



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.23

TPI 2021; SP-10(7): 99-103

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Received: 25-05-2021

Accepted: 27-06-2021

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## Surgical management of prostatic hyperplasia in unilaterally cryptorchid (Abdominal testis) dogs

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### Abstract

Cryptorchidism is one of the most common congenital defects seen in dogs in which there is failure of one or both testicles to descend into the scrotum resulting in hormonal imbalances which lead to prostatic hyperplasia. The present study was conducted in eight unilateral abdominally retained cryptorchid dogs presented to Veterinary Hospital, UAS Dharwad with signs of straining during defecation, stranguria, blood tinged urethral discharge. On clinical examination they were found to be suffering from marked prostatic enlargement on rectal palpation and were diagnosed to be cases of prostatic disorders with ultrasonography. Exploratory celiotomy was performed for removal of retained testicles located intra-abdominally in all the cases. Another testicle located in scrotum was removed by prescrotal incision in seven cases and a tumorous ectopic testicle in one dog was removed through incision over it. All the dogs recovered uneventfully and signs of problems with defecation and urination subsided gradually by eighth post operative week. Post operative ultrasonography revealed reduction in size of the prostate and the echotexture improved.

**Keywords:** cryptorchidism, celiotomy, dog, ultrasound

### Introduction

Cryptorchidism is one of the most common congenital defects seen in dogs in which there is failure of one or both testicles to descend into the scrotum within the first eight weeks of life. It is a sex-limited autosomal recessive trait (Bufalari *et al.*, 2015) <sup>[5]</sup>. The incidence of cryptorchidism has been reported to be 1% to 15% of adult dogs (Romagnoli, 1991) <sup>[20]</sup>. The retained testicle might be present in different locations, including the abdominal cavity, inguinal canal and subcutaneous tissue (ectopic testis). Retained testes can be unilateral or bilateral, and are usually small and atrophied. Unlike unilateral cryptorchid dogs, bilateral cryptorchid dogs are sterile in nature due to thermal suppression of sperm production. The hormonal imbalance in old aged cryptorchid dogs and it may be the reason for prostatic disorders in them (Mattos *et al.*, 2000) <sup>[14]</sup>.

The prostate, the only accessory sex gland in male dogs, is a bilobate and fibromuscular organ that surrounds the proximal portion of the urethra and is typically located at retroperitoneal space in the cranial aspect of the pelvic floor or just cranial to the pubic rim ventral to the rectum (Miller, 1993) <sup>[17]</sup>. Benign Prostatic Hyperplasia (BPH) is a modification of prostatic tissue with increase in the number of glandular epithelial cells and also cell size (Jayakumar *et al.*, 2016). It is induced by changes in the androgen : estrogen ratio during aging and affects more than 80% of intact male dogs that are older than 6 years (Ewing *et al.*, 1984) <sup>[6]</sup>. It is also observed in cryptorchid dogs (Bhuvaneshwari and Madeena Begum, 2018). Dihydrotestosterone (DHT) converted from testosterone by the prostatic enzyme, type II of 5 $\alpha$  reductase, is considered as chief cause for prostate gland enlargement (Leis-Filho & Fonseca Alves, 2018) <sup>[12]</sup>. According to Barsanti and Finco (1995) <sup>[2]</sup> dogs with BPH may be predisposed to developing prostatic diseases (e.g., prostatitis, prostatic abscesses / cysts). Castration is recommended for any prostatic disorders mainly BPH (Adel & Khadidja, 2017) <sup>[1]</sup>. Location of the intra-abdominal retained testicle can be identified with the help of ultrasound imaging technique (Memon, 2007) <sup>[15]</sup>. This paper puts on record the occurrence of BPH in cryptorchid dogs and its surgical management by orchietomy.

### Materials and Methods

The study was conducted in eight unilateral abdominally retained cryptorchid (Fig. 1) dogs presented to Veterinary Hospital, University of Agricultural Sciences Dharwad with signs of straining during defecation, stranguria, blood tinged urethral discharge.

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On clinical examination they were found to be suffering from marked prostatic enlargement on rectal palpation and were diagnosed to be cases of prostatic disorders with ultrasonography (Table 1). A complete blood count showed mild hemoconcentration and thrombocytopenia. A serum chemistry profile revealed mild azotemia, hypercalcemia, and hypercholesterolemia.

An ultrasonography in all dogs revealed enlarged prostate, mostly coarse, hyperechoic texture of the prostatic parenchyma (Fig. 2). In some cases multiple focal hypoechoic fluid filled cystic structures were noted (Fig. 3). This presentation is most consistent with benign prostatic hyperplasia with possible chronic active prostatitis.

Under Xylazine sedation and cocktail anesthesia [Ketamine (50mg / ml) and Propofol (10mg / ml) in 1:1 ratio by volume] explorative celiotomy was performed in all the dogs and the abnormally retained testicles were excised (Fig. 4). Orchiectomy through the pre scrotal incision was performed in all the patients for the testicle present in the scrotum (Fig. 5). In a case of ectopic tumorous testis (Fig. 6), incision was placed directly on the mass and orchiectomy was performed. Postoperatively, Antimicrobial (Inj. Ceftiofur @ 4 mg/kg I/M daily) and Analgesia and Anti inflammatory (Inj. Flunixin meglumine @ 0.1 mg/kg I/M daily) therapy along with I/V fluids (DNS and RL) was administered to all dogs for 5 days with regular wound dressing.

