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Case Report

Unilateral segmental aplasia of the epididymis and ductus deferens in a mixed-breed dog

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Abstract
A 9-month-old male mixed-breed dog was presented for elective bilateral orchiectomy. During the procedure, segmental aplasia of the tail of the right epididymis and absence of the corresponding ductus deferens were observed. Additionally, the head of the epididymis on the affected side appeared enlarged. Histopathological examination revealed multiple sperm granulomas with inflammatory infiltrate composed of macrophages, multinucleated giant cells, neutrophils, lymphocytes, and plasma cells, as well as fibrosis. The epididymal tail and ductus deferens were absent. These gross and microscopic findings supported a diagnosis of segmental aplasia of the epididymis and ductus deferens.
Keywords: congenital malformations, reproductive, pathology, dog.

Introduction

Normal sperm production requires coordinated functions of spermatogenesis, sperm maturation and transport, accessory gland secretions, neuromuscular, and psychological factors (6). The epididymis, ductus deferens, and ampulla are involved in transporting spermatozoa and fluid from the testes to the pelvic urethra. Within the epididimides, spermatozoa undergo maturation and are stored. Because a single duct connects the efferent ductules to the urethra, any obstruction or malformation can significantly compromise fertility (7).

The epididymis, ductus deferens, ampullae, and vesicular glands develop from the mesonephric (Wolffian) duct. Proper development of this duct is essential and occurs in three key stages: formation of the mesonephros, stabilization and elongation of the duct, and postnatal differentiation. These stages are regulated by specific genetic and hormonal developmental factors. However, the underlying mechanisms and causes of congenital defects remain unclear (10).

Segmental aplasia is a congenital condition characterized by the partial or complete absence of structures derived from the mesonephric duct during embryonic development of the male genital tract (Gracia et al., 1998). The epididymis and ductus deferens are most commonly affected. Obstruction of these structures can lead to sperm stasis, which predisposes the animal to the formation of spermatocele and sperm granulomas (7). This report describes a case of unilateral segmental aplasia of the epididymal tail, associated with aplasia of ductus deferens and the formation of a sperm granuloma in a dog.

Case description

A 9-month-old male mixed-breed dog was presented for elective bilateral orchiectomy. During the procedure, segmental

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aplasia of the epididymis, specifically in the tail, and aplasia of the corresponding ductus deferens was observed on the right testis. Samples from both testes and their respective spermatic cords and epididymides, were fixed in 10% buffered formalin, processed for paraffin embedding, cut in a microtome (4 µm-thick sections), and stained with hematoxylin and eosin (HE).

Grossly, the right testis measured 5.0 × 2.0 cm in diameter and the left testis measured 4.5 × 2.0 cm. The right testis showed absence of the epididymal tail and the ductus deferens, as well as enlargement in the epididymal head. The left testis and epididymis exhibited no gross changes (Fig. 1).

Microscopically, the right epididymis contained multiple granulomas composed of degenerated spermatozoa and an inflammatory infiltrate consisting of epithelioid macrophages, multinucleated giant cells, neutrophils, lymphocytes, and plasma cells as well as fibrous tissue. There was also marked dilation of the epididymal duct (spermatocele) and rete testis tubules, with thinning of the epididymal epithelium. There was vacuolization of the seminiferous epithelium and mild multifocal degeneration of germ cells. The epididymal tail and deferent duct were absent (Fig. 2-4). In the left testis, the seminiferous tubules similarly exhibited Sertoli cell vacuolization and mild multifocal germ cell degeneration (Fig. 5), though no significant histopathological changes were observed in the epididymis.

Discussion

Congenital malformations of the epididymis and ductus deferens are infrequent in dogs and other species. However, segmental aplasia of epididymis and/or aplasia ductus deferens have been described in dogs (1, 2, 5, 9), bulls (3, 11, 12, 14), rams (13), mink (4), and cats (Koning et al., 1983).

Aplasia of the epididymis can be unilateral (2) or bilateral (5), with the most commonly observed form being the absence of the epididymal tail, as noted in the present case. When this portion is absent, continuous sperm production leads to spermiostasis, which causes tubular dilation, enlargement of the mediastinum testis, and eventual testicular atrophy due to increased intratubular pressure (7).

In this case, a spermatic granuloma was observed in the head of the epididymis within the organ affected by the malformation. This condition results from the incomplete connection of the efferent ductules to the epididymal duct, with some ductules terminating blindly. This leads to increased luminal pressure and subsequent leakage of sperm. Due to the highly antigenic nature of spermatozoa, once they escape the lumen of the male reproductive tract, they are recognized as foreign by the immune system, triggering a localized inflammatory response as shown in the Figure 2B (8).

The clinical significance of segmental aplasia of the epididymis and ductus deferens is primarily related to fertility, and in cases of bilateral aplasia, the result is complete and irreversible sterility. These malformations are often

Figure 1. Unilateral segmental aplasia of the epididymis and ductus deferens in a dog. The testes and spermatic cords exhibited aplasia of the tail of the epididymis and ductus deferens with enlargement of the head of the right epididymis.

