Coccygeal osteosarcoma
A report in three cows

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SUMMARY
The report describes a rare occurrence of coccygeal osteosarcoma in three adult cows (2 cross-bred and one local Zebu cow). All cows had a hard ulcerated swelling at the base of tail from 4 to 6 months making it heavy and stiff. The swelling was pressing the anus and the cows had difficulty in defecation, lifting and moving the tail. Lateral radiographs revealed the lysis of the initial coccygeal vertebra (varying from C1 to C6 vertebrae) with sunburst appearance, indicating advanced stage of bone tumour. The tails were amputated, as cranial as possible, under general anaesthesia (midazolam, ketamine and isoflurane), in lateral recumbency. Histology showed bony spicules along with proliferation of the osteoblasts with pleomorphic and spindle shaped plump oval nuclei, confirming coccygeal osteosarcoma in all the cows. The cows are lived a quality life for 3 to 6 months after surgical excision of tail and died within 4 to 12 months. In conclusion, coccygeal osteosarcoma bears a poor prognosis due to delay in presentation, extensive involvement and consequent re-occurrence.

KEY WORDS
Amputation; bovine; coccygeal; osteosarcoma; surgery; tail tumour.

INTRODUCTION

Osteosarcoma is one of the most common bone tumour encountered in dogs, cats and humans[1]. A few cases of osteosarcoma have been reported in cattle, predominantly in the bones of head[2]; maxilla[3,4], mandible[5], nasal cavity[6,7] and ischium[8]. Osteosarcoma originating from the appendicular skeleton like scapula[9] and metacarpal bone[10] is also reported. As per author's knowledge, osteosarcoma originating from the coccygeal vertebra has not been reported in cattle. This case report describes the clinical presentation, radiographic, surgical and histological findings of coccygeal osteosarcoma in three adult cows.

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HISTORY AND CLINICAL OBSERVATIONS (Table 1)

The three non-gravid cows were presented to the University Veterinary Hospital at different time in an interval of total 20 months. Two of the cows were crossbred of exotic breeds while one was local Zebu humped cow.

All the cows had hard swelling/mass with a few ulcerated spots near the base of the tail, which was gradually increasing in size (Figure 1). The tail was heavy and stiff and the cows were unable to lift or move it freely, the severity of which increased with the size of the mass. The mass was pressing the anus and it was impossible to do per rectal examination in cow 1 (Figure 1a, b, c). All the three cows had nearly normal appetite.

The first 2 cows were moderately anaemic and the tail involvement was also extensive. Lateral radiographs of the coccygeal regions revealed lytic changes in the proximal coccygeal vertebrae with sunburst appearance (Figure 1c, f, i) suggestive of bone tumour. The involvement of number of coccygeal ver-

tebra varied in cows. The clinical and radiographic findings indicated advanced progression of the disease condition, whereas, prognosis was poor for surgical correction. However, the owners did not agree for euthanasia, and tail amputation was decided under general anaesthesia. The technical challenges associated with the amputation from the base of tail in cow 1 and 2 was the broad base, incomplete excision of the tumorous mass and inadequate skin flap for the closure of surgical wound. The cows were called off feed and off water for 24-36 hours on the day of surgery. Intravenous fluids (dextrose normal saline solution 5%) were administered during this period.

SURGICAL MANAGEMENT

The cows were restrained in lateral recumbency for surgery. Premedication was done using injection midazolam (Neon Laboratories Ltd., Mumbai, India) (0.2 mg/kg), intravenously, followed by induction with injection ketamine hydrochloride (Neon Laboratories Ltd., Maharashtra, India) (4mg/kg) intravenously, till effect. Endotracheal intubation was done with 20mm (ID) tube and the anaesthesia was maintained using 2-3% Isoflurane (Raman and Weil Pvt. Ltd, Daman, India) inhalant anaesthesia mixed with 100% oxygen using partial re-

Figure 1 - Photograph showing a tumorous mass at the base of the tail in cows (caudal and lateral view) and their respective radiographs in lateral view (Cow 1: a, b, c; Cow 2: d, e, f; Cow 3: g, h, i).

Table 1 - Detailed description of cows with coccygeal osteosarcoma.

		Cow 1	Cow 2	Cow 3
Breed		Holstein crossbred	Zebu humped	Jersey crossbred
Age		6 year	6 year	9 year
Weight		360 Kg	345 Kg	450 Kg
Period of illness		6 months	4 months	6 months
Size of mass		30 X 25 cm	18 X 14 cm	20 X 15 cm
Vertebrae involvement on radiograph (Figure 1c, f, i)		C1-C2-C3-C4-C5 (C1 and C5 showing partial lysis, C2,C3 and C4 showing complete lysis with sunburst appearance)	C3-C4-C5 (C3 partial lysis, C4-C5 showing extensive lysis and sunburst appearance)	C5-C6 (C5 showing complete lysis with sunburst appearance, C6 partial lysis)
CBC	Hb (g/dl)	8.5	7.0	11.0
	TLC / mL	12650	9200	11000
	N (%)	70	66	68
	L (%)	28	32	32
	PCV (%)	25.2	21.0	33.0
	Platelets (/µL)	340000	292000	325000
Follow up		Re-occurrence at 3 months and the cow died within next one month with hematoma and swelling in sacral and pubis region.	The surgical wound did not heal by primary intention. After 6 months, swelling appeared in the sacral region. The cow became recumbent and died within 12 months.	Swelling appeared at the surgical site after 4 months nd spread to sacrum and apubis. The cow had difficulty in passing faeces and died at 7 months.