## Results and Discussion

Benign prostatic hyperplasia is a common, spontaneous, age-related condition in sexually intact male dogs. The condition increases in frequency with age, and nearly 95% of intact male dogs are affected by 9 years of age Gobello and Corrada (2002) [8]. Mild inflammatory changes in the prostate are commonly associated, without bacterial infection (Purswell, 2000) [19]. Benign prostatic hyperplasia commonly causes no clinical signs in affected animals; however, if the prostate gland is markedly enlarged, a dog may experience constipation, tenesmus, or thin stools secondary to dorsal prostatic compression of the rectum. Also, intermittent, clear to light-yellow to hemorrhagic urethral discharge may occur in some dogs (Kustritz and Klausner, 2000) [11].

The causes of cryptorchidism may be genetic (autosomal recessive gene), anatomical or endocrinal disturbance and these may be intrinsically related (Mattos *et al.*, 2000) [14]. The pathophysiology of BPH is not completely understood, but DHT, which is irreversibly converted from testosterone by the action of 5 $\alpha$ -reductase in prostatic epithelial cells, is accepted as a key hormone in stimulating enhancement of prostate growth (Gobello and Corrada, 2002) [2]. Mattos *et al.* (2000) [14] reported high levels of estradiol in the serum of a bilaterally cryptorchid dog. This hormonal imbalance may be the reason of prostatic disorders in old cryptorchid dogs. Other hormones (estrogen, prolactin, growth hormone) have also been implicated in its pathophysiology (Kustritz and Klausner, 2000) [11].

In the present study, all prostatic disorders observed were in dogs older than 6 years age in agreement with Ewing *et al.*, (1984) [6], appeared as enlargement of the glands that suppress the surrounding organs namely the rectum and urethra. Clinical signs ranged from stranguria-dysuria, fecal tenesmus, urethral discharge, and systemic symptoms including depression, lethargy, fever, anorexia, pain and weight loss. Diagnosis was done by observing clinical signs, the presence of urination and defecation disorder, presence and position of

testicle in scrotum, rectal examination and ultrasound evaluation. Similar observations were made by Paclikova *et al.* (2006) [18]. Bladder retention was found in abdominal palpation, and protrusion of the prostate gland was palpated on ventral rectal palpation. Hematology was done to evaluate presence of inflammation and infection which was evident from leukocytosis with shift to left neutrophilia in acute or within normal in chronic disease. The biochemical parameters were not specific in patients without systemic alteration. Urinalysis was performed to evaluate the presence of blood, leukocytes, urinary sediment and overall epithelial cells (Adel & Khadidja, 2017) [1].

According to Mialot (1988) [16], the right testicle seems to be more frequently affected. He supposes that is because embryologically, there is a longer migration (since they are originally located at the caudal region of the kidneys, and the right kidney is more cranial than the left one). In our study also right testicle was more affected.

The onset of BPH and these associated diseases may be prevented by early castration. Uncomplicated BPH rarely requires surgical treatment. When prostatic disease is concurrent with BPH, castration is used in conjunction with treatment for the specific disease. Most cases that require treatment resolve after castration (White *et al.*, 1987) [21]. In the present study, treatment of benign prostatic hyperplasia was performed only when clinical signs warrant. Treatment of affected dogs was typically limited to castration, and the breeding of affected individuals was discouraged because of the hereditary nature of this disease. According to Gobello and Corrada (2002) [2], the most effective treatment is castration, which decreases prostate size by 50% within three weeks postoperatively and by 70% within nine weeks. In the cases of present study, the prostate size was reduced and the clinical signs were completely alleviated by eight weeks after surgery in all dogs. Recheck examination of these dogs 08 weeks after the castration revealed a markedly smaller prostate on rectal palpation compared with previous examinations. Additionally, the preputial discharge had resolved and abdominal ultrasound confirmed the absence of prostatomegaly noted on previous examinations. In dogs following surgery, with time the prostatic parenchyma became first normal and later hypoechoic. These findings are very similar to those reported in surgically castrated dogs (Bradley *et al.*, 2012) [14]. Furthermore, the small, intraprostatic cysts gradually resolved, leading to a more homogenous appearance of the parenchyma. Similar changes in echo texture were described by Goericke-Pesch *et al.* (2010) [9].

