

# Inflammatory diseases of the canine prostate gland

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The first article in this two-part series (UKVetVol 11 No 7) discussed the non-inflammatory diseases of the canine prostate gland. This article reviews the inflammatory conditions of the gland.

## INFLAMMATION OF THE PROSTATE GLAND

Prostatitis is probably the second most common canine prostatic disorder, and can be acute or chronic. Predisposing factors to infection include underlying prostatic disease (such as BPH, cysts, neoplasia, squamous metaplasia) as well as urethral diseases (urolithiasis, neoplasia, trauma, strictures) and urinary tract infections (UTI).

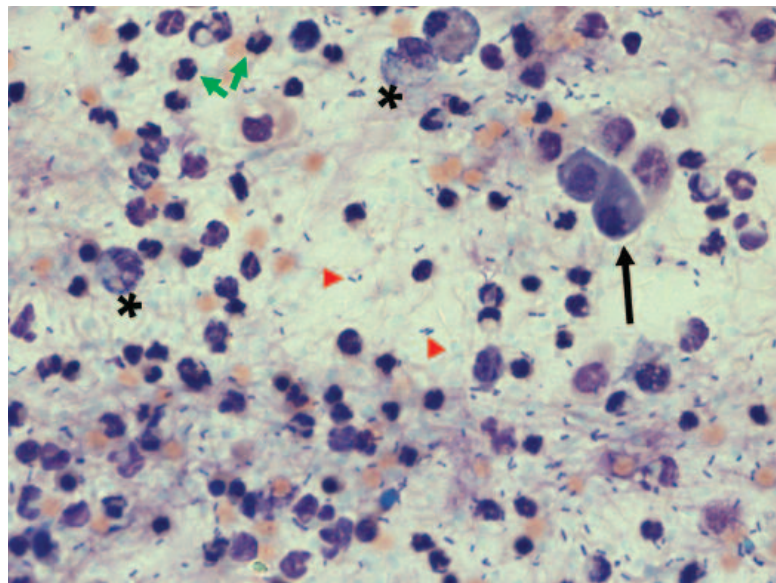
Most cases are bacterial and result from ascending urethral infection, although some are acquired haematogenously, and other potential sources are infected urine or semen. Causative infectious agents are those that typically cause ascending UTI, and because prostatic fluid normally refluxes into the urinary bladder, UTI is often concurrently present. Gram negative organisms are mostly implicated, especially *Escherichia coli*, and others include *Pseudomonas aeruginosa*, *Klebsiella* sp., and *Proteus mirabilis* although Gram positive bacteria (*Staphylococcus aureus*, *Streptococcus* sp., and *Enterococcus* sp.) have been isolated. *Brucella canis* (not present in the UK) can infect the prostate gland, but more usually infects epididymal and testicular tissue. *Mycoplasma canis* and *Ureaplasma* sp. are other possible opportunistic pathogens, and fungal prostatitis occurs rarely.

The normal prostate gland is inherently resistant to bacterial infection, with natural host defence mechanisms including genital tract mucosal defence barriers, acidity of prostatic fluid (pH 6.1 to 6.5), urethral peristalsis, mechanical flushing during urination and ejaculation, the urethral high pressure zone, and zinc-associated prostatic antibacterial factor that is secreted by the gland into seminal fluid. Any underlying impairment in these defences will thus predispose to infection, and concurrence of other prostatic disorders may alter normal defence mechanisms that prevent retrograde movement of bacteria.

## ACUTE PROSTATITIS

Acute prostatitis (AP) is usually suppurative (Fig. 1)

and can arise at any age, but is more common in older dogs with BPH, and uncommon in castrated dogs due to prostatic atrophy. Glandular changes and disrupted urine and prostatic fluid flow associated with BPH predispose to prostatic infection.



**Fig. 1:** Cytological features of acute suppurative bacterial prostatitis in fluid obtained by prostatic massage. Large numbers of neutrophils (green arrows) and bacteria (red arrowheads), with occasional macrophages (asterisk) and sloughed urethral transitional cells (black arrow).

Clinical signs are usually more severe than for BPH and additionally include urethral discharge, haematuria, pollakiuria, dysuria, tenesmus, caudal abdominal or pelvic discomfort, and prostatic pain on rectal palpation. Signs of systemic illness such as lethargy, anorexia and pyrexia are usually also present. Unless the patient is dehydrated, serum biochemistry is normal. Haematological parameters vary with disease duration and severity, but neutrophilic leucocytosis with or without a left shift, and toxic neutrophil changes may be present.

Urinalysis may demonstrate pyuria, haematuria, bacteriuria, leucocytes and possibly increased squamous epithelial cells. Urine culture and sensitivity (from a cystocentesis obtained sample) should be performed, and a positive bacterial growth is obtained. Although prostatic fluid should be

CPD

obtained if possible for cytology as well as culture and sensitivity, collection can be problematic in these cases:

- Prostatic massage or wash procedures may precipitate bacteraemia and septicaemia
- Dogs are reluctant to ejaculate due to the painful nature of this condition
- Fine-needle aspiration (FNA) may release organisms into the peritoneal cavity (with transabdominal aspiration), or perineal tissues (with perineal/perirectal approach).

