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Pathological studies on canine male reproductive organs

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Abstract
The aim of the present study was to find the gross and histopathological alterations in the canine male reproductive organs. A total number of 10 canine carcasses of different breeds, age, and body conditions were chosen for the present study. The mean age of occurrence of reproductive pathology was found to be 5.5 years. Grossly, severely congested testes, epididymis, vas deferens and edematous prostate was observed. Histopathological alternations were associated with the spermatogenic epithelial cells degeneration, intratubular multinucleated giant cells, thickened irregular basement membrane of seminiferous tubules, vacuolated Sertoli cells, interstitial fibrosis, infiltration of lymphocytes in the epididymis, degeneration of seminiferous tubules, Hyperplasia and edema of Vas deferens. It was concluded that old age had a higher risk of developing testicular pathologies.

Keywords: Age, breed, canine, gross, histopathology, male reproductive organs

Introduction
Pathologies present in the canine reproductive tract are varied and can be congenital, endocrine, autoimmune, infectious, traumatic and neoplastic. Genital disorders such as anatomic abnormalities, hormonal disturbances or disorders of infectious aetiology can reduce fertility. The search for the correct etiology and treatment of reproductive diseases among dogs has received much attention in the past few years (Holst *et al*., 2000; Memon, 2007) [1, 2] and early diagnosis of canine testicular disorders may be useful before selecting a male dog for mating or artificial insemination (Domingos and Salomao, 2011) [3]. Information about the frequency of pathological conditions of the reproductive organs in the male dog, except cryptorchidism is scarce. Two basic functions of the male reproductive tract are production of spermatozoa and hormones. To accomplish these functions, the male reproductive tract must not only produce spermatozoa (spermatogenesis) but also co-ordinate sperm release and transport to the epididymis where sperm maturation and storage occur. Hormone production has traditionally focused on testosterone; however, multiple steroid hormones, including estrogens, and an increasingly large number of non-steroidal signals are described with systemic and/or local effects. Many techniques have been used to estimate the reproductive potential of a male dog, to examine and diagnose disorders of the male reproductive tract or to detect a decline in the reproductive function. The purpose of this study was to examined randomly the male genitalia of canine for pathological conditions.

Materials and methods
The present work was designed to study the pathology of reproductive organs in dogs received for postmortem. The research work was conducted in Department of Veterinary Pathology of Madras Veterinary College, Chennai - 7. A total number of ten canine carcasses of different breeds, age, and body conditions were chosen for the present study. A thorough post mortem examination was carried out and the overall body condition, musculature and gross lesion(s), if any, in testes, epididymis, prostate, penis and prepuce were recorded. The representative tissue samples from various organs were collected in 10 per cent formalin, processed by routine paraffin embedding method, stained with Haematoxylin and esion (Bancroft and Gamble, 2007) [4] and examined under the microscope for histopathological studies.

Table 1: Age-Breed wise occurrence of canine male reproductive pathology

S. No	Breed	Age (year)
1	Labrador	4.5
2	Labrador	5
3	Labrador	8
4	German Shepherd	1.5
5	Doberman	10
6	Labrador	6.5
7	Labrador	5
8	Doberman	5.5
9	Labrador	3
10	Doberman	5.5

Results

Pathology of male reproductive organs were studied in 10 canine necropsies. The mean age of occurrence of reproductive pathology was found to be 5.5 years and the breed (Table 1).

Gross pathology

Grossly, testes appeared severely congested (Fig. 1) or soft in consistency or without any observable changes. Epididymis and vas deferens showed moderate to severe congestion (Fig. 2, 3) on the surface. Prostate gland showed mild enlargement and edematous.

