Reproductive Ultrasound of the Dog and Tom

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Ultrasonographic evaluation of the reproductive tract is an important component in the evaluation of the dog and tom with reproductive disorders. Information is obtained confirming normal anatomy as well as pathologic conditions (eg, testicular neoplasia). Serial ultrasonographic evaluation of the diseased reproductive tract can be very helpful in evaluating progression of disease (eg, testicular atrophy) and response to therapy (eg, benign prostatic hyperplasia).

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Performing ultrasound of the male reproductive tract requires basic knowledge of the normal canine and feline reproductive anatomy. The male canine reproductive tract consists of the male genital organs including the scrotum, the 2 testes (normally located within the scrotum), the epididymi, the deferent ducts (leading from the epididymis to the urethra), the spermatic cords, the prostate, the penis, and the urethra.

The canine scrotum is a pouch divided by a thin wall into 2 cavities, each of which is occupied by a testicle, an epididymis, and the tail end of the spermatic cord. The skin of the scrotum is covered with fine hairs. The dartos of the scrotum is a layer of tissue that lies just under the skin and is made up of muscle and other tissue. Under the dartos is connective tissue lining the scrotum. Each canine testicle is oval in shape and thicker centrally. The testicles contain seminiferous tubules. The epididymis is comparatively large in the dog and consists of an elongated structure composed of a long and convoluted or twisted tube. It begins at the cranial aspect of the testicle and is positioned along the edge. The deferent ducts are thin, muscular tubes that are made up of 3 layers.

The canine prostate gland surrounds the neck of the bladder, as well as the distal ductus deferens. A thin wall divides the gland into 2 equal-sized, smooth, firm lobes. The prostate has multiple openings into the urethra.

The canine penis is a highly vascularized structure. It is composed of several parts, including the root, body, and distal portion or glans penis. The root and body are made up of a vascular expansile tissue, the glans, and the os penis. During copulation, the glans penis swells, permitting the copulatory lock. The penis also surrounds the termination of the urethra and is important in directing the stream of urine to the outside of the body. The prepuce is the tubular sheet of skin that covers the free part of the nonerect penis.

The reproductive tract of the tom cat consists of the penis, the scrotum, 2 testicles, the prostate gland, 2 bulbourethral glands (Cowper's glands), the epididymis, the ductus deferens (also called the vas deferens), the spermatic cords, and the urethra.

The feline penis is located within the prepuce. When the penis is not erect, it is completely enclosed within the prepuce, which is visible on the caudal aspect of the body between the 2 pelvic limbs. The penis is covered by a protective sheath called the prepuce. The tip of the penis is called the glans, and it is covered with 120 to 150 penile spines that are directed caudally, away from the end of the glans. These penile spines start to appear at about 12 weeks of age and are fully developed at puberty. They are absent in neutered male cats, disappearing by 6 weeks after castration. The feline penis is a highly vascularized structure. It surrounds the termination of the urethra and is important in directing the stream of urine to the outside of the body.

The feline scrotum is located just ventral to the anus and dorsal to the prepuce. It is visible when the tail is lifted upward. The scrotum is covered with dense hair and is not pendulous. The scrotum is a pouch divided by a thin wall into 2 cavities, each of which is occupied by a testicle, an epididymis, and the tail end of the spermatic cord. The dartos of the scrotum is a layer of tissue that lies just under the skin and is made up of muscular tissue. Under the dartos is connective tissue that lines the scrotum.

The feline testes, or testicles, are normally located within the scrotum. Each testicle is round to oval in shape. The testicles contain the seminiferous tubules. The epididymis is an enlarged tube positioned along the edge of the testicle. Its beginning and end (head and tail) are located at the cranial and caudal aspects of the testicle, respectively. The deferent ducts are thin, muscular tubes that are made up of 3 layers. The ductus deferens or vas deferens begins at the tail of the epididymis and runs along the border of the testicle, and then toward the caudal aspect of the abdomen. It passes through

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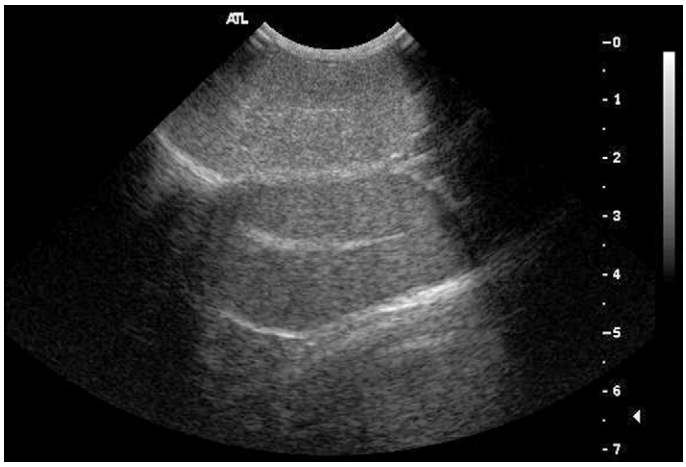

Figure 1. Normal canine testes. Using one testis as a "standoff" for the other facilitates evaluation by placing the testicle in the center of the image.

the prostate and empties into the urethra. The 2 spermatic cords are composed of the ductus deferens, and the vessels and nerves of the testicles. They are covered by a thin membrane. Each cord originates at the tail of the epididymis and extends through the inguinal canal.

