

16 Liver

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Biopsies

Biopsies of the liver come in two forms: the delicate needle-core biopsy and the larger wedge biopsy. In either case, the specimen should be measured and submitted in its entirety for routine histology. Thin-core biopsies are particularly susceptible to desiccation. Therefore, unless special studies are indicated, biopsies should be placed in fixative in the operating room. The core biopsy can be embedded whole, while the wedge biopsy may be thick enough to warrant sectioning before submitting to the histology laboratory. When sectioning the wedge biopsy, identify the smooth capsule, and then cut the liver at 0.2-cm intervals perpendicular to this surface. Multiple slides should be prepared from each tissue block for histologic evaluation. Step sections are preferred to serial sections so that the intervening sections are available for special stains. If a storage disease is suspected, then a small portion of the biopsy should be placed in glutaraldehyde for electron microscopy.

Partial Hepatectomy

Focal lesions in the liver can be removed by partial liver resections. The extent of these resections varies from small wedges to the removal of an entire lobe. Regardless of its size, the partial liver resection is not structurally complex. Typically, it consists of a focal lesion surrounded by a variable rim of non-neoplastic liver parenchyma. Several faces of the specimen are covered by a peritoneal lining, but at least one surface shows

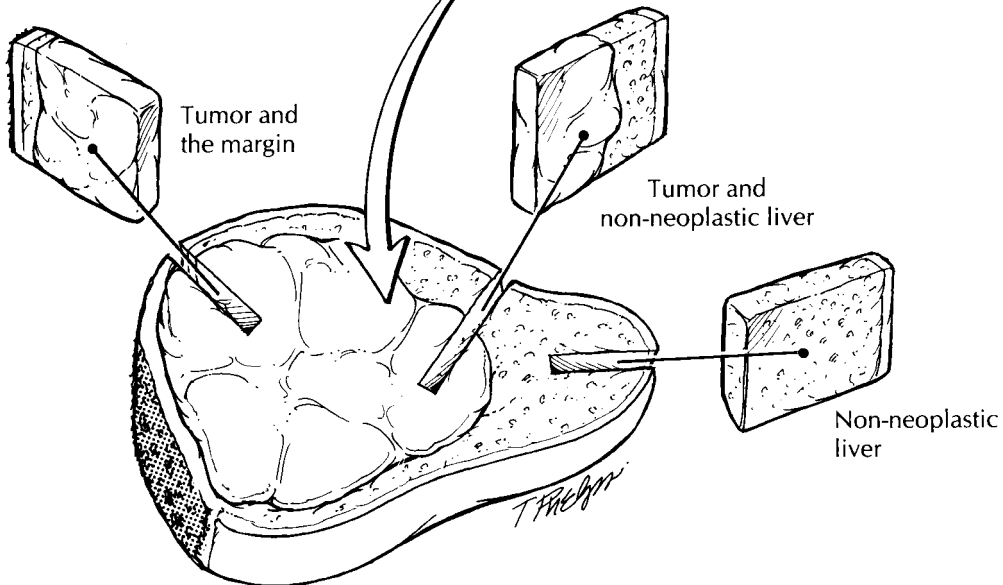
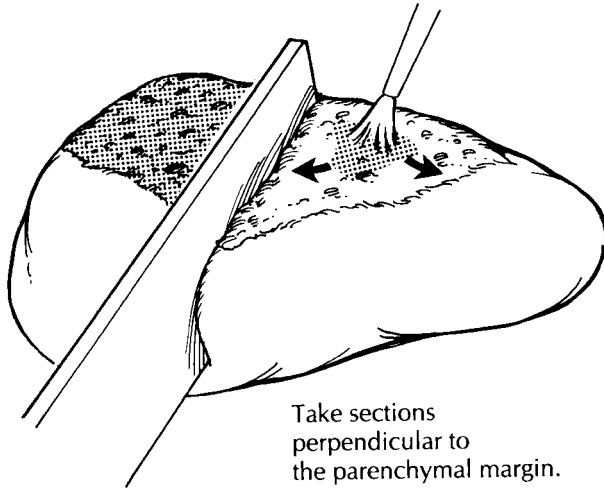
exposed hepatic parenchyma. This exposed surface is the surgical resection margin. This margin has to be correctly identified and oriented. Identification of the resection margin is seldom problematic. Unlike the smooth contour of the peritoneal-lined liver capsule, the resection plane exposes liver parenchyma—which may be fragmented or bloody—and shows cautery effect. On the other hand, orientation of the margin can be very difficult, given the paucity of anatomic landmarks in these limited resections. If the surgeon needs to know the precise location at which a tumor involves or approaches the surgical margin, orientation will require the surgeon's assistance.

