

Episiectomy and partial vaginectomy with urethroplasty for excision of vulvar mast cell tumour in a female dog

DANIELE LIRA DOS SANTOS^{1*}, JAESE FARIAS CHAVES¹, MARCELLA PINHEIRO SOUTO¹, GEYSE MARIA MACHADO LIMA¹, JULYANNE DE SOUSA SIQUEIRA², SIMON SILVA DE SOUSA¹, GABRIELE SOUSA SILVA¹, MARCIO ALAN OLIVEIRA MOURA², PRISCILA DOS SANTOS RIBAS¹, KATIANE SCHWANKE¹, PEDRO SOARES BEZERRA JUNIOR², PEDRO PAULO MAIA TEIXEIRA¹

¹Veterinary Hospital, Federal University of Pará, Castanhal – Pará, Brazil

²Pathology Animal Lab, Federal University of Pará, Castanhal – Pará, Brazil

*Corresponding author: danielelira.ta@gmail.com

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Abstract: This case report describes the surgical treatment of a grade II mast cell tumour in the vulvar region of a 4-year-old female Miniature Pinscher dog. The patient weighed 2 kg, and the tumour measured 2 cm in diameter. The surgery involved an episiotomy, a partial vaginectomy, and a subsequent urethroplasty. Due to the patient's small size, the surgical margins were set at 2 cm laterally and 2 cm deep, which meant that the entire vulva, as well as the ventral part of the vaginal canal had to be removed. Afterwards, the urethral ostium was elliptically fixed to the skin at the end of the urethroplasty. The follow-up evaluations revealed an excellent recovery without metastasis or recurrence over the following two years.

Keywords: canine; neoplasia; reconstructive surgery; surgical margin

As the life expectancy of animals has increased, it has resulted in an increased rate of neoplasia, known as a major cause of death in dogs (Gonzalez-Chavez et al. 2015). The most common cutaneous malignant neoplasm is the mast cell tumour, which is characterised by the neoplastic proliferation of mastocytes. It accounts for approximately 7–21% of the skin tumours in canine species (Arendt et al. 2015). Although the aetiology is unknown, it is recognised that the Bulldog breed, advanced age (Pratschke et al. 2013; Silva et al. 2014), receptor tyrosine kinase (c-KIT) defects and mutations (Takeuchi et al. 2013), and genetic mutations (Arendt et al. 2015) are possible predisposing factors for this neoplasm (Pratschke et al. 2013).

The common clinical presentation is a single, alopecic, and non-ulcerated tumour; however, patients usually do not present systemic clinical signs (Takeuchi et al. 2013; Miller et al. 2016).

It is diagnosed through a fine-needle aspiration (FNA) cytology and biopsy, and it can be graded through the histopathology into different grades that attempt to predict the malignancy and behaviour.

There are two recognised grading systems for mast cell tumours; one, as defined by Patnaik et al. (1984), who classified the tumour into grades I, II, and III; and another, more recently by Kiupel et al. (2011) and Silva et al. (2014), who classified the tumour into high and low grades.

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A surgical excision is the treatment of choice, often times combined with radiotherapy, chemotherapy, and or electrochemotherapy. Any adjuvant treatment will depend on the grade of the tumour, whether or not the surgical margins are tumour free on the histopathological examination, and the presence or absence of a metastatic disease. In oncological surgery, the broad margins are typically made laterally and deeply, which can cause extensive surgical wounds and even lead to the total or partial amputations of the affected organs (Spugnini et al. 2011; Warland et al. 2015).

Consequently, reconstructive surgery in veterinary medicine has been utilised to repair these wounds (Pratschke et al. 2013), and has become important as it improves the function and aesthetics, and increases the animal survival. Here, we report a case of vulvar mast cell tumour removal associated with reconstructive surgery.

Case report

The patient, a 4-year-old sterilised female Miniature Pinscher dog, weighing 2 kg, was presented to the Veterinary Hospital of the Federal University of Pará (UFPA). The owners reported the presence of a firm, round nodule measuring approximately 2 cm in the vulvar region, progressing in size rather quickly over approximately 1 month (Figure 1). On physical examination, the animal was alert, had a good nutritional status and the heart rate, respiratory rate, and temperature were within the physiological range for the species; however, a palpation revealed bilaterally enlarged popliteal lymph nodes.



Figure 1. Perivulvar cutaneous mast cell tumour in a dog. The nodule well delineated and not ulcerated, measuring approximately 2 cm (black arrow)

A fine-needle aspiration (FNA) was performed to collect samples of the vulvar mass and the popliteal lymph nodes, which were sent to the Animal Pathology Laboratory of UFPA for a cytological examination. The material collected from the patient's vulva consisted of individualised round cells with moderate anisocytosis and an abundant cytoplasm containing granules and nuclei with moderate anisokaryosis and evident nucleoli. The cytopathological findings were compatible with a mast cell tumour diagnosis. The lymph node material presented no evidence of metastasis. The blood count and biochemical tests were unremarkable.