Histopathology

The spermatogenic epithelium showed marked generalized degeneration (Fig.4) with absence of spermatogenesis and formation of intratubular multinucleated giant cells (Fig.5). The seminiferous tubules were atrophied with thickened irregular basement membrane, reduced germinal epithelial cells, vacuolated Sertoli cells and mild to moderate interstitial fibrosis. Epididymis showed diffuse marked infiltration of lymphocytes admixed with a few macrophages along with degeneration of epithelial cells (Fig.6, 7) in two cases. In a few areas the epithelium was hyperplastic (Fig. 8) and mild interstitial edema was observed. Intracytoplasmic and intranuclear inclusion bodies in the epithelial cells of epididymis (Fig. 9, 10) was observed in a case diagnosed as canine distemper. Mild to moderate degenerative changes were observed in the epithelial cells of prostratic acini (Fig. 11) and with diffuse lymphocytic infiltration in the interstitium (Fig. 12). Vas deferens showed mild to moderate degenerative changes in epithelial cells (Fig. 13) with presence of lymphocytes and few neutrophils (Fig. 14).

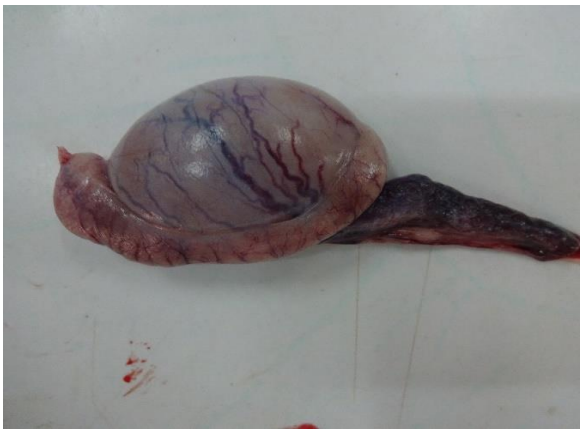

Fig 1: Testis showing congested surface

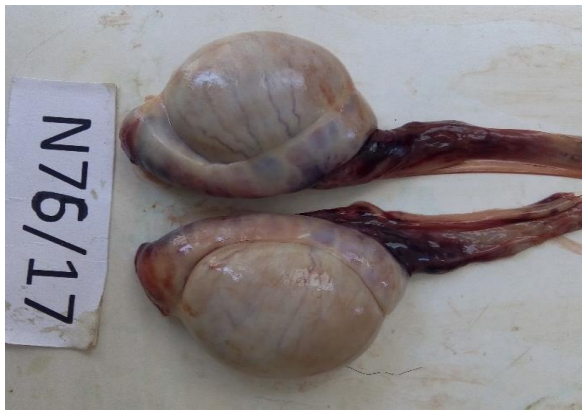

Fig 2: Epididymis and Vas deferens showing severe congestion

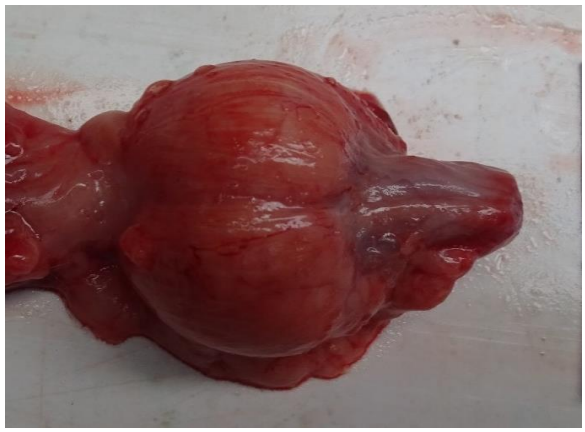

Fig 3: Prostate showing mild enlargement and edematous

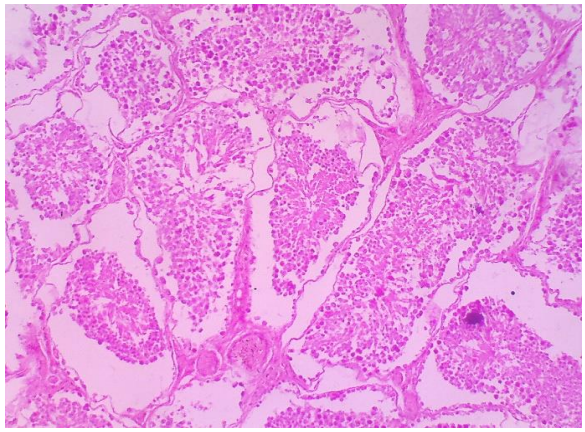

Fig 4: Testis – Degeneration of spermatogenic epithelium in the lumen of the seminiferous tubules. H&E x10

