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Canine Transmissible Venereal Tumor (TVT): Etiology, Epidemiology, Clinicopathology, and Therapeutic Management

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Abstract

Canine transmissible venereal tumor (TVT) is one of the oldest naturally occurring and unique contagious neoplasms affecting dogs, characterized by direct transmission of viable tumor cells, primarily during coitus. TVT is widely prevalent in tropical and subtropical regions and is the most commonly reported canine tumor in India. The disease predominantly affects sexually mature dogs, with higher incidence in bitches and seasonal variation linked to the estrus cycle. Clinically, TVT presents as friable, cauliflower-like genital masses accompanied by serosanguinous discharge, while extragenital involvement may occur in advanced or immunocompromised cases. Diagnosis is effectively achieved through exfoliative cytology and confirmed by histopathology, which reveals sheets of characteristic round cells with cytoplasmic vacuolation. Chemotherapy, especially vincristine sulfate, remains the treatment of choice, achieving high cure rates with minimal adverse effects, whereas surgery plays a limited adjunctive role.

Key words: Cytology, Transmissible venereal tumor, Vincristine sulfate

Introduction

The dog (*Canis familiaris*) is one of the earliest domesticated companion animals, having lived alongside humans for approximately 15,000 years (Zeuner, 1863). Dogs serve multiple roles in human society and are widely regarded as “Man’s Best Friend.” Owing to their increased susceptibility to cancer, dogs provide an excellent model for studying oncogenesis. Research on canine cancers has contributed substantially to the development of cancer diagnostics and therapeutic strategies in humans.

Canine Transmissible Venereal Tumor (TVT)

Canine transmissible venereal tumor (TVT) is the oldest known naturally occurring cancer in dogs. It is also referred to as infectious sarcoma (Roger, 1998), venereal tumor, contagious lymphoma (Vermooten, 1987), canine condyloma, venereal granuloma, and

Sticker's sarcoma (Sticker, 1904). The tumor was first described by Hujad in 1820 (Boscos *et al*., 2004). TVT is a contagious, round cell neoplasm transmitted mainly through the transfer of viable tumor cells during coitus, with implantation facilitated by mucosal injury (Das and Das, 2000).

Etiology and Mode of Transmission

TVT spreads not only by coitus but also by injecting the intact cells subcutaneously or rubbing them on a wound on the skin or mucous membrane. Cell free filtrates have no effect.

Geographic Distribution and Epidemiology

TVT is widely distributed in tropical and subtropical regions, especially in areas with large populations of free-roaming dogs and uncontrolled breeding practices. In India, TVT is the most commonly encountered canine tumor (Singh, 1993). Dogs older than one year are at higher risk, with peak susceptibility observed between two and five years of age (Das and Das, 2000).

Incidence

Seasonal variation in TVT occurrence has been reported, with the highest incidence during winter, followed by rainy and summer seasons. These fluctuations are closely linked to the estrus cycle in female dogs. TVT is more prevalent in bitches than in males, likely due to the mating of one infected male with multiple females (Cingi *et al*., 2020; Kumar *et al*., 2020).

Anatomical Location of Tumors

In female dogs, TVT commonly affects the vestibule, vagina, and vulvar lips. In males, the tumor is typically located on the glans penis, shaft (pars longa glandis), tip of the penis, and preputial mucosa. Extragenital involvement may occur in the skin, nasal cavity, oral mucosa, and eyes.

Clinical Signs

Clinical signs include serosanguinous genital discharge with a foul odour, excessive licking of the affected area, and visible swelling or deformation of the genitalia and perineal region due to large tumor masses. In advanced cases, anemia and secondary infections may also be observed.

Gross Pathology

Grossly, early TVT lesions appear as small, firm, grayish-red nodules on the genital mucosa. As the tumor progresses, it develops into large, cauliflower-like, pedunculated, or multilobulated masses. Although TVT is typically localized, metastasis to extragenital sites can occur, particularly in immunocompromised animals.

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Cytological Features

Exfoliative cytology is a rapid, economical, and reliable method for diagnosing TVT (Amaral *et al*., 2004). Cytologically, the tumor is composed of large, round to oval cells with moderate to abundant cytoplasm containing multiple clear cytoplasmic vacuoles. Additional features include anisokaryosis, increased nuclear-to-cytoplasmic ratio, and frequent mitotic figures (Park *et al*.,2006).

Histopathological Features

Histopathologically, TVT consists of sheets, cords, or clusters of neoplastic round cells separated by fibrous connective tissue stroma. The tumor exhibits a characteristic and predictable progression pattern (Cowell *et al*., 2007 and Zayas *et al*.,2019).

Treatment of Canine Transmissible Venereal Tumor

Chemotherapy

Chemotherapy is the treatment of choice for canine TVT, with vincristine sulfate being the most effective and widely used drug. Vincristine is administered intravenously at a dose of 0.025mg/kg body weight once weekly for 3–6 weeks, depending on tumor response. Complete remission is achieved in more than 90% of cases (Antonov, 2015). Side effects are generally mild and may include transient anorexia, vomiting, diarrhea, and leukopenia.

Surgical Management

Surgical excision of TVT is not commonly recommended as a sole treatment due to high recurrence rates, particularly when complete removal is not achieved. Surgery may be considered in small, localized tumors or when chemotherapy is contraindicated. Surgical intervention is often combined with chemotherapy to reduce tumor burden and minimize recurrence.

Prognosis

The prognosis for dogs with TVT is generally excellent when appropriate treatment is administered. Chemotherapy with vincristine results in high cure rates and low recurrence than compared to cyclophosphamide. Poor prognosis may be associated with immunosuppression, extragenital metastasis, or delayed treatment.

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