Subsequently, the animal was scheduled for the surgical removal of the vulvar nodule. The pre-anaesthetic medication included promethazine hydrochloride 0.2 mg/kg, i.v. (Pamergan; Cristália, São Paulo, Brazil); tramadol hydrochloride 4 mg/kg, i.v.; (Tramadon; Cristália, São Paulo, Brazil), meloxicam 0.2 mg/kg, i.v. (Maxican 2%; Ourofino, São Paulo, Brazil), and amoxicillin trihydrate 20 mg/kg, i.v. (Agemoxi; Agener União, São Paulo, Brazil). Propofol 4 mg/kg (Provive 1%; União Química, São Paulo, Brazil) was used for the induction and isoflurane (Isoforine; Cristália, São Paulo, Brazil) 1.5 V% for the maintenance. The urethra was catheterised with a number 6 PVC urethral catheter.

Subsequently, a triangular incision was made around the vulva (Figure 2); the relevant tissue was dissected and a monopolar diathermy was used for the tissue haemostasis. The area affected by the



Figure 2. Transoperative procedure – triangular excision around the vulva (dashed triangle)



Figure 3. Intraoperative procedure – removal of the vulva and the vaginal canal and fixation of the urethra to the skin

tumour was removed with a minimum surgical margin of approximately 2 cm.

This involved removing the entire vulva and part of the vaginal canal by following the technique of Salomon et al. (2004) and a technique adapted from Nelissen and White (2012) (Figure 3). To obtain the stipulated 2 cm deep margin, a vaginectomy was carried out by using a vestibular approach through access from an episiotomy. The caudal part of the vagina was dissected and separated from the vestibule at the vestibulovaginal junction, just cranial to the urethral tubercle. The muscles were dissected from the vestibule, and the remnant tissue was apposed with a continuous suture pattern to obliterate the dead space. The transected urethra was pulled caudally and then sutured to the distal vestibule with a nylon suture material, using an interrupted pattern.

The subcutaneous space was reduced, and the urethral ostium was elliptically fixed to the skin at the end of the urethroplasty (Figure 4).

The tumour sample was sent for a histopathological examination, and the results showed that it consisted of round cells arranged in strands or solid islands with a small amount of fibrous stroma extending from the superficial to deep dermis (Figure 5). The neoplastic cells showed an abundant basophilic cytoplasm, metachromatic granules stained in toluidine blue, and nuclei with moderate anisokaryosis, loose chromatin, and evident



Figure 4. Immediate post-procedure aspect of the episiotomy and partial vaginectomy with the urethroplasty for the excision of the vulvar mast cell tumour. The urethral canal with a catheter (black arrowhead)

nucleoli, with two to three mitotic figures in ten high-power fields. Additionally, there were areas of necrosis and occasional eosinophils among the neoplastic cells. The neoplasm was classified as a grade II or low-grade mast cell tumour according to Patnaik et al. (1984) and Kiupel et al. (2011),

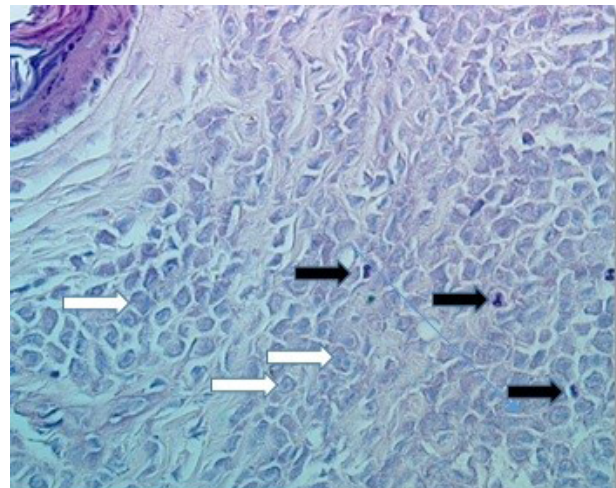


Figure 5. Vulvar cutaneous mast cell tumour in a dog. The neoplasm with round cells arranged in strands or solid islands with a small amount of stroma. The cells present moderate anisocytosis, abundant basophilic and granular cytoplasm, and round or oval nuclei with moderate anisokaryosis, loose chromatin, and evident nucleoli (white arrows). Occasional eosinophils (black arrows) are visualised among the neoplastic cells. Haematoxylin and eosin (H&E), × 40 magnification



Figure 6. Healing progress of the surgical wound 10 days after the vulvar mast cell tumour removal

respectively. The patient was given a guarded prognosis based on the neoplasm morphology, and had a low risk for tumour recurrence and metastasis.

