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BILATERAL ABDOMINAL CRYPTORCHIDISM WITH SEVERE TESTICULAR ATROPHY AND SERTOLI CELL-ONLY SYNDROME IN A 15-MONTH-OLD BOERBOEL DOG: A CASE REPORT

***[1]O. A. MAKINDE, [2]A.O. EGBETADE, [3]A. A. ADEBIYI, [1]L. MUSTAPHA, [3]T. M. OLADIPO, [4]M. E. OKANDEJI, [5]A. K. KADIRI, [5]A. F. MAKINDE**

[1]Department of Veterinary Surgery and Theriogenology, Federal University of Agriculture, Abeokuta
[2]Department of Veterinary Medicine, Federal University of Agriculture, Abeokuta.
[3]Department of Veterinary Pathology, Federal University of Agriculture, Abeokuta.
[4]Department of Veterinary Medicine, Federal University of Agriculture, Abeokuta.
[5]Veterinary Teaching Hospital, Federal University of Agriculture, Abeokuta.
***Corresponding Author**: makindeao@funaab.edu.ng **Tel:** +234-8038058217

ABSTRACT

Cryptorchidism is the most common congenital disorder affecting male dogs, with bilateral abdominal cryptorchidism being a rare presentation that often leads to severe testicular pathology. A 15-month-old intact male Boerboel dog was presented to the Veterinary Teaching Hospital, Federal University of Agriculture, Abeokuta, with suspected snake bite injury. The dog died from complications, and a necropsy revealed bilateral abdominal cryptorchidism. Both testes were severely atrophic (left: 3.0 cm length, 5.7 cm circumference; right: 3.2 cm length, 6.8 cm circumference) and located in the intra-abdominal cavity. Histopathological examination revealed a complete absence of spermatogenesis, with seminiferous tubules exhibiting marked atrophy, detachment of the basement membrane, and a Sertoli cell-only pattern. Moderate interstitial fibrosis was present in both testes. This case represents a severe form of bilateral abdominal cryptorchidism resulting in complete reproductive failure. The histopathological findings demonstrate the progressive degenerative changes that occur in retained testes. This case highlights the critical importance of early cryptorchidism detection in young dogs and emphasizes the need for prompt surgical intervention to prevent irreversible testicular damage and complete reproductive failure.

Keywords: necropsy, histopathology, seminiferous tubules, spermatogenesis, interstitial fibrosis, canine

INTRODUCTION

Cryptorchidism is defined as the failure of one or both testes to descend into the scrotum, and it represents the most prevalent congenital abnormality in male dogs. Recent studies report a prevalence ranging from 0.8 -10% across breeds (Blades *et al.*, 2022), with a recent clinical study documenting an incidence of 3.21% in dogs presented for elective gonadectomy (Cho *et al.*, 2025). The condition occurs with higher frequency in certain breeds, including toy breeds and brachycephalic dogs, though large breed dogs can also be affected (Kawakami *et al.*,

1991). Bilateral cryptorchidism is significantly less common than unilateral forms, occurring in approximately 25% of cryptorchid cases (Johnston *et al*., 2001).

Normal testicular descent in dogs occurs during fetal development and the first few weeks of life, with complete descent typically achieved by 6-8 weeks of age (Meyers-Wallen, 2012). Retained testes may be located anywhere along the normal path of descent, from the caudal pole of the kidney to the inguinal canal. Abdominal retention, where testes remain within the peritoneal cavity, represents the most severe form of cryptorchidism and is associated with the greatest degree of testicular pathology (Amann and Veeramachaneni, 2007).

Normal testicular descent follows a predictable timeline, with testes typically descending into the scrotum by 6-8 weeks of age, though descent may continue until 6 months of age in some individuals (Johnston *et al*., 2001). Dogs with testes that have not descended by 6 months of age are considered cryptorchid and unlikely to experience spontaneous descent thereafter. While comprehensive breed-specific prevalence data for Boerboels remains limited, large breed dogs generally show lower cryptorchidism rates (0.8-1.2%) compared to toy breeds (2.7-15%), though genetic predisposition can vary significantly within breed lines (Yates *et al*., 2003; Romagnoli and Schlafer, 2022).

The pathophysiological consequences of cryptorchidism are well-documented and include progressive testicular degeneration, compromised spermatogenesis, increased risk of neoplasia, and potential behavioral abnormalities (Soto-Heras *et al*., 2024; Roldán-Alzate *et al*., 2022). The elevated intra-abdominal temperature, approximately 2-3° C higher than scrotal temperature, creates an environment hostile to normal spermatogenesis and leads to progressive seminiferous tubular atrophy (Amann and Veeramachaneni, 2007).

