

Cryosurgery and electrocautery in treatment of transmissible venereal tumours in large breed dogs: a case report

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ABSTRACT: Five intact male group-raised Tosa dogs were diagnosed with transmissible venereal tumours. Surgical removal with electrocautery and a cryogun was conducted because the owner wanted to maintain the fertility of the dogs. The dogs were followed up for 12 months. The surgical wounds were completely healed by five to six weeks. The dogs remained fertile without complications or recurrences. To maintain fertility in dogs suffering from transmissible venereal tumours, the combination of an electrocautery and a cryogun is suggested.

Keywords: cryogun; fertility; male dogs

A transmissible venereal tumour (TVT) is a histiocytic tumour that can be transmitted among dogs and other canids through coitus, licking, biting, and sniffing tumour affected areas (MacEwen 2001). TVTs are also known as transmissible venereal sarcomas, sticker tumours, venereal granulomas, canine condylomas, or infectious sarcomas. TVTs are mostly observed in free-roaming, sexually active dogs in tropical and subtropical regions such as the southern US, Central and South America, southeast Europe, Ireland, Japan, and China (Eze et al. 2007).

Dogs with TVTs experience pain, haemorrhages and exhibit serosanguineous discharge in the external genitalia (MacEwen 2001). TVTs are usually cauliflower-like in appearance, friable, and red to flesh coloured (MacEwen 2001). A TVT can be detected in the nasal cavity, oral cavity, skin, sclera, or the anterior chamber (MacEwen 2001). Metastases have been reported in 5–17% of cases (Richardson 1981; Rogers et al. 1998).

Several treatments including surgery, radiotherapy, and chemotherapy have been used to treat TVTs (MacEwen 2001). Surgery has been used extensively to treat small, localised TVTs, although the recurrence rate can be as high as 50–68% in cases of large invasive tumours. Radiotherapy is also effective against TVTs but necessitates specialised equipment and immobili-

sation of the dog during radiotherapy (Boscos 1988). Chemotherapy using antimetabolic agents such as cyclophosphamide, methotrexate, vincristine, vinblastine, and doxorubicin is the most effective TVT treatment (Das et al. 1991; Das and Das 2000). However, dogs occasionally develop complications such as vomiting, diarrhoea and leucocytopenia. In addition, some antimetabolic agents can induce decreased fertility in male dogs (Rosenthal 1981).

In this study, we describe five male dogs with TVT that were treated using electrocautery and cryosurgery to maintain their fertility.

Case description

Five group-raised intact male Tosa dogs (weight, 115–130 kg) were presented with pain and haemorrhage at the penis. Their general condition was normal. The results of complete blood count and serum chemistry were within normal ranges. No remarkable findings were detected on thoracic or abdominal radiography. Multiple nodules were found from the glans penis to the crus penis, and some nodules were fused and formed larger nodules (Figure 1). Details are shown in Table 1. The nodules were firm, reddish, haemorrhagic, pedicu-

Table 1. Characteristics of the cases

	Sex	Body weight (kg)	Number of nodules	Location of nodules
Dog 1		115	2 large nodules fused small nodules	penis body crus penis
Dog 2		117	7 large nodules scattered small nodules	penis body crus penis
Dog 3	intact male	118	2 large nodules scattered small nodules	glans penis penis body – crus penis
Dog 4		124	4 large nodules scattered small nodules	glans penis – penis body crus penis
Dog 5		130	13 large nodules scattered small nodules	glans penis – crus penis penis body – crus penis

lated, and cauliflower-like. Round to oval cells with an eosinophilic thin cytoplasm were the main observations on the cytological examination. Nuclei were dense and vacuoles were present in the cytoplasm. The nodules were diagnosed as TVTs.

Surgical resection of the tumours was conducted. Anaesthesia was induced with 6 mg/kg propofol and maintained with 2–3% isoflurane and oxygen after tracheal tube intubation. Antibiotic (20 mg/kg cefazolin *i.v.*) and analgesic (5 mg/kg tramadol *i.m.*)

were administered. An aseptic surgical field was prepared with a povidone wash. A liquid nitrogen cryogun was prepared to remove the small nodules and remnants completely (Figure 2; Cryoalfasystem[®], Basel, Switzerland). The large nodules were held using haemostatic forceps and cut using an electric cautery (Figure 3A), which was also used to control haemorrhaging. The remnants in the areas around the lesions were intensively frozen, while scattered or fused small nodules were frozen exten-



Figure 1. Large (A), fused (B), and scattered (C) nodules



Figure 2. Photograph of the cryogun

sively for 20 s using a cryogun (Figure 3B). The surgical wounds were flushed with sterile saline after the nodules were removed. Postoperative antibiotic (20 mg/kg cefazolin *p.o.*) and analgesic (5 mg/kg tramadol *p.o.*) were administered for five days.

The dogs were presented for follow-up 12 months after the surgery. The clinical symptoms of all dogs were eliminated, and the surgical wounds healed completely by five to six weeks after surgery (Figure 4). All dogs had regained fertility by Week 7 after the surgery. There were no recurrences or metastases during the follow-up period.

DISCUSSION AND CONCLUSIONS

TVT's can occur in any breed, age, and sex of dog but it frequently occurs in dogs two to five years old (Das et al. 1991). TVT is most common during the period of maximum sexual activity in dogs (Das and Das 2000). All dogs in this study were used for commercial breeding. TVT may have been

transmitted easily by these dogs because they were a group raised in a closed environment.

