LIVER ASPIRATION

INDICATIONS & RECOGNIZING DIAGNOSTIC SPECIMENS

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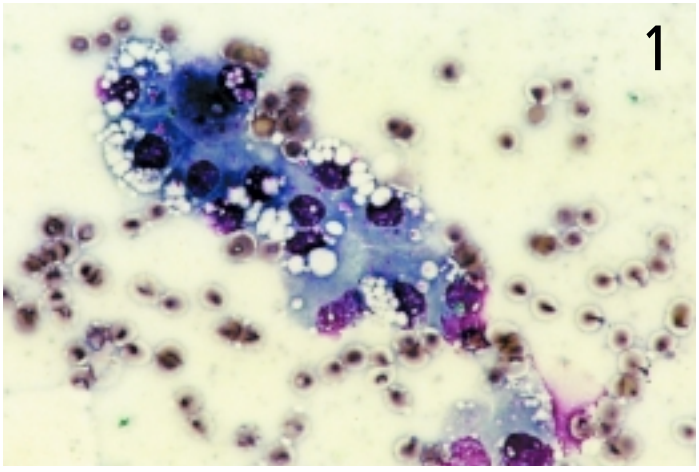
Fine-needle aspiration cytology of the liver is often an adjunct diagnostic procedure used in combination with serum biochemistry results, radiographs, ultrasonography, and biopsy. Clinical findings in animals with liver disease include icterus, anorexia, vomiting, diarrhea, abdominal enlargement, painful abdomen, and neurologic signs. Bleeding tendencies are occasionally found in animals with severe hepatic insufficiency. Indications for fine-needle aspiration cytology of the hepatobiliary system include generalized hepatomegaly, focal masses or enlargement of a single lobe, and serum enzyme elevations (alkaline phosphatase, alanine transaminase, aspartate transaminase) as well as tumor staging.

Best Diagnosed

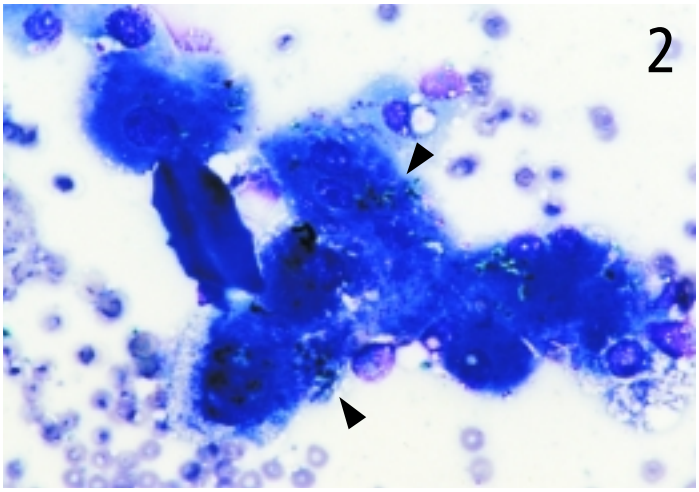
The categories of disease best diagnosed by aspiration cytology are processes associated with neoplasia, degenerative conditions, inflammation, nodular hyperplasia, extramedullary hematopoiesis, and pigment retention. Examples of neoplasia readily diagnosed by fine-needle aspiration include mast cell tumor, lymphoma, hepatic and biliary carcinomas, histiocytic sarcoma, and extensions of lymphoproliferative and myeloproliferative diseases that originate in the bone marrow (i.e., acute/chronic myeloid and lymphoid leukemias).

Metastatic carcinomas may be detected, especially with ultrasonography-guided samples. However, the origin of the metastatic carcinoma may not be obvious cytologically and histopathologic study may be needed to determine the organ of origin. Neuroendocrine tumors have a classic cytologic appearance and can be diagnosed cytologically, but again the organ of origin (i.e., liver, pancreas, thyroid, adrenal gland) must be confirmed by histopathologic examination. Sarcomas involving the liver—primary or more commonly metastatic tumors—may or may not be readily demonstrated cytologically and, due to their poorly exfoliative nature, are often missed on evaluation of cytologic specimens.

