

# Action Algorithm for the Diagnosis of Prostate Hyperplasia in Dogs

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## Abstract

In veterinary practice, at present, specialists often have to deal with pathology of the prostate gland in dogs. The reason for this is that the pathological process in the tissues of the prostate gland can occur asymptomatic and for a long period of time, subsequently leading to organ hypertrophy. An increase in the volume of the prostate gland most often has a benign character, which is generally accepted to be diagnosed as prostatic hyperplasia. The disease is often detected at a late stage, which complicates the treatment and worsens the prognosis. Hyperplasia, as a medical condition, is an indicative term used to describe the abnormal increase in the number of cells in any organ, in this case the prostate gland. This article describes the main symptoms, diagnostic methods and differential diagnosis proceeding from practical veterinary experience.

**Key words:** reproductive system, secretion, seminal plasma components, pathologies.

## Introduction

The prostate gland (prostate) is an important part of the male reproductive system, producing a fluid that contains simple sugars, citric acid, calcium and a number of enzymes that are involved in the balance and protection of seminal fluid, contributing to the survivability and motility of sperm and increasing its ability to fertilize the ovum. The prostate gland is the only accessory sex organ in dogs that plays an important part in the secretion of seminal plasma components. This is an oval-shaped bicuspid exocrine gland located in the pelvic cavity of adult dogs, through which pass the urethra and deferens ductus, where sperm is transferred to the urethra. The prostate communicates with the urethra through several holes along the entire prostatic urethra through which the seminal plasma is released. Pathologies of the prostate gland are extremely common in dogs, therefore their study is of great importance for a better understanding of these conditions.<sup>1</sup>

The prostate is dorsally in contact with the rectum, ventrally with the pubic symphysis, laterally with the abdominal wall and cranially with the bladder; its position may vary slightly depending on the age of the dog. Up to 2 months of age, the prostate is located in

the caudal part of the abdominal cavity; from this age on, during puberty, the prostate is located in the pelvic cavity. After reaching puberty, the organ increases in size, extending cranially into the abdominal cavity. Prostate hyperplasia in dogs is a pathological age-related change in the form of a painless increase that manifests itself in two phases: glandular and complex. The glandular phase is characterized by an increase in the number of cells and a symmetric increase in the gland. The complex phase is characterized by glandular hyperplasia, glandular atrophy, the formation of small cysts, chronic inflammation, including squamous metaplasia of the epithelium.

Benign prostatic hyperplasia (BPH) is a condition of enlarged prostate gland. This is the most common prostate disease observed in intact male dogs, less common in cats. The word “hyperplasia” means increased size.<sup>2</sup> Medium and large breeds are prone to the development of BPH. This condition is associated with proliferation (hyperplasia) and an increase in cell volume (hypertrophy) of prostate tissue. Benign prostatic hyperplasia begins as glandular hyperplasia and subsequently passes into cystic hyperplasia with the formation of many small cysts in the parenchyma of the

prostate gland. The aetiology of BPH is understudied, but it is known that dihydrotestosterone (DHT) plays a key part in the pathogenesis.<sup>3</sup>

The function of the prostate depends entirely on the testosterone produced by the testes, which significantly affect its function and size. Since the balance of hormones in a dog's body changes with age, the prostate tends to increase as a result of excessive production of sex hormones. Clinically manifested benign prostatic hyperplasia predominantly affects older dogs. On the other hand, a structural change in the glandular epithelium begins already at the age of two years and eventually leads to multiple, small intraprostatic cysts, which are filled with a vitreous yellowish fluid. These cysts can also protrude above the surface of the organ at an advanced stage. It is estimated that approximately 50% of intact males will develop BPH at the age of 5 years, 60% – at the age of 6 years, and 95% – at the age of 9 years. BPH is a condition observed only in intact (unesterified) male dogs.<sup>4</sup>

Unlike humans, dogs have an enlarged prostate gland that usually does not cause problems with urination, but can sometimes cause changes in bowel function. An increase in the volume of prostate gland can put pressure on the colon and reduce its diameter. When the prostate enlarges, it expands backwards in four-footed animals, that is, to the spine. If there is a significant increase, it can cause stress during bowel movements, constipation, and even faecal exposure. Faeces can be flat or ribbon-shaped. From time to time, an enlarged prostate pushes forward as against backward, pressing on the urethra. This can cause the dog to strain while urinating.<sup>5</sup>

### Materials and Method

Using the analysis method, other diseases that cause an enlargement of the prostate gland or similar clinical signs were identified:

