

Diagnosis and Surgico-Therapeutic Management of Bovine Tumours

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ABSTRACT

The present study was conducted on total 93 bovine tumour cases registered at Veterinary Clinical Complex of the College at Junagadh (India) to diagnose and surgically manage them. Each case was evaluated by taking detailed history and clinical examination followed by different diagnostic procedures like ultrasonography and thermography as per the need. Out of 93 cases of bovine neoplasm, 52 cases were confirmed of horn cancer; 20 cutaneous tumours included 5 tumours of head region, 4 cases of udder tumours, 4 cases of neck tumour, 4 cases of tumours at different parts of limb and 3 tumours at abdominal region; 8 cases were of genital tumour; 7 cases of eye cancer; 4 cases of odontoma, and 2 cases of nasal granuloma. After diagnosis, all the cases were managed by surgical excision alone or in combination with cryotherapy and chemotherapy. Histopathological examination of excised tumour mass was carried out which revealed 48 (51.61%) benign tumours, whereas 45 (48.39%) cases were malignant in nature. Among a total of 93 cases, there were 45 (48.39%) cases of squamous cell carcinoma, 15 (16.13%) cases of myxoma, 14 (15.05%) cases of fibroma, 10 (10.75%) cases of melanoma, 8 (8.60%) cases of papilloma and one (1.08%) case of haemangioma, which were treated accordingly. After surgico-chemotherapeutic management, animals recovered uneventfully. Moreover, improvement in their life was noticed after appropriate management.

Key words: Bovine tumours, Diagnosis, Histopathology, Surgical management, Thermography, Ultrasonography.

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INTRODUCTION

Bovine neoplasms produce high economic losses to dairy farmers by impairing their animal's production, reproduction and working ability. The incidence of bovine tumours is increasing due to various factors such as exposure to carcinogens, pigmentation, irradiation, hereditary factors and irrational use of pesticides and hormones (Dubielzig, 2002; O'Toole and Fox, 2003). Among the various neoplasms in cattle, ocular and periocular squamous cell carcinomas are the most common (Ceylan *et al.*, 2012; Gami *et al.*, 2017) followed by vaginal and vulvar tumours like fibro-papilloma, leiomyomas, leiomyosarcomas, fibromas, fibro-sarcomas, fibro-leiomyosarcomas and squamous cell carcinomas (Timurkaan *et al.*, 2009). To achieve early and precise diagnosis of neoplasms, a comprehensive diagnostic approach is necessary, which includes detailed history of the patient, clinical signs and physical examination. Diagnostic imaging techniques such as ultrasonography and thermography can be used for confirmative diagnosis (Couto and Moreno, 2013). While histopathological examination is considered as a gold standard technique for the detection and differentiation of various types of neoplasms (Singh *et al.*, 1990; Sivaseelan *et al.*, 2009). The treatment of neoplasms includes surgical removal, cryotherapy, radiation therapy and if necessary, chemotherapy (Ettinger and Feldman, 2010). The present study was aimed to diagnose and to manage bovine tumours by various methods like surgical removal alone or in conjunction with chemotherapy or cryotherapy.

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MATERIALS AND METHODS

The present study was carried out at the Department of Veterinary Surgery & Radiology, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Junagadh, Gujarat (India). During the study, bovines (cattle and buffaloes) affected with neoplasms and brought for diagnosis and treatment at the College were subjected to various diagnostic

modalities namely clinical assessment, ultrasonography, thermography and histopathology as per the need and merit of the case. Based on diagnosis, appropriate surgical and/or therapeutic regimens were instituted and the cases were followed up based on consistent, periodic and/or progressive prognosis of the pathology. Samples were collected after surgery for detailed histopathological examination.

RESULTS AND DISCUSSION

Clinical Assessment

Clinical examination was performed using various methods, such as visual inspection, palpation and needle aspiration. Out of 93 cases confirmed with tumours, 66 cases (70.96%) were hard in nature, while 27 cases showed firmness on palpation

(29.04%). Similar findings were also observed by Parsania *et al.* (2000), Tafti *et al.* (2002), Sreenu *et al.* (2003), Kohli and Mashadi (2008). Certain tumours, such as odontogenic tumours, papilloma, fibroma, fibrosarcoma, and fibro-adenocarcinoma, tend to feel firm to hard upon palpation. On the other hand, tumours like squamous cell carcinoma, myxoma, and lipoma are typically soft to firm in texture when palpated. During the study, neoplasms were found located at different sites, like the highest numbers of cases were of horn cancer (55.91%). Among these cases, the left horn (29.03%) was more affected than the right horn (26.88%). This was followed by tumours of the head region (9.68%), genitalia (8.6%), eyes (7.53%) in which left eye (5.38%) was more affected than the right eye (2.15%), udder (4.30%), tumours presented at different parts of limb (4.30%),