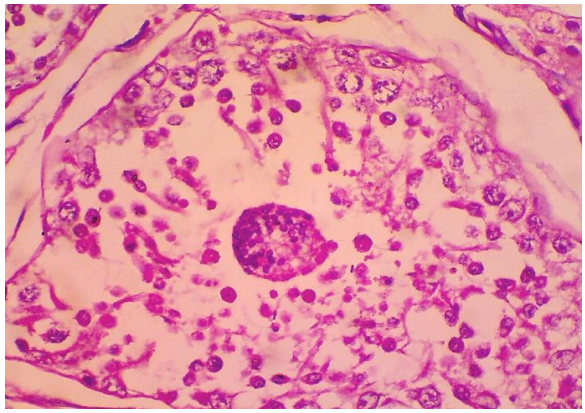

Fig 5: Testis - Presence of multinucleated giant cells in the lumen of seminiferous tubules.H&E x40

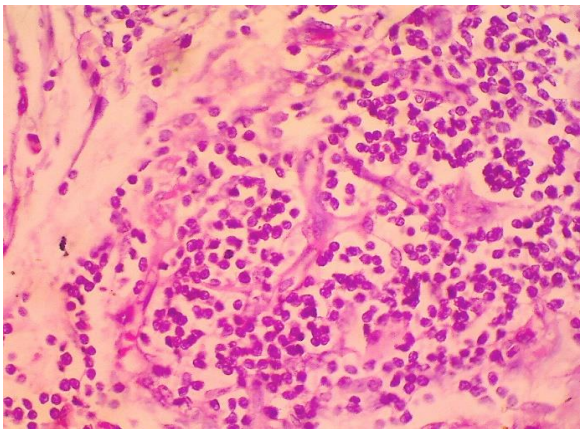

Fig 6: Epididymis - Multifocal lymphocytic infiltration in the interstitium space. H&E x40