The feline urethra extends from the urinary bladder to the very tip of the penis. The feline penile urethra is very narrow and much shorter than the urethra of the dog. The prostate gland is very small in the cat. It is normally located at the cranial aspect of the rim of the pelvis caudally in the abdominal cavity. The prostate gland surrounds the proximal portion of the urethra and the termination of the ductus deferens. The bulbourethral glands are situated on either side of the urethra. The prostate gland surrounds the proximal urethra, as well as the distal ductus deferens. The prostate has multiple openings into the urethra. It is a very small, relatively unimportant organ in the male cat.

Ultrasonography

As with the female reproductive patient, before performing a specific evaluation of the male reproductive tract, the abdomen should be evaluated methodically with the animal in dorsal recumbency.[1] The discovery of abnormalities in other systems can be relevant to reproductive disorders.

The testes are readily located within the scrotum in the normal dog and tom. Imaging each testis can be facilitated by using the opposite as a standoff structure (Fig 1). The normal testis is uniform in texture with echogenicity similar to the spleen (Fig 2). The mediastinum testis is a thin, centrally located, very hyperechoic line. The epididymis (head, body, tail) is less echogenic than the testis. The ductus deferens is difficult to visualize. The spermatic cord is adjacent to the head of the epididymis and has obvious, tortuous, small-diameter veins.

The normal intact canine prostate gland, located in the pelvic canal, has fairly uniform echogenicity, a smooth, stippled texture, and echogenicity similar to that in the spleen. Its shape is bilobed in the transverse plane and oval in the longitudinal plane (Fig 3, A and B). A hyperechoic "butterfly" pattern may be noted in the transverse image that corresponds to the distribution of ductal tissue, having more echogenic connective tissue than the more hypoechoic glandular tissue. The length and height of the prostate gland range from 1.3 to 3.3 cm in mature, 7- to 30-kg dogs.[2] The lumen of the prostatic urethra is usually not visualized. The periurethral connective tissue is variably imaged as a bright hilar echo. Caudally, the hilar echo may be surrounded by the hypoechoic urethralis muscle. The normal prostatic capsule can be difficult to detect. In the neutered male, the prostate will be quite a bit smaller; in fact, it is usually just a pod, or "flair" bulging out of the width of the urethra (Fig 4). The neutered male prostatic pod will appear isoechoic with the urethra and be much more hypoechoic than the intact male prostate.

The feline prostate gland surrounds the proximal urethra within the pelvic canal, making visualization difficult. Prostatic disorders are, fortunately, uncommon in the tom.

Disorders of the Male Reproductive Tract

Generally, any evidence of genitourinary disorders detected on physical examination or laboratory analysis indicate the need for ultrasound evaluation in the male dog. Ultrasonographic examination of the testes, epididymi, and prostate gland can demonstrate lesions too small or inaccessible for detection via palpation, and permits differentiation of soft tissue details not recognized with radiography. In the tom cat, ultrasound evaluation of the testes for morphologic abnormalities can assist in the diagnostic evaluation of infertility.

Infertility

Evaluation of the infertile (normal libido) stud dog's general and urogenital health by appropriate laboratory analysis

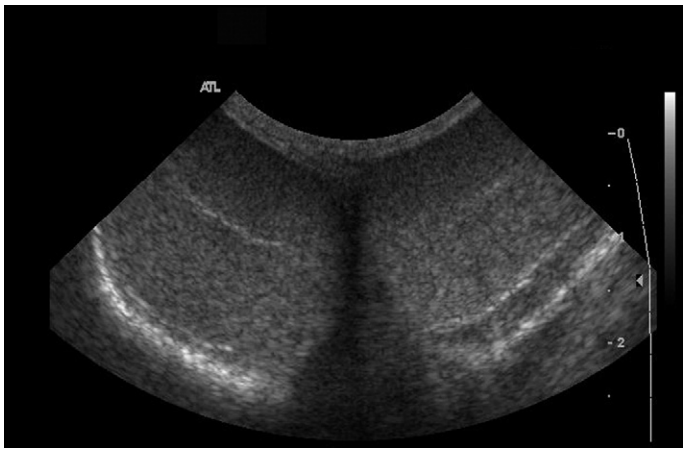

Figure 2. Normal canine testes. Note the uniform parenchymal echotexture (similar to the spleen) and mediastinum testis (hyperechoic central linear structure or slash). This transverse view allows for comparison of size and texture.