Boerboels are large, mastiff-type dogs originally developed in South Africa for farm protection. While cryptorchidism has been reported across various dog breeds, specific documentation in Boerboels remains limited in veterinary literature. This case report describes the necropsy findings and detailed histopathological analysis of bilateral abdominal cryptorchidism in a 15-month-old Boerboel, contributing to the understanding of this condition in large breed dogs.

Case Presentation

Clinical History

A 15-month-old intact male Boerboel dog, weighing 31 kg, was presented to the Veterinary Teaching Hospital, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria, with a history of suspected snake bite. The owner reported that the dog had been dull and anorexic for about 3 days, with visible facial swelling (Plate 1). Upon presentation, the dog exhibited signs of shock, including tachycardia, weak pulse, and pale mucous membranes. Generalized lymphadenopathy was also observed.

Clinical examination revealed an empty scrotum with no palpable testes in the scrotal sacs or inguinal canals. The dog's condition rapidly deteriorated despite supportive treatment, and the animal died within 72 hours of presentation due to complications associated with the suspected envenomation.

Plate 1: A 31 kg, 15-month-old Boerboel dog presented with visible right-sided facial swelling (arrow) from suspected snake bite.

Necropsy Findings

A complete necropsy was performed within few hours of death. External examination confirmed the absence of testes in the scrotum and inguinal regions. Upon opening the abdominal cavity, both testes were identified in the peritoneal cavity, positioned lateral to the bladder (Plate 2).

Plate 2: Gross anatomy of bilateral abdominal cryptorchid testes in situ (arrows)

The left testis measured 3.0 cm in length with a circumference of 5.7 cm, while the right testis measured 3.2 cm in length with a circumference of 6.8 cm. Both testes were markedly smaller than expected for a dog of this age and breed, appearing pale and firm on palpation (Plate 3). The epididymides were present but appeared atrophic and poorly developed. For comparison, normal testicular dimensions in dogs of similar age and breed typically range from 4.5-6.0 cm in length with circumferences of 8.5-12.0 cm for dogs weighing 25-35 kg (Kawakami *et al.*, 1991). The markedly reduced dimensions observed in this case (left testis: 50% smaller; right testis: 47% smaller than expected normal values) demonstrate the severe atrophic changes associated with prolonged abdominal retention.

Plate 3: Gross appearance of both excised testes, size comparison and atrophic changes (arrows). Scale bar = 2 cm ; Magnification: x 1.0

Histopathological Findings

Tissue samples from both testes were fixed in 10% neutral buffered formalin, processed routinely through graded alcohols, cleared in xylene, and embedded in paraffin wax following standard histopathological protocols (Feldman and Wolfe, 2014). Sections were cut at 4-5 µm thickness using a rotary microtome and stained with hematoxylin and eosin (H&E) according to established procedures (Feldman and Wolfe, 2014). Hematoxylin was used to stain nuclei blue-purple, while eosin counterstained cytoplasm and extracellular matrix pink.

Both testes showed no evidence of neoplastic transformation, inflammation, or other pathological processes beyond the degenerative changes associated with cryptorchidism (Plates 4 and 5).

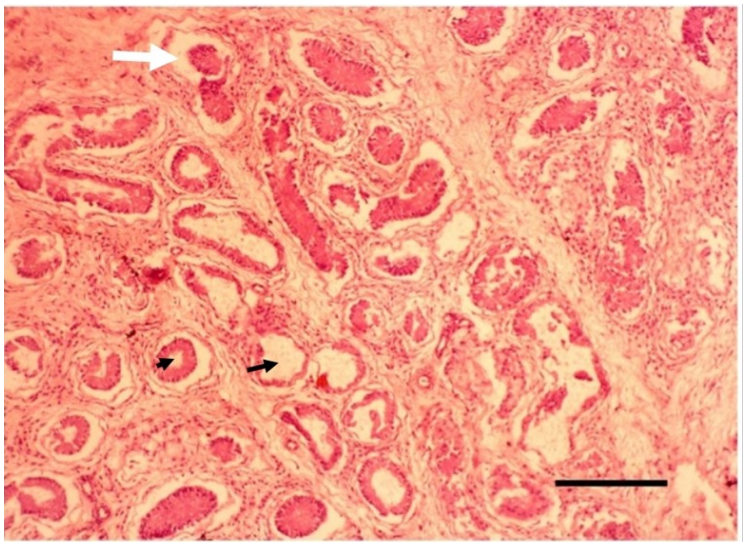

Plate 4: Photomicrograph of the Left Testis (HandE stain, X100. scale bar = 50 µm).