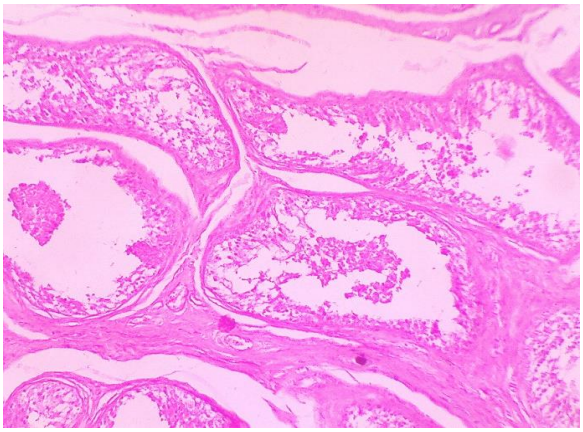

Fig 7: Epididymis- Degeneration of epithelial cells. H&E x10

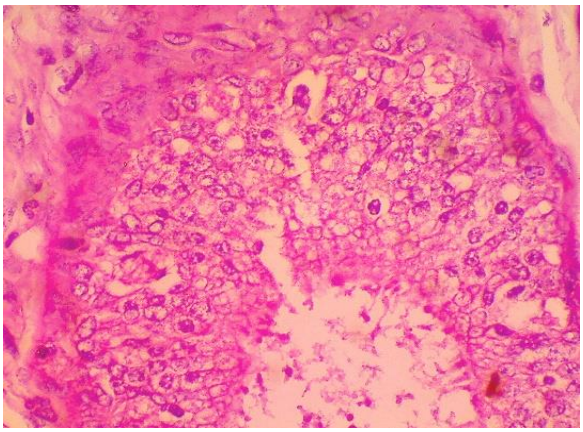

Fig 8: Epididymis - Hyperplasia of epithelial cells. H&E x40

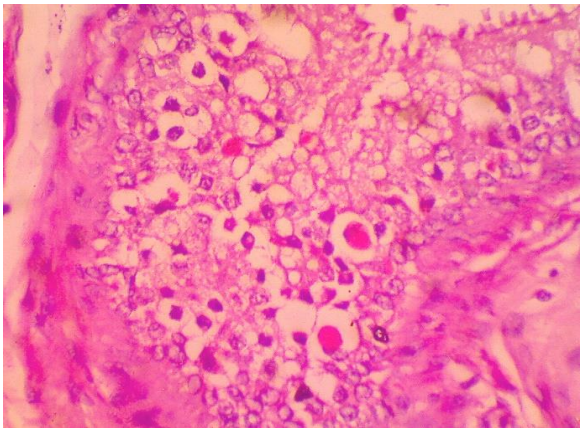

Fig 9: Epididymis - Intracytoplasmic inclusion bodies. H&E x10

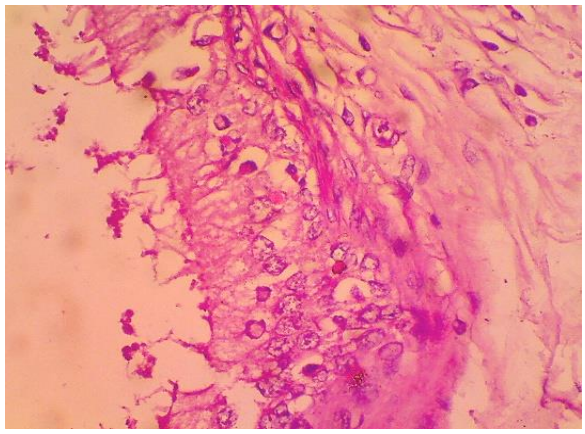

Fig 10: Epididymis - Intranuclear inclusion bodies. H&E x40

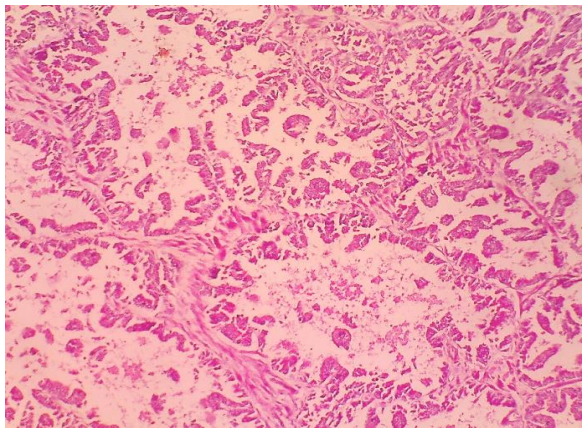

Fig 11: Prostate – Degeneration of acinar epithelial cells. H&E x10

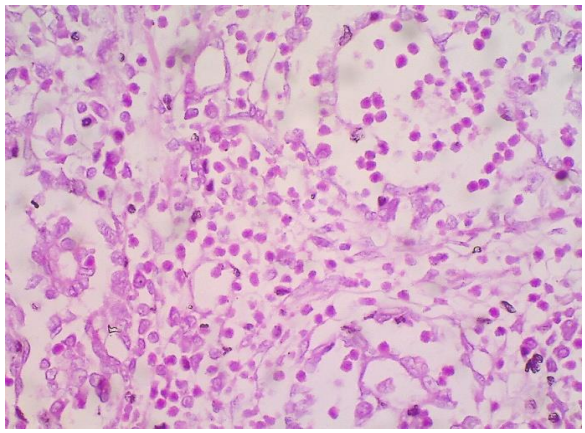

Fig 12: Prostate – Infiltration of lymphocytes in interstitium. H&E x40

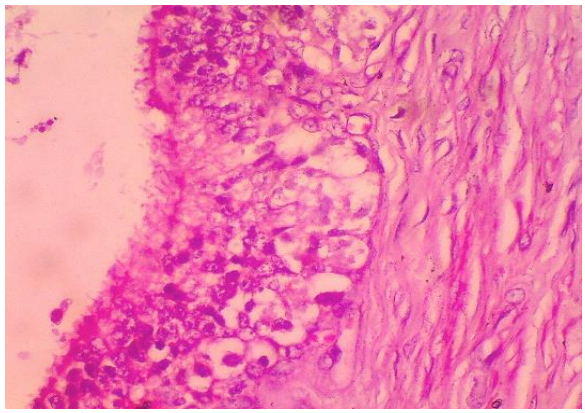

Fig 13: Vas deferens – Vacuolar degeneration in epithelial cells. H&E x40

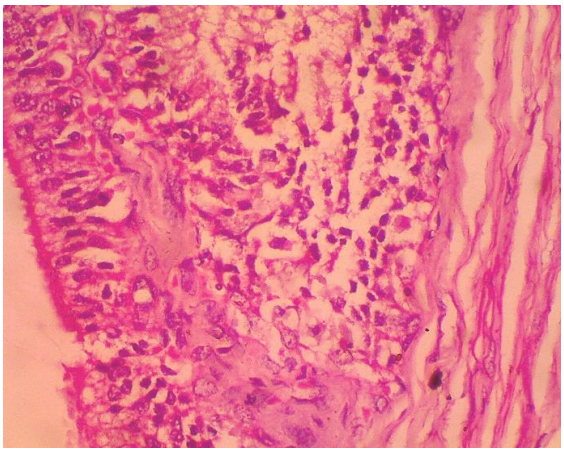

Fig 14: Vas deferens – Lymphocytic infiltration. H&E x40

Discussion

Food restriction depress the male reproductive capacity in proportion to the amount of daily food consumption (Nduka *et al*., 1983) [5], duration of food restriction (Oke *et al*., 2003) [6] and stage of life cycle during which the restriction occurred (Lasson *et al*., 1974) [7]. A wide variety of aetiological factors might be involved in the development of testicular degeneration, such as advanced age, nutritional deficiencies, heat stress, hormones, neoplasia, irradiation and trauma, among others (Foster, 1997) [8]. As testicular degeneration is an acquired condition, the prevalence found in this study indicates an external environmental insult to the testes. Senile testicular degeneration occurs in dogs over 10 years of age (Bloom, 1953) [9]. This was inlower frequency than that observed among adult and old dogs in the present study. Stray dogs were continuously exposed to adverse environmental factors that might lead to the development of degenerative changes in the testes at a young age. Testicular degeneration was based on severity of vacuolation of the seminiferous epithelium, the excessive thickening of the basement membrane and the presence of inflammatory cells (Acland, 2001) [10]. Common histological findings included tubules with multinucleated giant cells and were composed mainly of spermatids. Many workers had described inclusion bodies with regularity in natural cases (Gorham, 1960) [11]. Because the nuclei of dogs often contained groups of very small, dense granules free in the nucleoplasm. A possible mode of development of the inclusions from such particles (Nicander, 1964) [12].