The cryptorchid testis (abdominal) is smaller than the scrotal testis because of the absence of spermatogonia due to higher body temperature. However, Sertoli and Leydig cells remain, and androgen synthesis is unimpaired (Romagnoli, 1991) [20]. Similar observations of hypoplastic intra abdominal testis (Fig. 7) were made in the present study also. The one with ectopic testes case, it was large and tumorous and again the intraabdominal testis was small and hypoplastic (Fig. 8). Cryptorchid dogs were reported to have higher risk of developing testicular tumours. When compared to the descended testicle, retained testicles are 9-13 times more prone to tumour development (Madureira *et al.*, 2017) [13]. In the present study only one case had testicular tumor. Dogs with abdominal testes tend to develop Sertoli cell tumors as a result of the abdominal temperature causing loss of all tubule cells except the Sertoli cells. Conversely, dogs with inguinal testes tend to develop seminomas as a result of transitional

inguinal canal temperature, which appears to stimulate neoplastic growth of the spermatogenic cell line. Sertoli cell tumors account for about 60% and seminomas for 40% of tumors in cryptorchid testes (Feldman and Nelson, 1996) [7]. Because temperature does not affect interstitial cells, the incidence of interstitial cell tumors (as seen in this dog) is not

thought to be related to cryptorchidism (Romagnoli, 1991) [20]. In one ectopic testes case where it was large and tumorous the histopathology revealed, the interstitial cell tumor. To conclude bilateral orchietomy resolved BPH related urinary and defecation symptoms in all dogs within eight weeks of surgery.

**Table 1:** Details Of Clinical Cases Of BPH In Unilaterally Cryptorchid (Abdominal testis) Dogs Presented To Veterinary Hospital, UAS Dharwad.

Sl. No.	Breed	Age (yrs)	Side Affected	Location of the retained testes	Prostate disorder (Ultrasound exam)	Changes in Cryptorchid testes
1	Doberman	8	Right	Abdominal, near urinary bladder	Cystic	Hypoplastic
2	Non descript	6	Right	Abdominal, near inguinal canal	BPH	Hypoplastic
3	German Shepherd Dog	8	Left	Abdominal, near urinary bladder	Cystic	Hypoplastic
4	Pug	6	Right	Behind the kidney	BPH	Hypoplastic
5	Golden retriever	7	Left	Abdominal, near urinary bladder	Microcystic	Hypoplastic
6	Labrador	8	Right	Abdominal, near inguinal canal	Cystic	Hypoplastic
7	Doberman	9	Left	Abdominal, near urinary bladder	Cystic	Hypoplastic
8	Non descript	9	Right	-Ectopic Testes, subcutaneous -Abdominal, near urinary bladder	Multiple Cystic	Ectopic -Tumourous; Abdominal -Hypoplastic



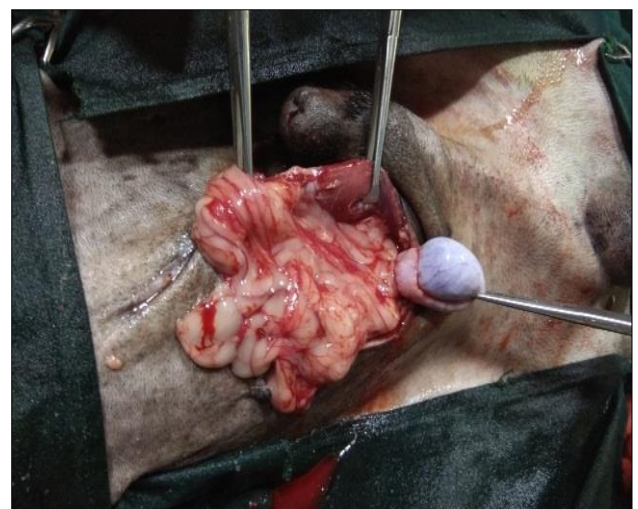
**Fig 1:** Unilateral cryptorchidism in a dog. Note absence of right testicle in scrotal sac.



**Fig 3:** Ultrasonogram of a unilaterally cryptorchid dog showing enlarged prostate, with coarse, hyperechoic texture of the parenchyma and intraparenchymal multiple focal hypoechoic fluid filled cystic structures.



**Fig 2:** Ultrasonogram of a unilaterally cryptorchid dog showing enlarged prostate, with coarse, hyperechoic texture of the parenchyma and intraparenchymal hypoechoic fluid filled cystic structure.



**Fig 4:** Exploratory celiotomy and retrieval of the abdominally retained right testis.



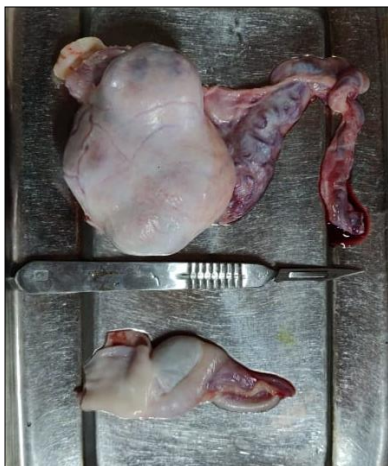
**Fig 5:** Post-operative appearance after performing bilateral orchidectomy (celiotomy for removal of abdominal testis and pre scrotal incision for scrotal testis).



**Fig 6:** Bilaterally cryptorchid dog - note tumorous ectopic left testis. The right testis was in abdomen



**Fig 7:** Comparison of normal scrotal testis (Upper) with abdominal hypoplastic testis (Lower).



**Fig 8:** Comparison of Tumorous ectopic testes (Upper) with abdominal hypoplastic testis (Lower).

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