- prostatitis is a bacterial infection of the prostate gland. The prostate is usually painful on palpation;
- abscess is an insulated pocket of infection containing white blood cells, bacteria and cell debris;
- paraprostatic cysts are fluid-filled sacs that are connected to the prostate by a thin stem;
- prostate neoplasia (cancer). Prostate cancer can closely mimic other types of prostatomegaly, but usually dogs with prostate cancer have an asymmetric increase

in one of the prostate lobes. Animals with prostate neoplasia are also usually systemically ill and have a history of weight loss;

- squamous cell metaplasia. Squamous metaplasia is a change in the prostate gland due to elevated levels of oestrogen in the blood.<sup>6</sup>

The main diagnostic tests carried out in patients with suspected prostate disease include general clinical tests, including haematological and biochemical tests of blood and urine, palpation of the gland through the rectum, microscopy of prostate secretion.<sup>7</sup> The studies were conducted during 2019 in the Veterinary Centre “Krokodil” in the city of Petropavlovsk-Kamchatsky. During the study period, 260 dogs with suspected benign prostatic hyperplasia were examined.

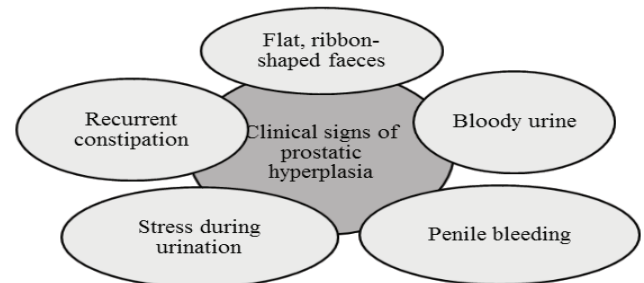


Figure 1. Clinical signs of prostatic hyperplasia

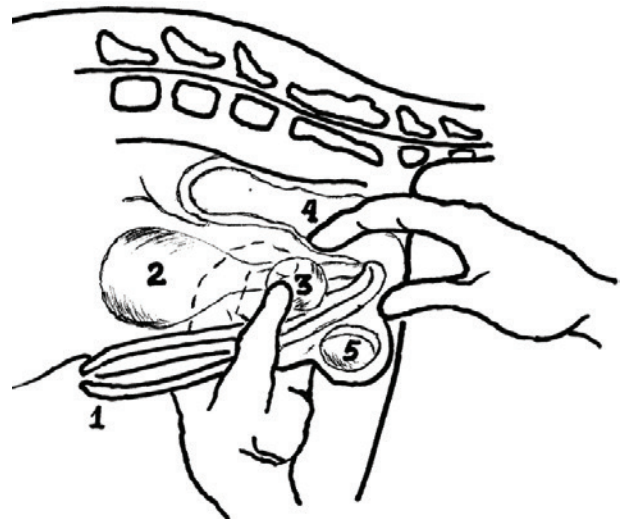


Figure 2. Physical examination (palpation of the prostate): 1 – penis; 2 – bladder; 3 – prostate gland; 4 – rectum; 5 – testis

In the process of diagnosis, the following research methods were used: gathering of medical history and clinical examination (Fig. 1); palpation of the gland through the rectum (Fig. 2); cytological and microbiological examination of the secretion of the prostate gland by obtaining ejaculate; X-ray examination, general urine analysis; biochemical and clinical blood

analysis; X-ray examination; ultrasound and aspiration biopsy.

### Results and Discussion

Rectal examination showed an increase in the size of the prostate gland in the animals under study; upon evaluation of the results of a general urinalysis, minor inflammatory changes were noted in 10 animals. A cytological evaluation of seminal fluid showed the presence of tumour cells that are large, irregular in shape, and react well to haematoxylin-eosin technique (Fig. 3).



Figure 3. Cytogram with benign prostate hyperplasia in a dog

On radiographs, the prostate is visible either in the pelvic canal or in the caudal part of the abdominal cavity, somewhat more cranial to the pubic tubercle. With an enlarged prostate, the colon can be pushed up and squeezed, while the bladder can be pushed further into the abdominal cavity (Fig. 4). Abnormal calcification of the prostate gland is easily visualized radiologically and sometimes correlates with the tumour process. Infection can also cause these changes.<sup>8</sup>