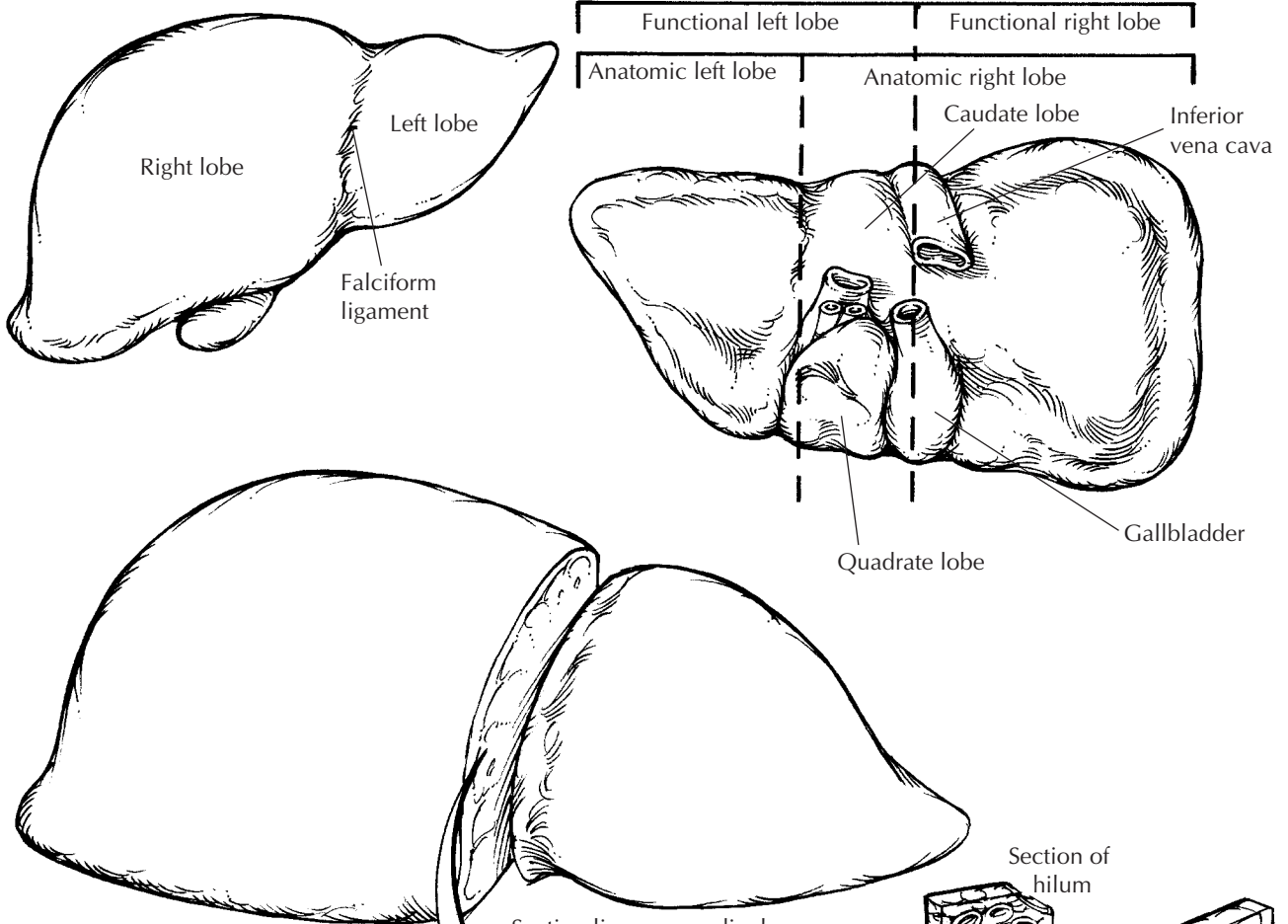
Once the margin is identified and the specimen oriented, weigh the specimen, and measure it in each dimension. Examine its contours and surfaces. A bulge in the surface of the liver and/or retraction of the serosa can help localize an intraparenchymal mass. Livers resected for traumatic ruptures should be carefully examined for lacerations of the capsule. Next, rinse the blood from the cut margin, blot it with paper towels, and then ink the dry resection margin. As illustrated, serially section the liver perpendicular to the resection margin. The initial section should pass through the center of the tumor to demonstrate the closest approach of the tumor to the resection margin. Continue sectioning the liver parallel to this first cut at thin (e.g., 0.5-cm) intervals. Examine all cut surfaces for additional nodules.

