Prostatic Disease in Dogs
India Lane, DVM, MS, Ed.D, DACVIM
University of Tennessee
Knoxville, TN

Prostatic disorders are primarily encountered in intact male dogs and humans and are frequently influenced by androgenic (dihydrotestosterone, DHT or testosterone) stimulation. Prostatic diseases include: Benign prostatic hyperplasia/hypertrophy (BPH), prostatic and paraprostatic cysts, bacterial prostatitis or abscess, and prostatic neoplasia. Diagnostic Evaluation of the prostate gland may include: Signalment and clinical signs; Rectal palpation; Diagnostic imaging including radiography, sonography and computed tomography; cytologic evaluation and culture of prostatic fluid; +/- biopsy. Evaluation of clinical features, prostatic gross morphology and cellular features is usually sufficient for diagnosis. Treatment of prostatic disease may include: hormonal manipulation with either castration or antiandrogenic pharmacologic agents; antimicrobial treatments that penetrate prostatic tissue and glandular fluid; surgical approaches (cyst drainage, removal or omentalization of cysts/abscesses; prostatectomy).

Diagnostic approach

Key clinical findings
Benign prostatic diseases such as BPH and chronic bacterial prostatitis are likely to cause localized signs: hematuria, urethral discharge, hindlimb stiffness and tenesmus. Signs of systemic illness are possible with acute bacterial prostatitis, advanced prostatic neoplasia or abscession. Urinary incontinence, urinary obstruction, hindlimb tremors and weight loss are ominous signs that suggest neoplasia. Prostatic enlargement in a neutered dog is almost always caused by neoplasia.

Diagnostic imaging

Survey radiographs
Signs of disease include: Symmetrical or asymmetrical enlargement; poor contrast of capsule; granular mineralization; enlarged sublumbar nodes (usually metastasis); bony lesions of pelvis or lumbosacral spine (metastasis). Note that mineralization within the prostate in a neutered dog is highly associated with neoplasia; lack of mineralization in an intact dog rarely is associated with neoplasia. Contrast Radiography is rarely necessary for the evaluation of prostatic disease, but can be useful when the prostatic urethra needs to be identified more clearly, such as with compression by large paraprostatic cyst or abscess or obstruction or disruption by neoplasia.

Transabdominal ultrasonography
Sonography is easy and useful for evaluating the prostate gland. The normal gland is homogeneous in appearance (similar echogenicity to spleen) with smooth margins. Normal size is dependent on dog’s body weight and can be calculated. Sonography can be used to: identify enlargement, homogeneity; evaluate sublumbar lymph nodes (and other abdominal nodes or organs); identify and aspirate or drain cysts; guide aspirates or biopsies. Occasionally contrast ultrasound or contrast CT is recommended to provide more detail about vascular structures in the diseased prostate gland.

Prostatic sampling

Ejaculate
Easily obtained in young, intact or breeding dogs, but more difficult when the dog has painful prostatic disease such as infection, abscess, or neoplasia. The third fraction of the ejaculate is collected for evaluation of prostatic fluid.

Urethral brush sample
An easy, quick and accurate sampling method. A tiny protected urethral brush is passed retrograde into the urethra; then the brush is advanced and exposed at the level of the prostate gland for a brushing of the prostatic urethral epithelium. The brush is then retracted and withdrawn from the urethra. Cells are usually captured on the brush and can be placed in a small amount of saline or brushed directly onto a microscope slide. Avoid if acute prostatitis is suspected.

Fine needle aspirate
Using a long small gauge needle, cyst fluid or tissue can be aspirated with ultrasonographic guidance (avoid the urethra). There is a possibility of seeding abdomen with bacteria (abscess) or neoplastic cells. Samples from parenchyma are often not as helpful as fluid samples or urethral brushings.

Prostatic massage/wash
Useful for collecting prostatic fluid when an ejaculate is not possible. The procedure is a little cumbersome, requires sedation and at least two people to perform. Prostatic massage is contraindicated in suspected acute bacterial prostatitis. Inflammation will disrupt prostatic fluid: blood barriers; massage or brushing can force bacteria into the bloodstream.

- Procedure: Pass urinary catheter and empty bladder. Flush 5 ml sterile saline into bladder and retrieve as sample # 1. Retract catheter just dital to prostate gland and massage prostate per rectum for 1 – 3 minutes. Repeat flush of 5 ml saline
and retrieve sample (#2, which includes the prostatic fluid) as the catheter is advanced into the urinary bladder and then withdrawn. Bacterial cultures of bladder (#1) and prostate (#2) can be compared using this method.

**Prostatic biopsy**

Multiple methods are possible, including catheter biopsy, perabdominal, peri-rectal and transrectal or open approaches. Very important for confirming neoplasia.

Samples are usually submitted for: Cytology. Normal cytological findings include healthy prostatic epithelial cells, few red blood cells, few inflammatory cells; Culture: Submit for aerobic, anaerobic and mycoplasma culture. Normal fluid is sterile. Histopathology: routine stains are usually sufficient.

