Prostate

Ultrasound-Guided Fine-Needle Biopsy and Aspiration

Jill Brunker, DVM, Oklahoma State University

Overview

Ultrasonography has become an important imaging tool for assisting in a number of interventional procedures performed on the veterinary patient. Fine-needle biopsy and aspiration of the prostate can be a relatively safe and a minimally invasive tool for diagnosing prostate diseases. While not always providing a definitive answer, cytologic examination of fine-needle aspirates can be diagnostic or highly suggestive of certain prostate diseases, such as benign prostatic hyperplasia, neoplasia, infections, and inflammation. The incidence of complications is very low and can include mild hemorrhage, leakage of septic contents, or local spread of neoplastic cells through the needle tract.

Definitions

Fine-needle biopsy refers to using a small-gauge needle (22-gauge) in several quick, stabbing motions—or a "sewing machine action"—to retrieve samples from *solid* tissue. This helps minimize damage to the sample, which can occur when suction is applied to the syringe. The sample is still transferred onto a glass slide for cytologic examination. Fine-needle biopsy differs from a 14- or 16- gauge Tru-Cut biopsy, which results in a sample of the size needed for histopathologic evaluation.

Fine-needle aspiration is most beneficial for sampling *fluid-filled* structures; the fluid is more apt to be aspirated into the hub of the syringe.

continues

WHAT YOU WILL NEED

Any portable ultrasound machine is adequate to perform the technique. A sector-array transducer is preferred over a linear-array transducer for two reasons. First, visualization of the entire prostate is not easy with a linear-array ultrasound transducer; this is because part of the caudal aspect of the prostate is almost always located close to the cranial portion of the pelvic canal. A sector-array transducer makes it easier to gain access to that area and image the entire prostate. Second, it is easier to align the needle with the sector-array transducer, allowing better visualization of the needle on the monitor.

Transducers with frequencies of 7- or 7.5-MHz are recommended; however, 5.5- to 6-MHz transducers may produce an image with good resolution. Transducers with higher frequencies have better resolution than those with lower frequencies (3.5- or 5-MHz). Some sector-array transducers come with a clip-on biopsy guide that can be attached to the transducer. This device is more often used for Tru-Cut biopsies.

STEP-BY-STEP

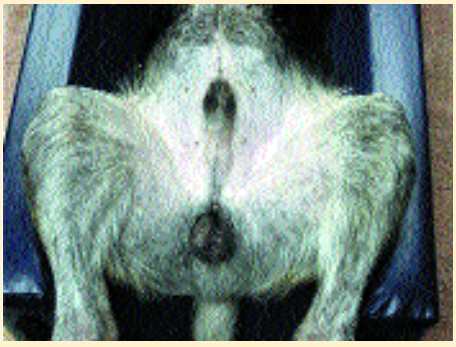
How to Perform Ultrasound-Guided Fine-Needle Biopsy and

1 **Getting started.** Anesthesia and sedation are needed only in cases of uncooperative and/or painful patients. Rule out coagulopathy before performing the technique if a high risk for bleeding is suspected.

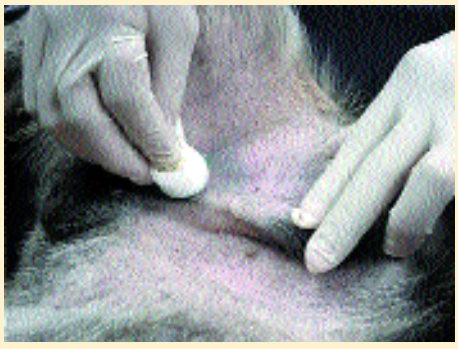
For ultrasound-guided fine needle biopsy or aspiration, the free-hand technique can be easily done and special guidance devices are not necessary. This technique also allows the sonographer to redirect the needle if it is not going directly to the area of interest. Attach a 22-gauge, 1.5-inch needle to a 6- or 12-ml syringe. Use of an extension set attached to the needle on one end and the syringe on the other end has also been recommended and allows easier manipulation of the needle. The sample can then be transferred to glass microscope slides.

PROCEDURE PEARL

Anesthesia and sedation are needed only in cases of uncooperative and/or painful patients.

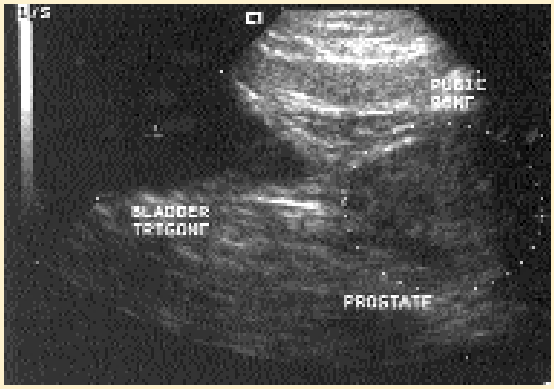


2 **Preparing the patient.** After identifying the prostate, aseptically prepare the area of the caudoventral abdomen. Place the dog in dorsal recumbency and clip an area from the cranial end of the prepuce to the base of the scrotum, extending the area laterally approximately 5 to 10 cm depending on the size of the dog. With ultrasonography, identify the image of the prostate and other associated landmarks needed to locate where the needle is going to be inserted. Use isopropyl alcohol instead of the ultrasound gel to facilitate later preparation of the aspiration area.



3 **Aseptic preparation.** When you are ready to begin the procedure, aseptically scrub the clipped area with chlorhexidine or iodine scrub. Radiate the scrub pattern outward away from the center. Isopropyl alcohol can be used to remove residual scrub material. Again, always start from the center and radiate outward. Clean the end of the ultrasound transducer with the isopropyl alcohol to avoid contamination of the prepared site.