Examples of degenerative conditions include hepatic lipidosis in cats (**Figures 1 and 2**) and steroid hepatopathy in dogs. Pigment retention can be identified by cytologic examination of needle aspirates. Examples include bile pigment associated with cholestasis, hemosiderin associated with hemorrhage, lipofuscin (an aging



Fine-needle aspirate of liver tissue from a cat with hepatic lipidosis. Numerous clear cytoplasmic vacuoles are present within the hepatocytes (original magnification, 500X; reduced 75%).



Fine-needle aspirate of liver tissue from a cat with hepatic lipidosis that also had evidence of cholestasis. Bile casts (linear green fragments between hepatocytes) are evident in biliary canaliculi. Hepatocytes have increased cytoplasmic basophilia and increased numbers of binucleated hepatocytes indicative of concurrent hepatocellular hyperplasia in response to the cholestasis (original magnification, 500X; reduced 75%).

pigment), and copper in dog breeds having genetic hepatopathy associated with copper retention (Bedlington terriers, Doberman pinschers, dalmatians, and West Highland white terriers).

With this in mind, let's examine a few relevant questions regarding fine-needle aspiration cytology of hepatobiliary tissue.

Q • What are the indications for fine-needle aspiration of the liver?

A • Generalized hepatomegaly, focal masses, or unexplained elevations in liver enzymes or for tumor staging. Remember: Cytologic evaluation best diagnoses neoplasia, degenerative conditions, inflammatory processes, nodular hyperplasia, and pigment retention.

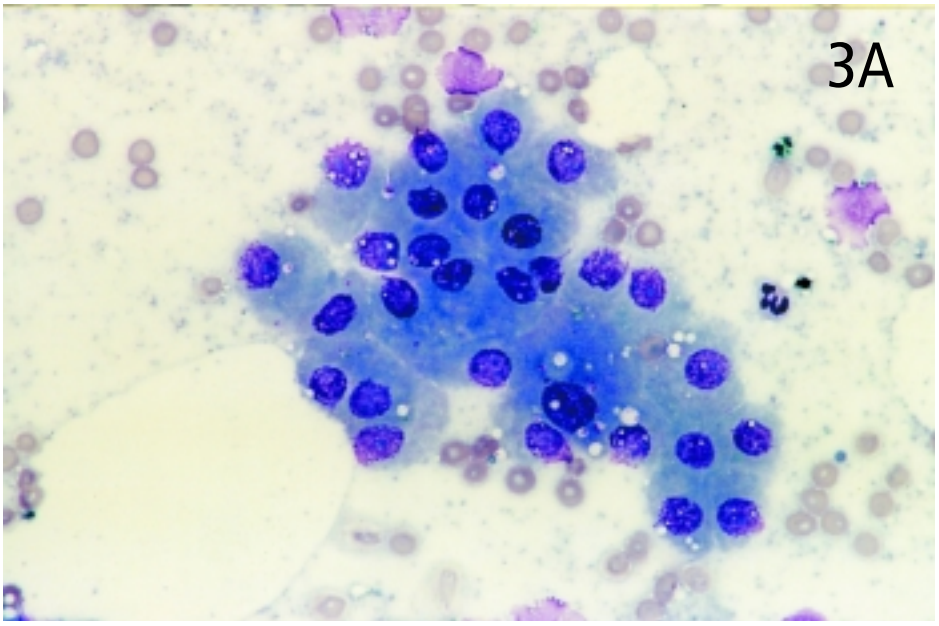
Q • What are some contraindications to fine-needle aspiration of the liver?