Microscopic examination revealed severe testicular pathology characterized by marked seminiferous tubular atrophy. The seminiferous tubules showed complete detachment from the basement membranes (white arrow), with the germinal epithelium entirely absent. Only Sertoli cells remained lining the tubules, creating the characteristic "Sertoli cell-only" pattern. Tubular lumina varied from narrow (arrow head) and collapsed to moderately dilated (arrow). Moderate interstitial fibrosis was evident throughout the testicular parenchyma. No evidence of active spermatogenesis was observed in any tubules examined (Plates 4 and 5).

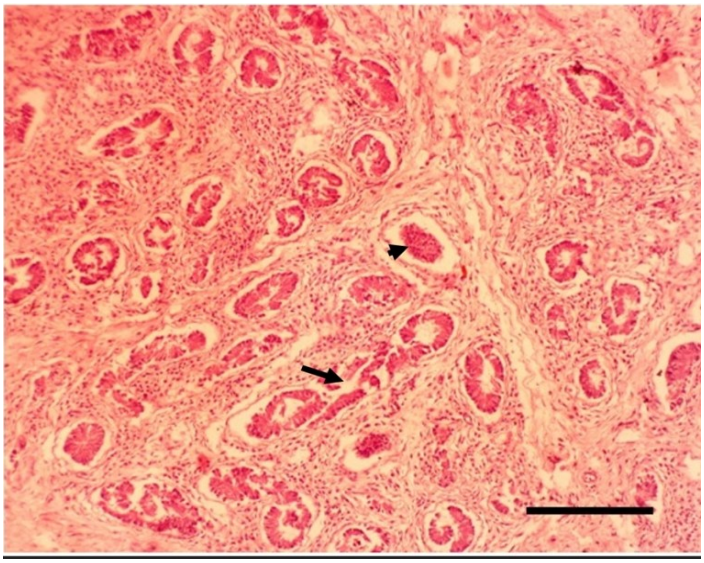

Plate 5: Photomicrograph of Right Testis (HandE stain, X100. scale bar = 50 μm).

Histopathological changes were similar to those observed in the left testis. Seminiferous tubules demonstrated marked atrophy with basement membrane detachment (arrow head) and complete absence of the germinal epithelium. The Sertoli cell-only pattern was consistently observed across all tubular cross-sections. Some tubules showed Sertoli cell sloughing into the luminal space (arrow). Moderate interstitial fibrosis was present, and no spermatogenic activity was detected.

DISCUSSION

This case presents a severe example of bilateral abdominal cryptorchidism in a large breed dog, resulting in complete testicular atrophy and reproductive failure. The histopathological findings demonstrate the end-stage consequences of prolonged exposure to elevated intra-abdominal temperatures on testicular function.

Veterinary practitioners should establish routine protocols for cryptorchidism screening during puppy examinations, with particular attention to high-risk breeds and genetic lines. Diagnostic evaluation should include thorough palpation of the scrotum, inguinal canals, and caudal abdomen, supplemented by ultrasonographic examination when indicated (Meyers-Wallen, 2012; Kustritz and Klausner, 2021). Definitive diagnosis of abdominal cryptorchidism may require advanced imaging techniques including computed tomography or magnetic resonance

imaging in challenging cases.

The normal process of testicular descent involves complex hormonal and mechanical factors including the production of insulin-like factor 3 (INSL3) and anti-Müllerian hormone (AMH) by Leydig and Sertoli cells, respectively (Piekarska *et al.*, 2024; Stachowiak *et al.*, 2024). Recent studies have demonstrated massive alterations in gene expression patterns in undescended testes, including epigenetic modifications in INSL3 and RXFP2 genes that may contribute to cryptorchidism pathogenesis (Nowacka-Woszuk *et al.*, 2020). Disruption of this process can result from genetic factors, hormonal imbalances, or anatomical abnormalities (Meyers-Wallen, 2012).

In cryptorchid testes, the elevated temperature environment leads to progressive damage to spermatogenic cells, beginning with the most temperature-sensitive germ cells, with histological alterations appearing from the peripubertal stage and persisting throughout life (Roldán-Alzate *et al.*, 2022; Soto-Heras *et al.*, 2024). The Sertoli cell-only syndrome observed in this case represents the terminal stage of this degenerative process, where all germ cells have been eliminated, leaving only the more temperature-resistant Sertoli cells (Kawakami *et al.*, 1993).