Record the number, size, location, color, consistency, and circumscription of all lesions. Note the presence or absence of necrosis, hemorrhage, and scarring. Measure the distance from all lesions to the surgical resection margin. If intrahepatic

Partial Hepatectomy

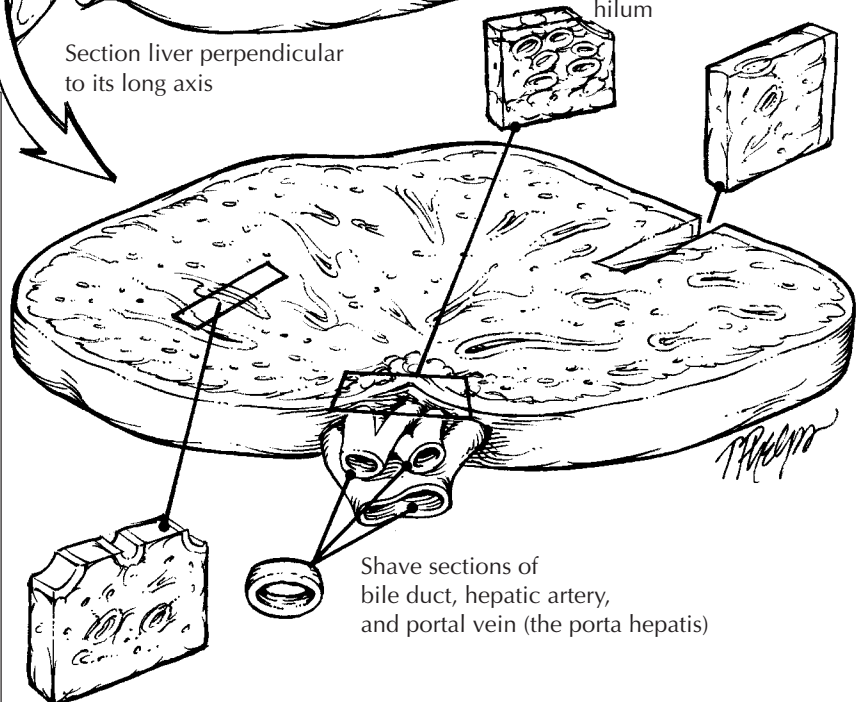
1. Weigh and measure the specimen.
2. Identify and ink the liver resection margin.
3. Serially section the liver perpendicular to the resection margin at 0.5-cm intervals.
4. Document the distance from the resection margin to the edge of the tumor.
5. For metastatic lesions, submit sections from the periphery of the tumor and of the margin. Sample primary liver tumors more extensively, including perpendicular sections from the resection margin at points most closely approached by tumor. Representative sections of non-neoplastic liver should also be submitted, including a section as far away from the mass as feasible to evaluate background liver fibrosis.





Total Hepatectomy

1. Orient the liver by identifying the four lobes: right, left, caudate, and quadrate. Weigh and measure the liver.
2. Submit shave margin sections from the bile duct, hepatic artery, portal vein, and hepatic veins.
3. Look for lymph nodes in the soft tissues of the liver hilum.
4. Dissect the gallbladder from its bed and routinely process.
5. Serially section the liver perpendicular to the long axis.
6. Submit three sections each from the right and left lobes and one section each from the caudate and quadrate lobes. Include standard gallbladder sections. Thoroughly sample all lesions.



blood vessels are apparent, examine them for tumor thrombi. Remember to describe the appearance of the non-neoplastic hepatic parenchyma. Is the lesion arising in a background of cirrhosis? Is there intraparenchymal hemorrhage associated with an overlying laceration of the capsule?

Sections of tumors should be taken to demonstrate the relationship of tumor to the surrounding liver parenchyma and of the tumor to the resection margin. Sections from the periphery of the tumor are generally much more informative than are those from the center of the tumor. The periphery of a tumor demonstrates the interface with adjacent tissues, and the periphery of a tumor is often less necrotic than the center. Sample the resection margin using perpendicular sections from the areas closest to the edge of the tumor. Depending on the extent of the resection, several representative sections of the non-neoplastic liver parenchyma should also be submitted for histologic evaluation. These sections of uninvolved liver parenchyma are generally more informative when taken far from the nodule. In particular, sections taken adjacent to a tumor can significantly overestimate the degree of fibrosis.

