

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3. **Evaluation of pancreatic forceps biopsy by laparoscopy in healthy beagles.** Harmoinen J, Saari S, Rinkinen M, Westermarck E. *Vet Ther* 3:31-36, 2002.
4. **Effect of pancreatic tissue sampling on serum pancreatic enzyme levels in clinically healthy dogs.** Corder AP, Armstrong PJ, Newman SJ, et al. *J Vet Diagn Invest* 22:702-707, 2010.



Laparoscopic image after biopsy showing adequate hemostasis at the biopsy site.