CBC: Complete Blood Count, Hb: Haemoglobin, TLC: Total Leucocyte Count, N: Neutrophils, L: lymphocytes, PCV: Packed Cell Volume

breathing circuit.

Incisions were made on the either sides of the tumorous mass. Subcutaneous dissection was done to make a skin flap for the closure of tail stump after amputation. In cow 1, the tumorous mass had multiple bone pieces and was firmly adhered to the rectal wall.

During dissection, an almost 6 cm linear tear occurred in the rectal wall, which was later repaired using polyglactin 910 (no. 3-0) in a simple continuous manner. The tumorous mass was resected upto the sacrum (Figure 2). The remaining lytic bone pieces and affected tissues were also removed. All major blood vessels encountered were ligated and the surgical wound was flushed with normal saline solution. The subcutaneous sutures were applied using polyglactin 910 (no.2-0) and the skin closure using silk no. 2 in horizontal/cross mattress pattern. The anaesthetic recovery showed slight shortage of skin on ventral aspect leading to widening of the anus in cow 1. In cow 2 and 3, the surgery was comparatively simple, with no rectal involvement and the amputation was done after C1 and C2 vertebrae, respectively. Though, in cow 2, there were pus pockets in the tissue leading to contamination of the surgical wound.

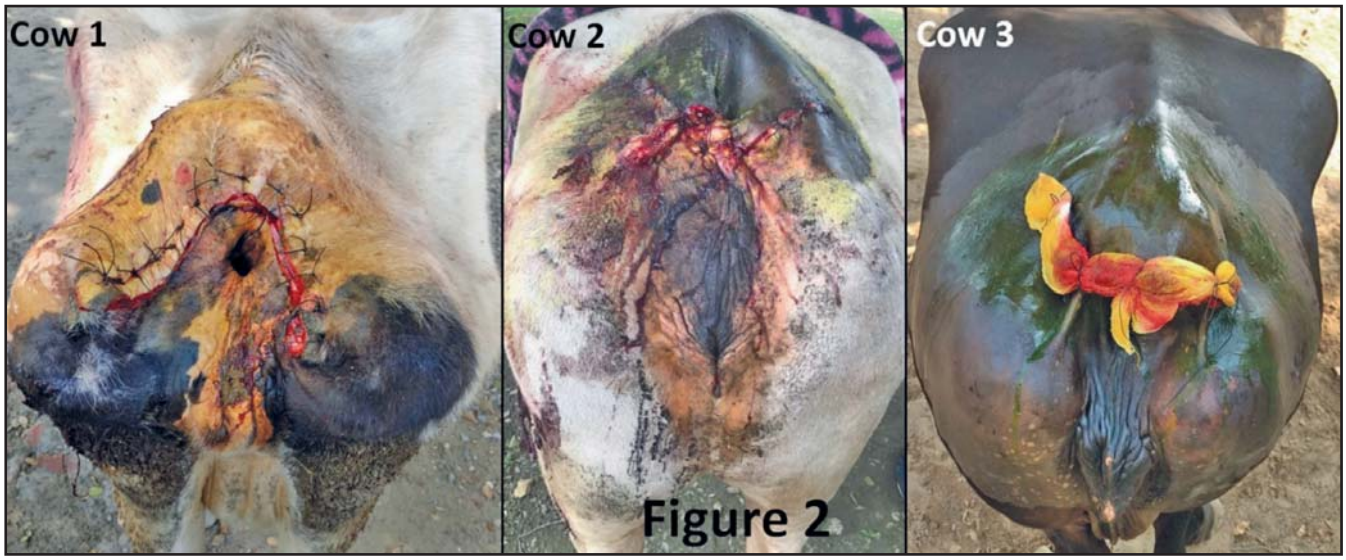

Figure 2 - Photograph showing cows after tail amputation.