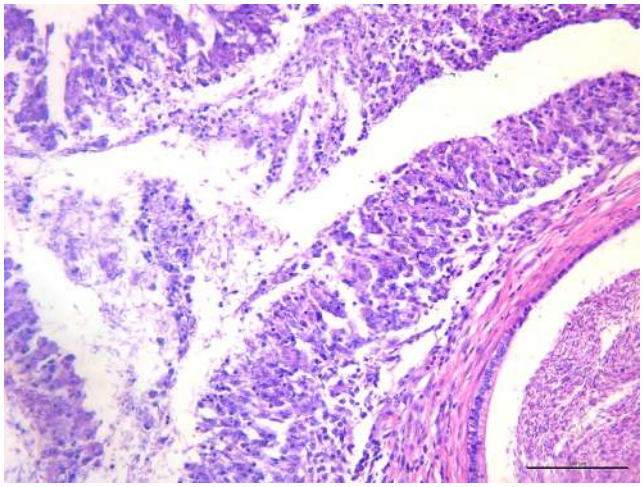

Figure 2. Dilation of the epididymal duct accompanied by thinning of the epididymal epithelium, with surrounding spermatic granulomas composed of degenerated spermatozoa and numerous epithelioid macrophages.

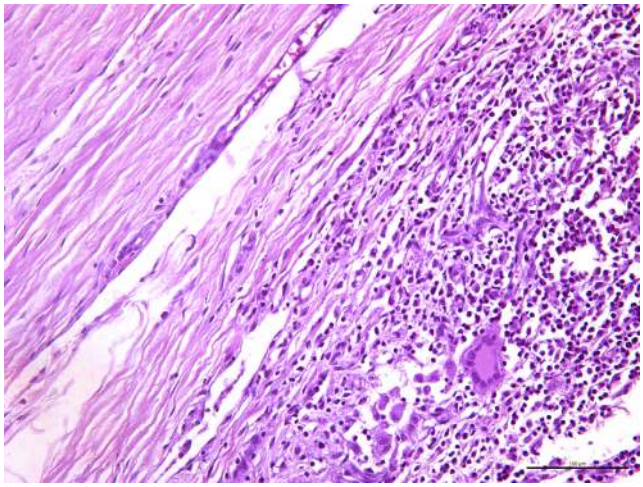

Figure 3. Interstitium of the epididymis with intense inflammatory infiltrate composed of lymphocytes, plasma cells and multinucleated giant cells. HE, scale bar = 100 µm.

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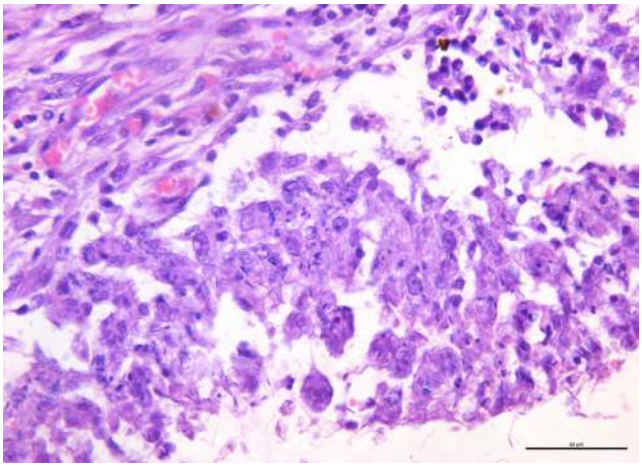

Figure 4. Epithelioid macrophages containing integrated and degenerating spermatids within their cytoplasm. HE, scale bar = 50 µm.

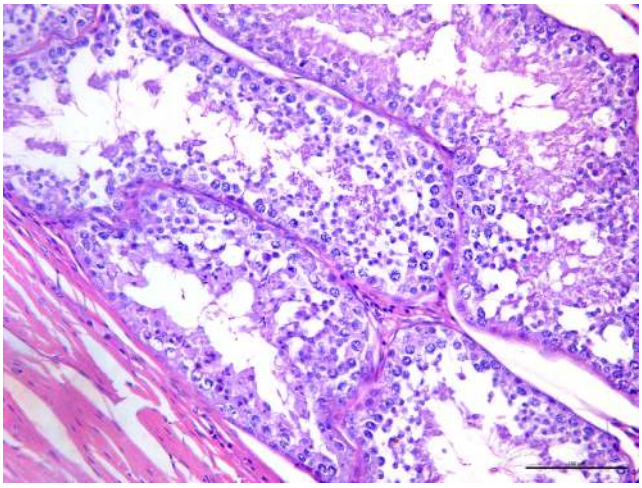

Figure 5. Seminiferous tubules exhibiting Sertoli cell vacuolization and mild, multifocal germ cell degeneration, HE, scale bar = 100 µm.

asymptomatic and may go unnoticed unless fertility problems arise, particularly in breeding animals. Consequently, they are typically diagnosed incidentally during elective orchiectomy (such as in the present case) or postmortem examinations (2).

Segmental aplasia of the epididymis and ductus deferens is a congenital malformation that is infrequently reported in the veterinary literature. This case highlights the importance of considering this condition when investigating subfertility and testicular abnormalities in young male dogs.

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