The dog recovered well in the postoperative period, and the following drugs were prescribed: amoxicillin + potassium clavulanate (Agemoxi CL; Agener União, São Paulo, Brazil; 20 mg/kg b.i.d.) v.o., for 10 days, ketoprofen (Ketojet; Agener União, São Paulo, Brazil; 1 mg/kg s.i.d.) v.o., for 3 days, dipyrone sodium (Dipirona gotas; Biovet, São Paulo, Brazil; 25 mg/kg t.i.d.) v.o. for 3 days, tramadol hydrochloride (Tramadol; Cristália, São Paulo, Brazil; 4 mg/kg t.i.d.) v.o., for 7 days, and promethazine hydrochloride (Pamergan; Cristália, São Paulo, Brazil; 0.2 mg/kg b.i.d.) v.o., for 3 days. The patient returned after 5 days for the evaluation and removal of the urethral catheter, and after 5 more days for the removal of the stitches (Figure 6).

Subsequently, the patient was seen for a follow-up at the clinic after 40 days, and again 8 months after the surgery (Figure 7), and more than 2 years after the event, no tumour recurrence was noted.

DISCUSSION

Genitourinary tract reconstruction surgeries are necessary in the treatment of tumours in the vulvar region, each presenting particularities depending on the location and type of the neoplasia (Nelissen and White 2012).



Figure 7. Follow-up 8 months after surgery to remove the vulvar mast cell tumour

Miniature Pinschers are not mentioned in the literature among the breeds highly predisposed to cutaneous mast cell tumours. The more predisposed breeds are the Boxer, English Setter, Dachshund, Weimaraner, Boston Terrier, Bullmastiff, and Golden Retriever, which may have genetic components involved (Dobson 2013; Arendt et al. 2015; Smiech et al. 2017). In addition to the genetic assumptions, cutaneous mast cell tumours can be associated with chronic dermatitis or the use of or exposure to skin-irritating substances, which can also affect other breeds and even mixed-breeds (Gonzalez-Chavez et al. 2015; Miller et al. 2016).

Mast cell tumours located in the mucocutaneous and perineal regions tend to be more aggressive (Warland et al. 2015). In this case, the nodule located in the vulvar region was classified as grade II according to Patnaik et al. (1984), and as low-grade according to Kiupel et al. (2011) (Silva et al. 2014). Although tumours with this classification are not the most aggressive ones, they have a metastatic potential of between 5–22%, mainly involving the regional lymph nodes (Pratschke et al. 2013; Silva et al. 2014). For the metastasis assessment, especially in the regional lymph nodes, the FNA cytology technique has shown high sensitivity (Mutz et al. 2017). The FNA samples collected from the

popliteal lymph nodes, in our case, did not show any metastasis during the clinical follow-up.

The lateral excision margin recommended for the treatment of a grade II mast cell tumour is 3 cm, and it must be deep enough to reach the deep fascial plane (Pratschke et al. 2013). The European consensus on mast cell tumour removal in dogs and cats recommends margins of 3 cm for mast cell tumour grades III and 2–3 cm for grades II (Blackwood et al. 2012). However, it has already been described that the surgical margins differ from the histological margins in mast cell tumour samples (Risselada et al. 2015). Regardless of the small size of the patient in this case, the margins were sufficient.

The combined abdominal and vestibular approach for the subtotal vaginectomy allowed a complete resection of the extensive vaginal lesions, was not associated with any major complications, and the outcome was favourable (Nelissen and White 2012). Antihistamines were used in the pre- and post-operative period, as the manipulation of the tumour causes the mast cells to release inflammatory mediators such as histamines, proteases and vasoactive amines. These can act locally to cause itching and swelling, resulting in delayed healing (Warland et al. 2015).

However, recent studies have shown that mast cell vasodilation is mediated by two receptors, H₁ and H₂, in addition to a prostaglandin called D₂, which is also released by canine mast cells. The used antihistamines act only on the H₁ receptor, leaving their action ineffective and/or unsatisfactory in dogs (Sanchez et al. 2017). However, in this case, it occurred satisfactorily, with positive results.

We conclude that oncological surgeries of the genitourinary tract can result in the complete surgical removal, specifically in the case of a mast cell tumour, and especially in cases of small patients. However, in cases where it is difficult to attain a margin, our technique has proved effective as a treatment, while importantly managing to preserve the urinary function, so this case can serve as a guide for future similar cases.

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Conflict of interest

The authors declare no conflict of interest.

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