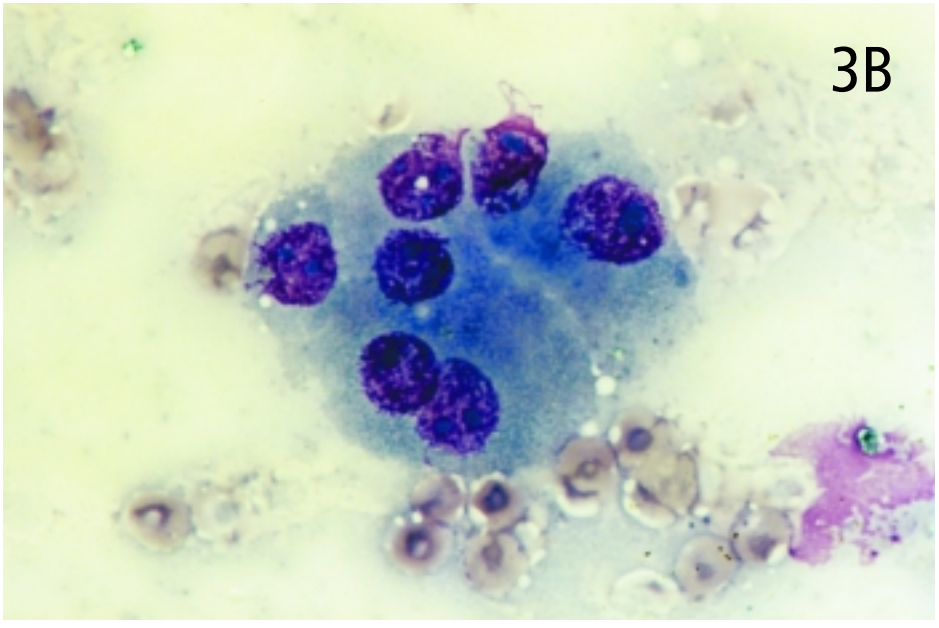
A • Severe thrombocytopenia (< 50,000 cells/µl) and acquired or congenital bleeding tendencies, such as those demonstrated by prolonged mucosal bleeding times, coagulation tests (APTT, PTT), decreased levels of antithrombin III, or increased amounts of D-dimers or fibrin degradation products. In these cases, the procedure may cause significant bleeding or possible fatal hemorrhage or shock.

Q • Is there any reason why I may be unable to obtain a fine-needle aspirate of the liver?

A • Subcutaneous fat or intraabdominal fat, especially in obese animals, may prevent obtaining a diagnostic specimen. Other organs that may be aspirated instead of the liver include the spleen and gallbladder, given their proximity to the liver. In small dogs and cats, the diaphragm may be perforated and lung tissue

continues





Fine-needle aspirate of liver tissue from a cat. A. Normal hepatocytes are fairly uniform, round to polygonal in shape, and have a moderate amount of blue-lavender, grainy cytoplasm. Nuclei are round to oval and have fine chromatin patterns and small nucleoli (original magnification, 500X; reduced 85%). B. Higher magnification (1000X; reduced 85%). An occasional binucleated hepatocyte is a normal finding.

APTT = activated partial thromboplastin time; PTT = prothrombin time

may be aspirated. Since the spleen is a lymphoid organ, cytologic examination often reveals a large amount of peripheral blood with low numbers of small, mature lymphocytes; few erythroid precursors; lymphoblasts; and plasma cells. Aspiration of the gallbladder is recognized by the appearance of dark, greenish-black fluid in the syringe. Normal lung tissue often has low cellularity with few to low numbers of macrophages. Aspirating organs other than the liver can be avoided by use of ultrasonography and selecting a needle size appropriate to the animal.