If positive prostatic fluid cultures are obtained they often yield the same organisms as in urine. Consequently, if history and clinical findings are suggestive, a presumptive diagnosis is frequently based on urine cytology and culture. Prostatic tissue culture and biopsy are rarely indicated, as response to antibiotic therapy is usually rapid.

A firm and enlarged gland is evident on palpation, and may be diffusely to asymmetrically enlarged. Prostatomegaly will be seen radiographically. Ultrasonographic changes in echogenicity are more pronounced than with BPH, and the gland may be variably hyperechoic with a more complex contour.

### CHRONIC PROSTATITIS

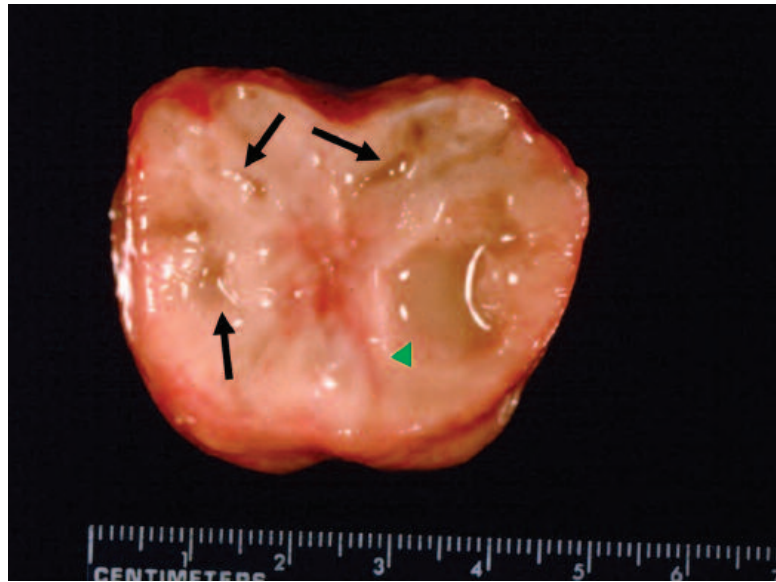
Chronic prostatitis (CP) results when acute cases are treated inadequately due to resistance, relapse of infection, inadequate therapy duration or due to blockage of the prostatic ductal system. Some cases may develop insidiously, however, without prior bouts of AP. Host immunological status and adherence capacity of the infectious agents play a role in the outcome of treatment and also in development of chronic disease.

The most common feature of CP is recurrent urinary tract infections (UTI), although some cases show no clinical signs. Chronic prostatitis should also be considered in dogs presenting for infertility. On physical examination the gland may be asymmetrically enlarged, but can be normal with physical abnormalities limited to the urinary tract. It is not painful, and prostatic palpation may produce only mild discomfort for the patient. Pyuria, haematuria and bacteriuria on urinalysis should raise suspicion of CP. Prostatic fluid evaluation is essential for diagnosis; however, any concurrent UTI should be controlled as fluid evaluation is complicated by contamination with infected urine. Inflammatory cells will be seen cytologically, and bacterial culture is positive for one bacterial species, usually *E. coli*. The haemogram and biochemical profile are unaffected unless abscessation is present. Although definitive diagnosis requires biopsy and prostatic tissue culture, these may not be indicated as a presumptive diagnosis is often based on history, clinical signs, urinalysis and prostatic fluid cytology and culture. Culture of prostatic tissue may also yield false negative results due to localisation of some

infections. The technique of ultrasound-guided fine needle aspiration and biopsy of the gland, however, improves diagnostic quality, allowing more precise identification and sampling of affected tissue.

### PROSTATIC ABSCESS

Prostatic abscesses usually arise secondary to CP (in which infectious agents are not cleared), or infected cysts. Purulent material accumulates within the tissue, and small pockets of infection and exudate may coalesce to form large abscesses (Fig. 2). Clinical signs are similar to AP with signs of systemic illness usually present, especially if rupture and peritonitis



**Fig. 2:** Cut section of prostate gland with benign prostatic hyperplasia: Small foci of associated cystic change (arrows), and a small abscess (green arrowhead).

result. Abscesses may be large enough to partially obstruct the pelvic canal or cause dysuria. Some cases, however, may be less fulminating with only intermittent UTI. Findings on urinalysis, prostatic fluid evaluation, haematology and biochemistry are similar to AP. Prostatic palpation is often painful and the gland asymmetrically or irregularly enlarged with variable consistency. Prostatomegaly will be evident on radiography, and localised peritonitis may be indicated by loss of radiographic contrast in the caudal abdomen. Ultrasonographically, the gland is enlarged with a more complex contour, and is hyperechoic with hypoechoic fluid-filled cavities that may be difficult to differentiate from cysts.