Epididymitis in the dog is usually caused by infection *via* ascending route, immune-mediated or following a traumatic injury (Johnson, 1986) [13]. *Brucella canis* is the most common infectious agent associated with epididymitis (Carmicheal and Joubert, 1988) [14]. The most frequent etiological factor of prostatitis is ascending infection of an aerobic microflora from the urethra. Hematogenous route of infection from orchitis and epididymitis was also possible, as well as in case of septic diseases (Dorfman and Barsanti, 1995b) [15].

Widespread acute inflammatory changes without abscess formation might also lead to prostatic enlargement. Histological examination revealed that in the acute stage the major changes took place in the prostatic acini. The acini were filled with inflammatory exudate, the cellular picture being dominated by lymphocytes (Baumueller and Madsen, 1977) [16].

We conclude that occurrence of genital system pathologies in the present study was similar to findings reported by other authors. The prevalence of genital pathologies in the studied population of male was high. In males, old age had a higher risk of developing testicular pathologies. Cases of testicular degeneration was quite frequent suggesting the presence of adverse environmental factors. Monitoring the prevalence of reproductive diseases in stray dogs would be of great epidemiological interest to assess the risk for spread of congenital or acquired diseases among dog populations in a specific area or region. Control of the disease was difficult because stray dogs serve as a reservoir. Dog owners and breeders should carefully examine males before mating and should also prevent mating of valued dogs with stray (Rust, 1949) [17]. Careful examination of animals in breeding kennels before mating, with a view to present mating with affected animals, and dog licensing laws, controlling the pool of potentially infected, ownerless dogs roaming wild, will control the incidence of the disease (Head, 1967) [18].

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