While cryptorchidism has been extensively studied in various dog breeds, reports specifically involving Boerboels are limited. Large breed dogs generally have lower reported incidences of cryptorchidism compared to toy breeds, though the condition can occur across all breed sizes (Yates *et al.*, 2003). The bilateral presentation in this case is particularly significant, as it represents complete reproductive failure and has implications for breeding programs in this breed.

Large breed dogs, including German Shepherds, Rottweilers, and mastiff-type breeds like Boerboels, demonstrate different cryptorchidism patterns compared to smaller breeds. While the overall incidence is lower, the severity of pathological changes tends to be more pronounced when cryptorchidism occurs, possibly due to the greater temperature differential between the abdominal cavity and optimal testicular environment in larger dogs (Amann and Veeramachaneni, 2007). This case shows the severe consequences that can occur in large breed cryptorchids when early intervention is not implemented.

The empty scrotum observed during clinical examination should have prompted immediate investigation for cryptorchidism, particularly in a young intact male dog. Early identification and surgical management (orchiopexy or orchiectomy) are crucial for preventing the severe degenerative changes observed in this case (Johnston *et al.*, 2001).

Recent epidemiological data from a population-based registry confirm the elevated risk of testicular tumors in cryptorchid dogs, with Sertoli cell tumors being the most common type in retained testes (Manuali *et al.*, 2020). The retained testes in this case showed no evidence of neoplastic transformation, likely due to the young age of the animal. A 2025 study of surgical complications associated with cryptorchid castration emphasized the importance of appropriate surgical approach, with paramedian incisions showing significantly higher complication rates compared to parapreputial approaches (Grimes *et al.*, 2025).

Current recommendations for managing cryptorchidism include surgical removal of

retained testes, particularly in cases of abdominal retention where the risk of complications is highest (Amann and Veeramachaneni, 2007). Orchiopexy, while technically possible, is generally not recommended due to the compromised fertility potential and increased neoplastic risk (Meyers-Wallen, 2012).

Current veterinary best practices recommend orchiectomy for all cryptorchid dogs, ideally performed between 6 and 12 months of age to minimize degenerative changes while ensuring complete hormonal and anatomical development (Johnston *et al.*, 2001). Pre-surgical evaluation should include complete blood count, serum biochemistry, and coagulation profile, with particular attention to identifying concurrent congenital abnormalities that may complicate anaesthesia. Post-surgical monitoring should focus on wound healing, hormone-related behavioral changes, and long-term oncological surveillance, as the contralateral descended testis (in unilateral cases) may still carry elevated neoplastic risk.

This case report is, however, limited by the lack of pre-mortem diagnostic imaging, which could have provided additional information about the exact location and condition of the retained testes. The dog's death from suspected envenomation prevented comprehensive endocrinological evaluation that might have provided insights into the underlying cause of the cryptorchidism. The owner of the dog also reported that the dog was strictly kept for farm security, hence why they didn't observe that it was a cryptorchid, as it was never presented for mating.

CONCLUSION

This case illustrates the severe reproductive consequences that arise from prolonged testicular retention in a Boerboel dog with bilateral abdominal cryptorchidism. The histopathological findings of Sertoli cell-only syndrome, characterized by marked seminiferous tubular atrophy and complete absence of spermatogenesis, represent the end-stage consequences of cryptorchidism.

For veterinary practitioners, this case emphasizes the importance of systematic cryptorchidism screening during routine puppy examinations, particularly in large breed dogs; the necessity of prompt surgical intervention (orchiectomy) when cryptorchidism is diagnosed, ideally before 12 months of age; the value of client education regarding the hereditary nature of cryptorchidism and its implications for breeding decisions; the need for long-term oncological surveillance in cryptorchid dogs.

For dog breeding programs, this case underscores the importance of removing cryptorchid animals from breeding stock and carefully evaluating the genetic lines that produce affected individuals. The complete reproductive failure demonstrated in this Boerboel highlights why cryptorchidism is considered a disqualifying condition in most breed standards and breeding programs.

This case contributes valuable documentation of severe bilateral abdominal cryptorchidism in the Boerboel breed and serves as a reminder that even large breed dogs require vigilant reproductive health monitoring to prevent the serious complications illustrated in this report.

Ethics Statement

This case report was prepared following institutional guidelines for veterinary case documentation. Informed consent was obtained

from the dog owner for publication of this case report and accompanying images. No experimental procedures were performed on the animal.

Conflict of Interest

The authors declare no conflicts of interest related to this case report.

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