**Management of prostatic diseases**

**Benign prostatic hyperplasia (BPH)**

Glandular hyperplasia develops in nearly all intact male dogs with increasing age (especially > 5 yrs). A changing androgen:estrogen hormone ratio with age (and local growth factors) appears to cause the development of BPH, with increased secretion and urethral discharge, cyst formation, increased vascularity and bleeding. The prostate gland is mild to moderately enlarged and smooth, symmetric and nonpainful. Diagnostic Findings include hematuria, homogeneous prostatic enlargement, small cysts, increased RBCs and hyperplastic prostatic epithelial cells. Definitive diagnosis can be obtained by biopsy but response to treatment (castration) is usually sufficient for diagnosis.

Castration is the preferred treatment for BPH. The prostate gland will involute rapidly, decreasing approximately 50% in size within 3 weeks, 70% in size by 9 weeks, with complete involution by 12 weeks. Castration should resolve small cysts, bleeding and chronic bacterial prostatitis. If the prostate gland remains enlarged or clinical signs persist post-castration, then another disease process is likely.

**Medical alternatives for management of BPH**

- Finasteride is a 5-alpha reductase inhibitor that blocks production of DHT from testosterone. Mechanism of action maintains circulating testosterone that contributes to secondary sex characteristics, libido and semen quality.
  - **Dose** 0.1 -0.5 mg/kg/day PO, up to 5 mg/dog
  - Decreases prostate size and clinical signs within 1 – 4 weeks. Treatment usually given for 1 – 4 months.
- Progestins exert negative feedback on the pituitary which causes direct suppression of LH release and testosterone production, and are best used for a short period of time in order to maintain breeding dog prior to castration. Progestins are fairly effective in decreasing prostatic size and clinical signs but have more adverse effects than finasteride, including diabetes mellitus, mammary hyperplasia, immunosuppression, hypothyroidism. Options include:
  - Megesterol acetate 0.1 – 0.5 mg/kg PO q 24 hrs for 3 – 8 weeks (also inhibits 5alpha reductase, facilitates clearance of testosterone and competitively binds testosterone receptors)
  - Medroxyprogesterone injection 0.3 mg/kg SC once (can last up to 10 months)
- Anastrazole is an anti-estrogen agent that appears to be moderately effective as well.
- GnRH Superagonist implants (chemical castration). Decreases size and clinical signs in dogs with BPH for 6 – 22 months. Mild adverse effects included weight gain, transient initial worsening of clinical signs.

Intraprostatic treatments, including botulinum toxin injection, ethanol and thermal ablation, and histotripsy that disrupt hyperplastic tissue have been investigated in research models.

**Acute and chronic bacterial prostatitis**

The prostate gland is usually protected from bacterial invasion by host defense mechanisms that protect the urinary tract. Prostatic fluid is also antibacterial in nature, due to locally secreted immunoglobulins and prostatic antibacterial factor. However, prostatic diseases or cysts increase the risk of infection. Bacterial infections are usually caused by pathogens that gain entrance to the urethra and ascend into prostate tissue. The most common organism is E. coli. Other fairly common organisms include Staphylococcus, Klebsiella, Proteus, Pseudomonas, Enterobacter. Rare agents include B. Canis, mycoplasma; Anaerobes may be found in prostatic abscesses.

The prostatic epithelium and a typically acidic prostatic fluid pH (pH 6.4) creates a blood-prostatic fluid barrier that influences antimicrobial penetration and effectiveness. With acute inflammation, the barrier is ineffective; injectable antimicrobials effective against E. coli are appropriate initial choices. With chronic bacterial prostatitis (or the prolonged treatment of acute disease), antimicrobials that are lipid-soluble, weakly ionized, poorly protein bound, and weak bases enter prostatic tissue most effectively, and are then ionized (accept a proton) and become “trapped” there. Good choices include:

- Gram negative organisms: enrofloxacin, trimethoprim-sulfa, chloramphenicol
- Gram positive organisms: clindamycin, erythromycin, clindamycin, trimethoprim-sulfa, chloramphenicol
- Mycoplasma: enrofloxacin

Long term antimicrobials (6-8 weeks usually, 12 weeks if relapsed) and intensive monitoring are required. Castration is required for complete resolution. Ideal follow-up includes culture of urine and prostatic fluid during initial 2 weeks of treatment then monthly
thereafter until completely resolved (ensuring several negative cultures are obtained). Castrated dogs are unlikely to require such intensive monitoring.

Treatment of Prostatic Abscesses generally requires surgical drainage and omentalization or marsupialization. Drainage by ultrasound-guided aspiration (along with long term antimicrobials) can be successful in some cases. Subtotal or total prostatectomy may be a salvage procedure.