In most cases, a 22-gauge, 1.5-inch needle placed on a 6-ml luer taper-tip syringe is adequate. In large dogs, it is important to use the electronic calipers on the ultrasound machine to measure the distance between the skin surface and prostate. If a needle longer than 1.5 inches is needed, 22-gauge spinal needles come in longer lengths and can be used as a substitute after removing the stylet.

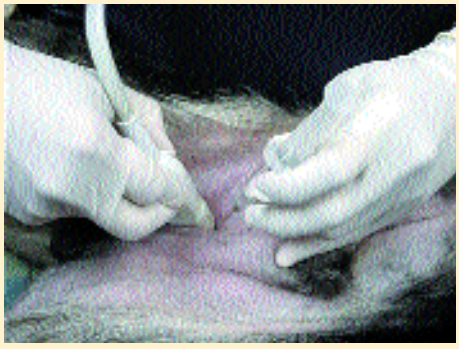


4 **Identifying the structures.** Image the prostate by placing the transducer on the caudoventral abdomen on one side of the prepuce. It is useful to identify the urinary bladder first and then displace the transducer caudally until you can visualize the trigone area. You will notice that the image of the bladder becomes more narrowed and the trigone area becomes triangular. The prostate will appear just caudal to the trigone area as an ovoid hypoechoic (gray) structure. Just caudal to the prostate, a hyperechoic (white) linear area will appear. This is part of the pubic bone.

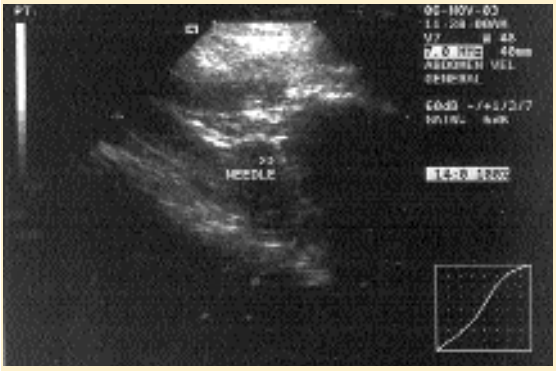
PROCEDURE PEARL

Use isopropyl alcohol instead of ultrasound gel to facilitate later preparation of the aspiration area.

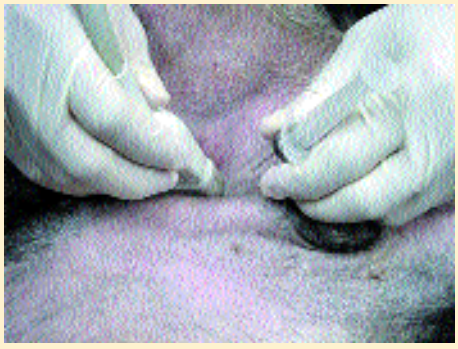
Aspiration of the Prostate



5 **Inserting the needle.** After attaching the needle to the syringe, pull back the syringe plunger, as illustrated, to allow the sample to move easily up into the needle. Align the needle with the groove present on all transducers to assure that the needle passes through the ultrasound beam and can thus be seen on the monitor. Because the prostate is slightly more echogenic (slightly brighter) than other parenchymatous organs, it is sometimes difficult to visualize the needle. The needle will appear on the monitor as a hyperechoic (very bright), ill-defined linear structure passing through the abdominal cavity and prostate parenchyma (below). If the needle is not easily seen in the monitor, slight movement can be noted through the pathway of the needle. The prostate can also be seen to move as the needle enters the prostatic parenchyma.



Acknowledgment: The author thanks Dr. Robert Cruz for his help in obtaining the images/photos in this article.



6 **Obtaining the sample.** *Fine-Needle Biopsy.* Once the needle is in the prostatic parenchyma, quickly move it back and forth approximately six to ten times without redirecting to obtain the sample. Be careful to avoid extending the path of the needle out of the prostate into the abdominal cavity, urethra, adjacent blood vessels, or colon. Therefore, it is important to measure the distance between the ventral abdominal wall and the prostate with the mechanical calipers of the ultrasound machine to ensure that the needle does not advance beyond that point.

PROCEDURE PEARL

Measure the distance between the ventral abdominal wall and the prostate to ensure that the needle does not advance beyond that point.

Slide Preparation

Fine-Needle Biopsy. After the sample is obtained, the aspirated material is transferred onto a glass slide. This must be done quickly to minimize drying of the aspirated material within the needle. While holding the syringe with the needle at a 90-degree angle to the glass slide, forcibly push the plunger of the syringe down. This will blow the sample onto the slide. The cells can then be spread out in a manner similar to that in preparing a blood smear, or you can place another slide on top of the glass slide containing the sample and gently slide the two in opposite directions. Repeat the process to make sure all of the aspirated cells are removed from the needle, but be sure to always remove the needle from the syringe when refilling the syringe with air so the sample is not aspirated back into the syringe.

Sample obtained by fine-needle biopsy prepared with Wright's stain

Fine-Needle Aspiration

When fine-needle aspiration is going to be performed on fluid-filled structures, the needle is more easily seen as it passes through these lesions (abscess, cysts). In this case, the plunger of the syringe should *not* be pulled back before the needle is advanced. Aspiration of the lesions for treatment purposes is typically unrewarding as they will most likely fill up again. However, aspiration for cytologic analysis and culture can be done.

The procedure can be repeated in an effort to ensure adequacy of sample for both fine-needle biopsy and fine-needle aspiration.

See Aids & Resources, back page, for references, contacts, and appendices.