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Short Communication

Surgical management of spontaneous mammary tumor in rats (*Rattus norvegicus domestica*)

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Abstract

Mammary tumors (fibroadenomas and fibrosarcomas) are the most common spontaneous tumor in rats. The present report incorporates the surgical treatment of mammary tumor in five rats with a history of hard swelling for one to four months. Tumors spread extensively over the body from the thoracic region up to the inguinal region, with ulceration in three rats. The anaesthetic protocol included inj. xylazine and Inj. ketamine through intraperitoneal route. The tumor growth was excised surgically. The excised tumor growths were identified as fibroadenoma. The present report refers to the common occurrence of spontaneous mammary tumors in domestic rats with successful anaesthetic and surgical outcomes.

Key words: Rat, Mammary tumor, Surgical excision

Highlights

- All the rodents were successfully operated for mammary tumor.
- Spontaneous mammary tumor is very common affection in domestic rats.
- All the rats recovered from anaesthesia without any undue complication.

Rats are genetically predisposed to a high incidence of tumors, and most are benign tumors (Raja Ramesh, 2016). The most common tumors are mammary fibroadenomas, occurring in 36.1% of females and 2.6% of males, while dermal fibromas occur in 4.5% of males and 3.0% of females (Parmar *et al*., 2020). The general anaesthesia of rats is challenging to most clinicians due to the small size of the patients, high metabolic rate and susceptibility to hypothermia and hypoglycemia (Kumar *et al*., 2012). Nowadays, rodents are considered like pet animals and presented to the Veterinarian for diagnosis and treatment, and deserve the same approach as other domestic species (Tinelli *et al*., 2021). The paper presents the surgical management of spontaneous mammary tumors under general anaesthesia in domestic rats.

Five rats were presented to VCC, College of Veterinary Science, Mhow with a history of hard swelling (Fig. 1) for one to four months as per the individual case. The owners witnessed an initial slow tiny growth to rapid large growth within 15 to 30 days. There was a history of decreased activity levels and a tendency to attempt self-mutilation of the growths and abrasions due to dragging of growths during movement. Rats were presented to the clinic when the growths became quite big, affecting their movements and started touching the floor. Clinical examination revealed a large hard swelling with demarcated margins and sessile with a firm attachment to the body (Fig. 1). The location of the tumor varied from the region of thoracic up to the inguinal region as per the individual case of rats with ulceration in three rats. Rats aged between three months to one year and weighed 50 to 150 g. Manual palpation did not elicit a

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pain response. The surgical treatment was planned for excision of growth to relieve the distress of animals.

All the rats were anaesthetized using a combination of Inj. xylazine @10 mg/kg b. wt. and Inj. ketamine @80 mg/kg b. wt. by intraperitoneal route at left quadrant of the abdomen while the animal was restrained in a head down position, using a tuberculin syringe (Thurman *et al.*,1996). Rodents need not be fasted preoperatively as they do not vomit, and due to their small size, they are susceptible to hypoglycemia due to low hepatic glycogen reserve (Rao and Verkman, 2000). This anaesthetic protocol provided a moderate duration of anaesthesia of 30 min (Richardson and Flecknell, 2009). Intraperitoneal (IP) injection has been commonly used in laboratory rodents because it requires minimal skill and does not show pain when irritating drugs are administered (Capello, 2011).

After following the standard protocol, skin incision was given on the periphery of the growth by avoiding the blood vessels, and the growth was freed from the surrounding tissue by blunt dissection (Fig. 2). Supplying blood vessels were observed which ligated properly. After the excision of growth, the fascia and subcutaneous tissue were opposed using 3-0 suture material (Polyglactin 910) and the skin by using silk.

The post-operative dressing was done with betadine ointment (Fig. 3) and bandaging. Cage rest was advised, antibiotics (ciprofloxacin@10 mg/kg b.wt.) and analgesics (meloxicam @1 mg/kg b. wt) for 5 days postoperatively were recommended.

All the rats recovered from anaesthesia, and their wounds healed without complications. There was a reoccurrence of growth in one animal after 6 months of removal. The excised tumor growths were diagnosed as fibroadenoma, a mammary tumor, on the basis of histopathological examination. Studies reported that old rats develop mammary tumors, most of which are fibroadenomas (Percy and Barthold, 2007; Quesenberry and Carpenter, 2012). These are benign tumors that usually have well-defined borders.Tumors can become very large and develop in both males and females (Quesenberry*et al.*, 2004). Consi-dering that mammary tissues on both sides of the ventral midline extend from the axillary region up to the inguinal region, mammary tumors can extend anywhere from the submandibular region to the base of the tail. Metastasis is generally rare in mammary tumor (Keeble and Meredith, 2009).

Surgical removal of the mass is currently the treatment of choice, even if the tumor is prone to recurrence as because complete mammary chain resection is not easily feasible in rats (Hocker *et al.*, 2017) and due to persistent hormonal promoting factors, secondary mass often develops following excision (Keeble and Meredith, 2009; Quesenberry and Carpenter, 2012). The owners should be advised to timely spay their pets to reduce the probability of mammary tumor appearance (Tinelli, 2021).

The present case report refers to the common occurrence of spontaneous mammary tumors in domestic rats with successful anaesthetic and surgical outcomes.

Conflict of interest: Authors have no conflict of interest in this study.

Author's contribution: All the authors were involved in the surgical procedures of one and more animals (rats); the first author operated and assisted in the excision of tumor in 5 rats and prepared the manuscript.

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Fig. 1. Tumors growth in four rats

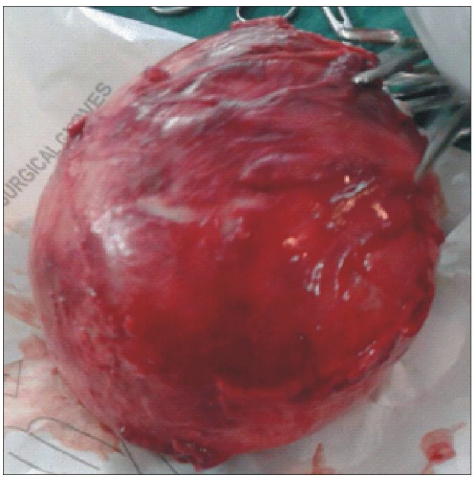

Fig. 2. Excised tumor mass

Fig. 3. Post-operative wound

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