Important Issues to Address in Your Surgical Pathology Report on Partial Hepatectomies

- What procedure was performed, and what structures/organs are present?
- How many tumor nodules are present? What are their sizes? Are they confined to one lobe?
- What are the type and histologic grade of the neoplasm? Is the tumor of liver origin or a metastasis from another site?
- Is vascular invasion identified?
- Is the surgical margin involved by tumor? If not, what is the distance from the margin to the edge of the tumor?
- Does the tumor involve lymph nodes? Include the number of nodes examined and the number involved by tumor.
- What is the condition of the non-neoplastic liver? Is the non-neoplastic liver cirrhotic? Is there evidence of hepatitis?

Liver Explants

Entire liver resections are encountered in hospitals where liver transplantations are performed.

The aim of these dissections is to document the cause of the patient's hepatic failure and, in the cases of liver tumors, to stage the tumor and assess the margins at the porta hepatis. Not infrequently, the cause of the hepatic failure is infectious. Be very careful in handling these specimens, and as always strictly observe universal precautions. It is not unreasonable to take the margins, thinly section the specimen (see figure), and submerge the entire specimen in formalin before further processing.

To sample all regions of the liver adequately and to evaluate the important structures of the porta hepatis, you will need to remember the basic anatomy of the liver. As illustrated, the liver is made up of four lobes. Viewed from above, the anatomic right and left lobes are separated by the falciform ligament. The two central lobes are best appreciated by examining the undersurface of the liver. The caudate lobe sits between the portal vein and the inferior vena cava. The quadrate lobe is between the gallbladder fossa and the ligamentum teres and is separated from the caudate lobe by the portal vein. Sometimes the liver is more simply divided into functional right and left lobes by a plane that passes from the gallbladder bed through the inferior vena cava. The major structures forming the porta hepatis are the bile duct, hepatic artery, and portal vein. These three structures maintain a consistent relationship one to another. The duct is most anterior and to the right, the artery is to the left, and the vein is most posterior.

Weigh and measure the liver, and record the appearance of its external surface. If the gallbladder is present, record its size as well. Begin the dissection at the liver hilum. Avoid the temptation to section the liver parenchyma before the hilar structures have been located, identified, and sampled. First, identify and submit a shave section (complete cross section) of the common hepatic duct, the hepatic artery, the portal vein, and hepatic veins. Typically, the hilar vessels and bile duct have been surgically clipped or sutured by the surgeon and can thus be easily located. The portal vein and hepatic veins are frequently transected quite close to the liver, with little extrahepatic tissue remaining. In these cases, the margins may have to be of the initial intrahepatic portion of these vessels. Remember to check for thromboemboli. In cases of chronic extrahepatic biliary tract disease, the extrahepatic bile duct may be difficult to recognize. If this is the case,

make a cut in the liver parallel to the porta hepatis, about 1 cm away from the porta hepatis. Now locate a large bile duct (by its green-yellow color) and insert a probe back toward the porta hepatis to reveal the extrahepatic bile duct. Look for lymph nodes in the hilar soft tissues, and sample each of these for histologic evaluation. Take a section perpendicular to the hilum that captures the soft tissue of the porta hepatis and the underlying liver. This section provides a look at many larger bile ducts and peribiliary glands. Next, dissect the gallbladder from its bed, and process it as you would a routine cholecystectomy (see Chapter 17).

Now that the porta hepatis has been carefully examined and sampled, section the liver parenchyma. Using a long, sharp knife, section the liver as illustrated. Record the color and consistency of the liver parenchyma. Is the liver nodular, fibrotic, or necrotic? Are any focal lesions present?

In addition to the sections taken of the porta hepatis, all lobes of the liver should be represented in a routine sampling of the explanted liver. Three sections each from the right and left lobes and one section each from the caudate

and quadrate lobes are generally sufficient, but more sections may be required to sample all areas that have a distinct appearance. Additional sections should also be taken of any focal lesions.

Important Issues to Address in Your Surgical Pathology Report on Liver Explants

- What procedure was performed, and what structures/organs are present? How much does the liver weigh?
- What are the nature and extent of the disease that underlies the liver failure?
- Are there any thromboemboli in large vessels?
- Is the gallbladder present? Are calculi or any other pathologic processes identified?
- Is a neoplasm present? What are its type, grade, size, and location? Does the tumor involve the structures of the porta hepatis? Are the margins at the porta hepatis involved by tumor?
- How many lymph nodes were examined, and how many of them harbor a metastasis?