Chemotherapy is the most effective TVT treatment (MacEwen 2001), and vincristine is frequently the agent of choice (MacEwen 2001). When tumours do not respond to vincristine, a combination with other agents such as L-asparaginase, cyclophosphamide, methotrexate, and doxorubicin can yield satisfactory results (Kim et al. 1996; Pansawut et al. 2012; Javanbakht et al. 2014). However, single-agent therapy with two to five treatments of vincristine (0.025 mg/kg) at weekly intervals is the most effective treatment (Amber et al. 1990). Chemotherapy with vincristine is desirable for TVT treatment because it results in a good prognosis without serious complications. However, the owner in our case refused chemotherapy because he wanted to maintain the fertility of the dogs.

Cytotoxic agents can alter spermatogenesis temporarily or permanently (Rosenthal 1981). Vincristine can cause cytoplasmic protein precipitation, which, in turn, interferes with microtubule formation (Rosenthal 1981). Vincristine can damage germ cell DNA, thereby reducing the rate of development of these cells (Zhang and Sun 1992). It is known that vincristine is associated with the risk of infertility in humans (Lee et al. 2006). However, Gobello and Corrada (2002) reported that vincristine administration does not alter libido, testicular size, or semen parameters in male dogs with genital TVT. The cause of this discrepancy is not clear. Further studies on the effect of vincristine on spermatogenesis should be conducted, but we cannot completely rule out the possibility that vincristine alters fertility in male dogs. Therefore, we decided to perform cryosurgery of the tumours rather than chemotherapy to maintain the fertility of the dogs.

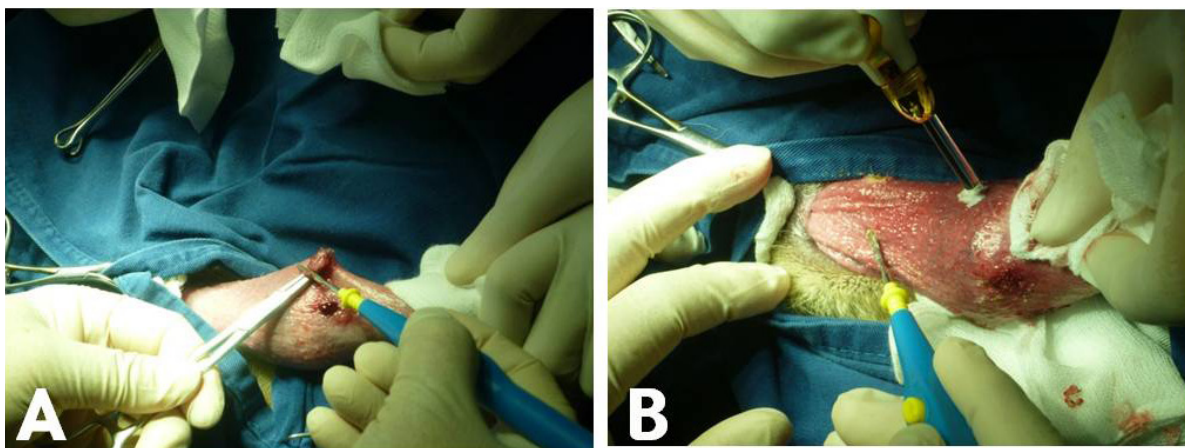


Figure 3. Removing the tumours using electrocautery (A) and a cryogun (B)



Figure 4. Surgical wounds five weeks after surgery

TVT's are easily transplanted to surgical wounds during surgical removal of tumours, including *en bloc* excision and debulking, and recurrence is 12–68% for cases of TVT (Idowu 1984; Dass and Sahay 1989; Pandey et al. 1989; Gandotra and Chauhan 1993). Thus, removing TVTs using electrocautery and/or a cryogun is desirable (Das and Das 2000; Savadkoohi et al. 2013). Electrosurgical removal is widely used in veterinary clinics and provides improved haemostasis. However, it leads to greater postoperative pain due to the thermal injury (Gloster 2000). In this study, we used an electrocautery to remove the large nodules, but not the small ones. The small nodules were extensively scattered mainly in the crus penis. Applying electrocautery to small nodules may cause severe widespread pain. Therefore, we used a cryogun instead of electrocautery to remove the small nodules.

Cryosurgery can be used to reduce tumour recurrence, as it induces direct cellular death and vascular collapse, leading to tumour elimination (Withrow 2001). It is a very effective treatment for solid tumours of the eyelid, perianal, oral, skin, and others (Withrow 2001). De Queiroz et al. (2008) successfully treated benign and malignant cutaneous tumours by cryosurgical ablation with very low recurrence. We successfully removed small nodules and remnants using a cryogun. In particular, a cryogun was effective for removing the scattered nodules in a short time. These advantages can relieve the pain induced by tumour removal and allow rapid recovery of fertility.

In conclusion, we treated TVTs in male dogs with electrocautery and cryosurgery instead of chemotherapy to maintain the fertility of the dogs. The combination of electrocautery and cryosurgery was efficacious, cost-effective, and convenient and there were no com-

plications or recurrence. This method can be used as an alternative for the treatment of TVTs.

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