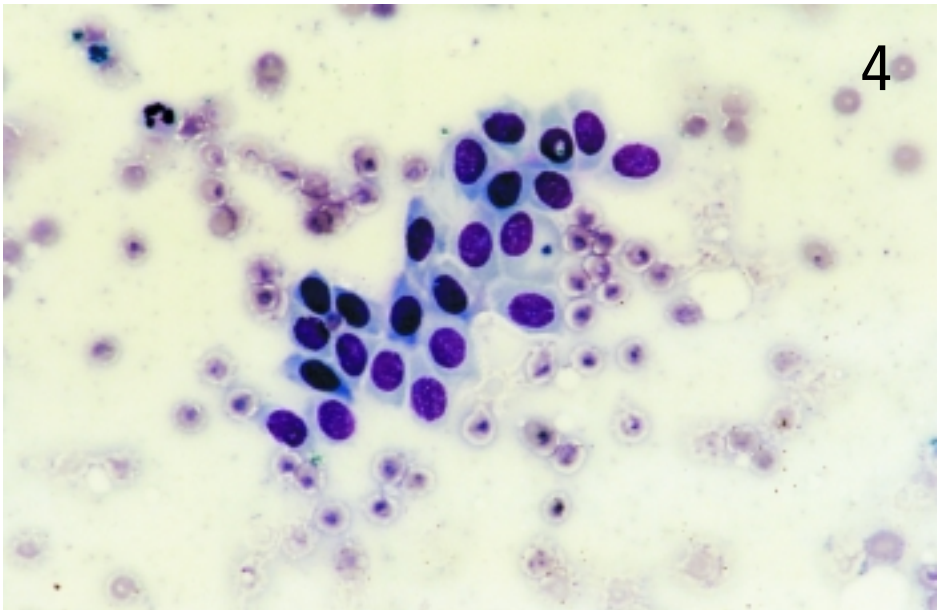
Q • How do I obtain a fine-needle aspirate of the liver?

A • The animal may be in the standing position or lateral recumbency, but the procedure is usually easiest in dorsal recumbency. For this position, insert the needle at a 35- to 45-degree angle midway between the xiphoid process and left costal arch. Insert a 22-gauge, 1- to 2.5-inch hypodermic needle into the tissue and direct it several times in the area following the same plane without exiting the skin. Then attach a 6-ml syringe filled with air to the hub of the needle, and expel the material onto a slide. Lay a second slide, in either the horizontal or vertical direction of the other slide, on top, and gently pull the slides apart. Upon completion you will have two smears.

Alternatively, an aspiration technique may be used: Attach the needle to the syringe, and aspirate several times with the plunger. Release the suction before completely withdrawing the needle. The author prefers the first method (nonaspiration technique) because it is associated with less blood contamination and cell disruption. In addition, impression smears of biopsy specimens may be made and submitted as cytologic specimens pending histopathologic studies. Remember to blot the blood from the tissue and to touch the tissue gently to the slide several times with minimal pressure when making impression smears from tissue. Forgetting to remove the blood causes hemodilution, and too much downward pressure will rupture the cells, resulting in nondiagnostic specimens.

Q • Now that I have my two smears, how do I tell if they are adequate samples and representative of the tissue aspirated?

A • Stain one of the smears with a rapid Wright's stain. Most cytologic preparations from the liver will reveal hepatic parenchymal epithelial cells, sometimes with a rare cluster of biliary tract epithelial cells. Hepatocytes are large, round to oval epithelial cells that have a round, purple nucleus with a moderate amount of encircling pale-blue to lavender cytoplasm, which has a slightly grainy appearance. The cytoplasmic borders are well-defined. Since hepatocytes are epithelial cells, they are present in small clusters and larger sheets. In addition, they often have a small nucleolus or several small nucleoli (**Figures 3 and 4**). Biliary tract epithelial cells are small and cuboidal or occasionally are columnar in shape and have a dark, round, purple nucleus and a small amount of blue cytoplasm. If you are certain that you have collected the correct specimen from your patient, submit both the stained and the unstained smear to your local diagnostic laboratory for evaluation and interpretation by a clinical pathologist.



Fine-needle aspirate of liver tissue from a cat. A small sheet of biliary epithelial cells is occasionally found in normal hepatic aspirates. They are cuboidal with scant amounts of pale basophilic cytoplasm. Nuclei are round to oval with dense chromatin and indistinct nucleoli.