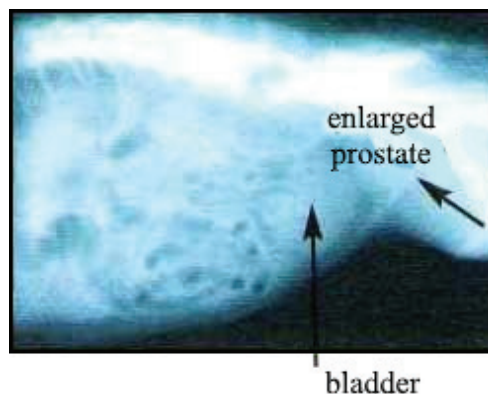


Figure 4. Lateral radiograph of the caudal part of the abdominal cavity, on which an enlarged prostate is visible

Ultrasound of the abdominal cavity, performed to evaluate the texture and consistency of the prostate gland, including its size and shape (Fig. 5). A smooth capsule with a symmetrically enlarged gland is noted. Small cystic areas can be observed, which are usually well defined and have smooth edges.

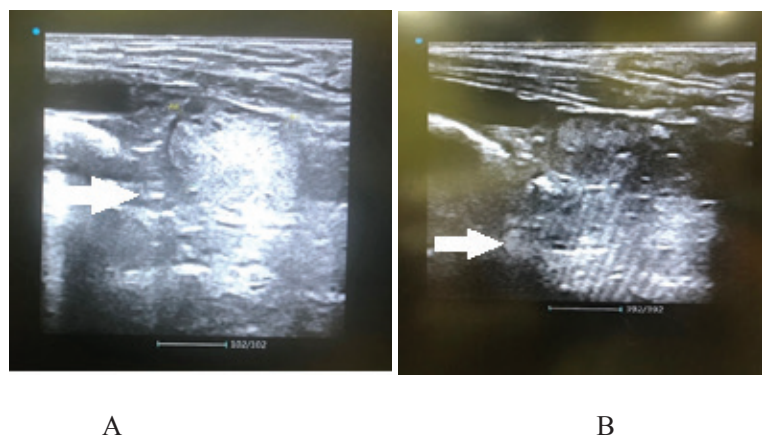


Figure 5. Ultrasound picture of prostatic hyperplasia: A – Yorkshire Terrier dog, age 3 years; B – Yorkshire Terrier, age 8 years

The advantages of ultrasound are high information content, speed of obtaining results, non-invasiveness. In veterinary practice, an ultrasound frequency of 2 to 10 MHz is used. A certain echographic picture appears

depending on the structure of the organ. Ultrasound of the prostate can be performed using abdominal and rectal sensors. Transabdominal ultrasound is a simple and quite informative method of research. The location of the prostate provides easy access for ultrasound

examination, allows to evaluate the shape, size, presence or absence of structural changes in the gland.<sup>9</sup>

Ultrasound is a common imaging technique used to examine the dog's prostate gland, which has proven successful in diagnosing many clinical conditions. While B-mode ultrasound is useful for evaluating the prostate, there are apparently significant differences in the emergence of certain pathological conditions, although some experienced ultrasound doctors often have a high ability to make the correct diagnosis.<sup>10</sup> Aspiration in the tissue of the prostate gland allowed to obtain small samples for histological analysis. Fine needle aspiration is useful upon collecting fluid from cysts or obtaining small samples of cells from prostate tissue. A biopsy provides the nucleus of the tissue for histopathology (microscopic examination of the tissue), and usually gives more accurate information on the pathology of the prostate gland, as more tissue can be evaluated.<sup>3</sup>

According to the studies, the following results were obtained. In 134 males, slight increases in size and a change in the structure of the prostate gland were detected. Proceeding from the studies, 67 dogs were diagnosed with benign prostatic hyperplasia (adenomas) and prostatitis was diagnosed in 28 dogs. 31 dogs had a suspicion of prostate adenocarcinoma, which was confirmed in 8 dogs subsequent to an additional histological examination.

### Conclusions

Upon diagnosing benign prostatic hyperplasia (adenoma) in dogs, it is necessary to use a comprehensive approach involving several research methods for the differential diagnosis of this pathology: gathering medical history, palpation of the gland through the rectum, cytology of prostate secretion, x-ray, cytological and microbiological examination of prostate secretion, ultrasound, histological examination upon aspiration or percutaneous biopsy. General urinalysis, biochemical and clinical blood tests constitute non-informative research methods for diagnosis clarification with given prostate pathology in dogs.

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**Conflict of Interest:** There is not conflict of interest.

**Ethical Clearance:** All procedures were performed in accordance with the ethical standards of the institutional and national research committee and with

the 1964 Helsinki declaration and its later amendments or comparable ethical standards. A study was approved by Animal Research Ethics Committee of the St. Petersburg State University, November 13, 2019, No 1347-A.

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