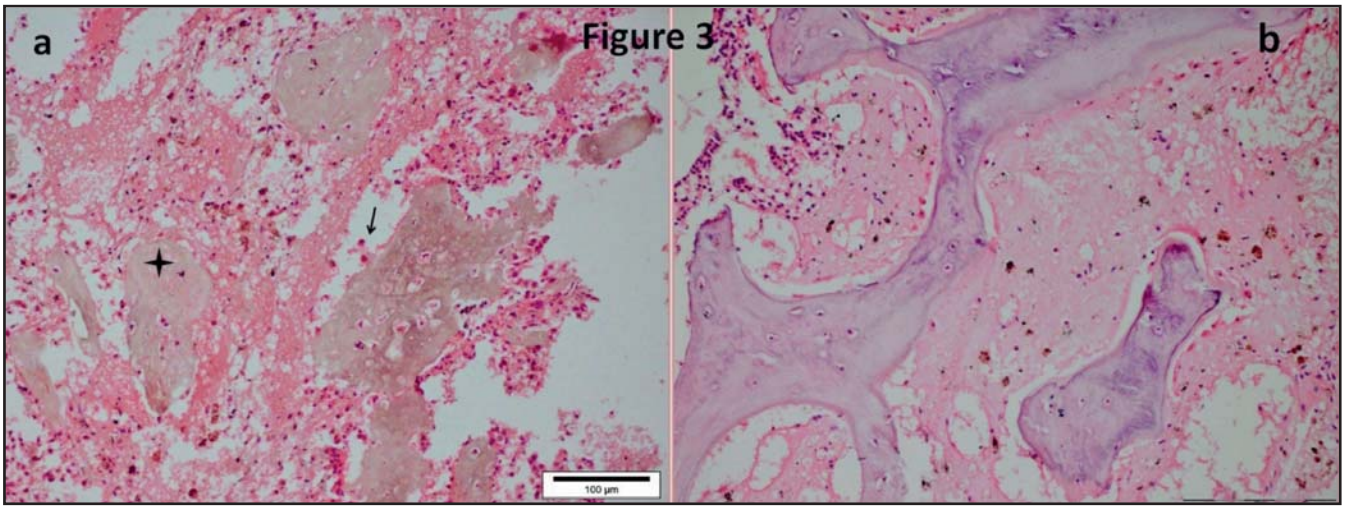

Figure 3 - Photomicrograph showing bony spicules (black star) along with proliferation of osteoblasts (black arrow) suggestive of osteosarcoma (H&E, 20X).

POSTOPERATIVE CARE AND COMPLICATIONS

Post-operative care included injection ampicillin-cloxacillin (10 mg/kg), twice daily for 5 days, injection gentamicin sulphate (4mg/kg) divided in 2 doses daily for 3 days and injection meloxicam (0.2mg/kg) once daily for 3 days, intramuscularly. The surgical wound healed uneventfully in cow 1 and 3; however, cow 2 had surgical wound dehiscence. After surgery, cow 1, 2 and 3were survived for 3, 6 and 4 months, respectively and reported re-occurrence of tumour involving sacral and pelvic regions. Subsequently, all the cows died in a time period of 4, 12 and 7 months, respectively.

HISTOLOGY

The biopsy samples were stained with haematoxylin and eosin (H&E) stain as per the standard procedure.
Microscopically, the slides showed bony spicules along with proliferation of the osteoblasts with pleomorphic and spindle shaped plump oval nuclei (Figure 3), suggestive of osteosarcoma.

DISCUSSION

Tail tumours are rare in bovine. There are a few reports of mixed apocrine adenocarcinoma in a cow[11] and a buffalo calf[12]. Adult buffaloes were not reported for tail tumours; although buffaloes have common occurrence of tail varicosity[13], tail gangrene and dislocations[14]. Such lesions, particularly, when present on the base of the tail make difficulty during defecation and calving[13]. In the present report also, cow 1 had difficulty in passing faeces as the anal region was compressed by the tumour mass. Radiography of bone with lysis and sunburst appearance is typical of osteosarcoma[15] which was also confirmed on histopathology in the present study.
An osteosarcoma or osteogenic sarcoma is a cancerous tumour of a bone. It is an aggressive malignant neoplasm that arises from the primitive transformed cells of mesenchymal origin and it exhibits osteoblastic differentiation. Histologically, it is characterized by the production of osteoid and/or immature bone tissue by neoplastic osteoblasts[2]. Osteosarcoma revealed tumorous cells with pleomorphic and spindle shaped plump oval nuclei. These cells are usually accompanied by strands of osteoid which become distinct islands[4].
Tail amputation for coccygeal osteosarcoma, in the present study, was a high risk surgery as there were chances of uncontrolled and diffused haemorrhages from the aggressive tumorous lesion. Tail amputation for gangrene or varicosity is usually recommended in standing position under epidural anaesthesia[13]. But, in the present cows, the surgery was done under general anaesthesia so to avoid unwanted movement of the cow, intraoperatively, and to facilitate adequate resection and ligation of the vessels. Besides, the tumorous mass was extensive and caudal epidural space was not available for injecting local anaesthesia, particularly in cow 1 and 2.

CONCLUSION

Coccygeal osteosarcoma is a rare clinical entity in cows and bears poor prognosis due to delay in presentation, extensive involvement and consequent re-occurrence. Extensive cases of coccygeal osteosarcomas can be operated guardedly by tail amputation, under general anaesthesia, considering the short term welfare of the cow.

Conflicts of interest

The authors have no conflicts of interests with anyone.

Authors contribution

Author 1, 2, 3 are the surgeons, Author 4 anaesthesiologist and Author 5 pathologist. All authors have scrutinized and approved the manuscript.

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