### EMPHYSEMATOUS PROSTATITIS

Emphysematous prostatitis is a rare manifestation of prostatic disease characterised by inflammation with pathological gas accumulation due to infection with gas-producing organisms such as *Escherichia coli*. More commonly such gas-producing infections occur in the urinary tract of dogs with diabetes mellitus, as bacteriuria and glycosuria predisposes them to bacterial glucose fermentation and gas formation.

## TREATMENT OF PROSTATITIS

The prostate gland represents a privileged site: the acidic pH (6.4) of prostatic fluid and the tissue's lipid membrane constitute a 'blood-prostate barrier' for most antibiotics, so penetration is poor and efficacy generally limited. Antibiotic choice is thus important, and based on culture and sensitivity as well as the drug's penetrating ability. Drugs that are highly lipid soluble, have low protein binding, and are either weak bases or amphoteric produce most satisfactory intraprostatic penetration and antibacterial effect. Although treatment failure is 30%-40% with AP, therapy for one month or longer results in fewer recurrences. Enrofloxacin or trimethoprim-sulphonamides are excellent initial therapeutic choices, whereas penicillins, cephalosporins and aminoglycosides do not penetrate prostatic tissue well. Culture and sensitivity testing of urine/prostatic fluid, or both should be repeated following antibiotic therapy, and monthly thereafter to ensure resolution of infection. Subsequently castration should be considered, especially if BPH is present, as this condition is likely to recur.

Inflammation in AP may compromise the blood-prostate barrier, allowing a broader range of antibiotics to be used, and a  $\beta$ -lactam antibiotic combined with a fluoroquinolone may be effective. Severe cases may require intravenous antibiotic therapy until the animal stabilises to allow subsequent oral therapy. CP may be more difficult to resolve as the blood-prostate barrier is intact. Antibiotics are administered orally, and therapy should continue for at least four weeks or more. Ideally culture and sensitivity testing should be repeated weekly during treatment, and monthly following cessation of therapy to evaluate for antibiotic resistance or persistent infection.

Prostatic abscesses represent a medical and surgical emergency and are associated with high mortality due to complications of septicaemia, endotoxaemia, disseminated intravascular coagulation, and hypoalbuminaemia from peritonitis. Immediate medical stabilisation is imperative, with intravenous fluid therapy indicated for shock or dehydration. Larger abscesses are best treated surgically, with various methods of drainage described (needle aspiration, placement of drains or marsupialisation), and additional intracapsular prostatic omentalisation is also considered useful.

Studies suggest that castration as an adjunct to antimicrobial therapy in CP may aid resolution of infection. Where antibiotic treatment and castration fail to eliminate chronic infections, some patients respond well to low-dose antimicrobial therapy, although this is merely palliative and used to suppress infection such that the patient is asymptomatic. It involves once daily administration of an antibiotic at 50% of its usual dose, with trimethoprim sulphonamides, quinolones and cephalosporins most

commonly used. In cases that are refractory to these treatments, total prostatectomy may be the only option to eliminate infected tissue. Inevitably this is a difficult surgical procedure and risk of post-operative urinary incontinence is high.

## CONCLUSION

Prostatic diseases are numerous but their presenting clinical signs may be similar as prostatomegaly is a common feature. Signs are often non-specific and frequently attributed to dysfunction of other organ systems (urinary bladder, intestinal and orthopaedic), and except for AP or abscessation, disease may be asymptomatic. Multiple lesions may also exist concurrently, and numerous aetiological agents may be involved.

Typical signs include faecal tenesmus, intermittent haematuria, recurrent urinary tract infections, and caudal abdominal discomfort. Diagnosis of prostatic disorders can therefore be problematic. Consequently in middle-aged to older intact male dogs that present with either urinary, digestive or locomotor problems, or with systemic signs of unknown origin (pyrexia, pain, septicaemia, vomiting, anorexia), however, the possibility of prostatic disease should be considered.

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*Readers are invited to answer the questions as part of the RCVS CPD remote learning program. Answers appear on page 99.*

**1. Most cases of bacterial prostatitis arise in association with:**

- a. Ascending infection from the urethra
- b. Haematogenous dissemination
- c. Prostatic adenocarcinoma
- d. Sertoli cell tumour
- e. Castration

**2. The most common feature of chronic prostatitis is:**

- a. Emphysema within the gland tissue
- b. Secondary mycoplasma infection
- c. Recurrent urinary tract infection
- d. Prostatic squamous metaplasia
- e. Prostatic pain

**3. Which is true of acute prostatitis:**

- a. Affected animals are often systemically ill
- b. Inflammation is usually granulomatous
- c. It is more common in younger dogs
- d. Prostatomegaly is not a feature
- e. It is common in castrated dogs