**Prostatic neoplasia**

Adenocarcinoma of the glandular tissue or Transitional Cell Carcinoma arising from the prostatic urethra are the most common neoplasms found in the prostate gland (squamous cell carcinoma, sarcomas occur occasionally). Certain common breeds are reported to have increased risk: Beagles, Dobermans, Springer Spaniels, Scotties, Shelties, and Westies. Remember that urinary incontinence, urinary obstruction, hindlimb weakness, tremors and weight loss suggest neoplasia in dogs with prostatic disease. The metastatic pattern extends to regional (sublumbar) lymph nodes, bone and lungs; metastasis is common at the time of diagnosis. Neutering does not protect dogs from prostatic neoplasia; in fact the relative risk for development of carcinoma increases with the duration of time that the dog has been neutered.

No highly successful treatment is available. Advanced surgical methods may be applied to tumors isolated to the prostate, but morbidity is high (urinary incontinence) and significant effect on survival has not been documented. Generally, dogs are treated palliatively with piroxicam, but prostatic carcinomas are not as responsive to NSAIDs as transitional cell carcinomas of the urinary bladder. Urinary diversion or stenting may be necessary in dogs with urethral obstruction from prostatic neoplasia.

**Key take home points**

- Prostatic diseases most often cause localized lower urinary tract signs; systemic signs usually indicate acute prostatitis, abscess or advanced neoplasia.
- The canine prostate is easy to evaluate with palpation, ultrasound examination, and aspirate or brushing of prostatic cells or fluid.
- Prostatomegaly in a neutered male dog is almost assuredly caused by neoplasia.
- Urinary obstruction is rare in dogs with prostatic disease except for neoplasia that disrupts the urethral lumen and paraprostatic cysts or abscesses that create extramural compression.
- Castration should resolve all clinical signs and prostatic enlargement associated with BPH.
- Finasteride is the pharmacologic alternative of choice for management of BPH if castration is not possible.
- Long term antimicrobials that penetrate well into prostatic fluid, along with castration, are needed for management of prostatitis. Castration is also recommended to achieve complete resolution.
- The prognosis for dogs with prostatic neoplasia is poor; palliative treatment with piroxicam may minimize clinical signs for short term periods.

**Table. Key pharmacologic agents used for prostatic disease in dogs**

<table>
<thead>
<tr>
<th>Key Drug</th>
<th>Drug Class</th>
<th>Dose Range</th>
<th>Frequency</th>
<th>Route</th>
<th>Indications/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finasteride</td>
<td>5-alpha reductase inhibitor</td>
<td>0.1 -0.5 mg/kg/day PO, up to 5 mg/dog</td>
<td>Q 24 hrs</td>
<td>PO</td>
<td>Short or long term management of BPH; Well tolerated</td>
</tr>
<tr>
<td>Osaterone acetate</td>
<td>Steroid anti-androgen</td>
<td>0.2-1.0 mg/kg</td>
<td>Q 24 hrs</td>
<td>PO</td>
<td>Very effective for BPH; not available in US</td>
</tr>
<tr>
<td>Megestrol acetate</td>
<td>Progestin</td>
<td>0.1 – 0.5 mg/kg</td>
<td>Q 24 hrs</td>
<td>PO</td>
<td>Short term (3-8 weeks) management of BPH; multiple adverse effects possible</td>
</tr>
<tr>
<td>Medroxy-progesterone</td>
<td>Progestin</td>
<td>0.3 mg/kg</td>
<td>Single injection</td>
<td>SC</td>
<td>Short-intermediate term (up to 10 months) management of BPH; adverse effects possible</td>
</tr>
<tr>
<td>Enrofloxacin</td>
<td>Flouroquinolone antimicrobial</td>
<td>5 -10 mg/kg</td>
<td>Q 24 hrs</td>
<td>PO</td>
<td>Long term treatment of bacterial prostatitis; antimicrobial selection should be based on C&amp;S</td>
</tr>
<tr>
<td>Marbofloxacin</td>
<td>Flouroquinolone antimicrobial</td>
<td>2.5-5 mg/kg</td>
<td>Q 24 hrs</td>
<td>PO</td>
<td>Same as enrofloxacin</td>
</tr>
<tr>
<td>Prazosin</td>
<td>Alpha-antagonist</td>
<td>1 mg/15 kg</td>
<td>Q 12 hrs</td>
<td>PO</td>
<td>Functional urinary obstruction associated with BPH; more effective in humans. Possible sedation or hypotension</td>
</tr>
<tr>
<td>Silodosin</td>
<td>Selective a-1a antagonist</td>
<td>0.1 mg/kg?</td>
<td>Q 24</td>
<td>PO</td>
<td>Same as for prazosin; dosage extrapolated from humans; no clinical experience in dogs</td>
</tr>
<tr>
<td>Piroxicam</td>
<td>NSAID</td>
<td>0.3 mg/kg</td>
<td>Q 24 hrs</td>
<td>PO</td>
<td>Palliative treatment of prostatic carcinomas; use GI protectants</td>
</tr>
</tbody>
</table>