Horn cancer in Gir Cow



Eye cancer in Gir Cow



Odontoma of jaw in a buffalo



Tumour at posterior to udder in Buffalo



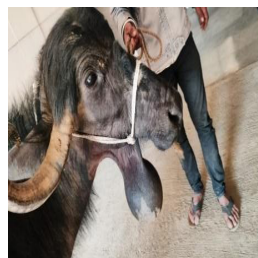
Tumour in front of shoulder in Buffalo



Eye cancer in Gir Cow



Perineal papilloma in Gir Cow



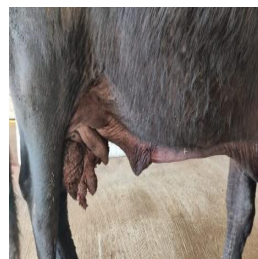
Tumour at lower mandible in Buffalo



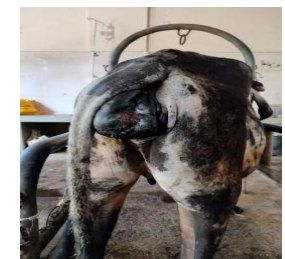
Tumour at limb in Buffalo



Rectal tumour in Bullock



Udder tumour in Buffalo



Vulvar tumour in Cow

neck (4.30%), abdomen region (3.22%) and nasal cavity (2.15%) (Illustration 1). Similar types of observations were recorded earlier by various scientists (Rameshkumar and Thilagar, 2000; Gulbahar *et al.*, 2002; Sreenu *et al.*, 2003; Manjunath *et al.*, 2007; Kohli and Mashadi, 2008). The presence of tumours in different body parts could be attributed to the anatomical structure of those areas, which may be more susceptible to continuous friction, workload, exposure to carcinogens and other factors.

In this study, tumours of various sizes were observed in different parts of the body, ranging from as small as a peanut to as large as a football. The size and shape of tumours are influenced by various factors, including the tumour's location, type, tissue involved and the duration of tumour growth. Certain tumours have a rapid metastatic nature, leading to a significant increase in their size. Tumours that occur in tissues subject to continuous work or friction, such as limb tumours, oral tumours, udder tumours and neck tumours, tend to grow larger in size. On the other hand, some tumours have a slow metastatic nature, so even after a long duration, they may appear small in size. Similar types of observations were recorded by Tafti *et al.* (2002), Parsania *et al.* (2000), Sreenu *et al.* (2003), Sharma and Sharma (2006), Manjunath *et al.* (2007), Kohli and Mashadi (2008).

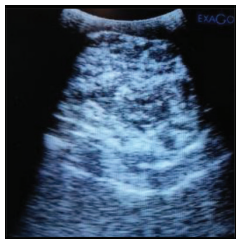
Ultrasonography

In this study, only 17 cases underwent ultrasonographic examination, revealing specific findings for each tumour type (Illustration 2). Among the examined cases, 4 cases of odontomas, 4 vulval tumours, 2 rectal tumours, 3 tumours of abdominal region and 4 tumours of neck were analysed.

Ultrasound scans showed irregular to oval shapes of odontomas, abdominal tumours and neck tumours, while uneven shapes were observed during scanning of remaining tumours. The outer margins of all tumours appeared brighter (hyperechoic), while the inner masses exhibited varying degrees of brightness (hypoechoic to hyperechoic). In the cases of vulvar and rectal tumours dark areas (anechoic nodules) within the hypoechoic to hyperechoic masses were observed, indicating the presence of fluid-filled regions. None of the tumours showed signs of invasiveness during the scanning process. Abouelnasr *et al.* (2016) conducted a study where they identified different types of tumours in buffaloes, such as osteosarcoma, fibro-papilloma, adenocarcinoma, and lipoma. These tumours appeared in ultrasonography as circular masses with an intensely hyperechoic acoustic shadow.

Thermography

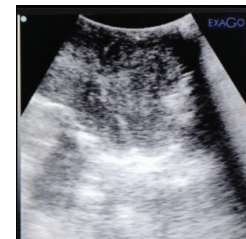
In all affected cases of bovine tumours, thermography was performed to correlate the lesions and extent of metastasis and confirm the diagnosis. An average 1-2 °C rise in the thermal temperature of the affected area was noticed as compared to normal (Illustration 3). During the study, thermography was found beneficial for early detection of tumours. Casas-Alvarado *et al.* (2022) stated that infrared thermography has shown its utility in the early and non-invasive diagnosis of various inflammatory conditions and it could be a valuable method for detecting and distinguishing between malignant and benign neoplasms.



Ultrasonogram showing well define border and hypo-hyperechoic tumour mass (Myxoma)



Ultrasonogram showing ill-defined border and hypo-hyperechoic tumour mass (Fibroma)



Ultrasonogram showing well-defined border and hypo-hyperechoic tumour mass (Fibroma)



Ultrasonogram showing ill-defined border and hypo-hyperechoic tumour mass (Squamous cell carcinoma)



Ultrasonogram showing irregular shape and calcified border, hypo-hyperechoic tumour mass (Myxoma)



Ultrasonogram showing well define border and hypo-hyperechoic tumour mass (Melanoma)

Illustration 2: Ultrasonographic images of different tumours



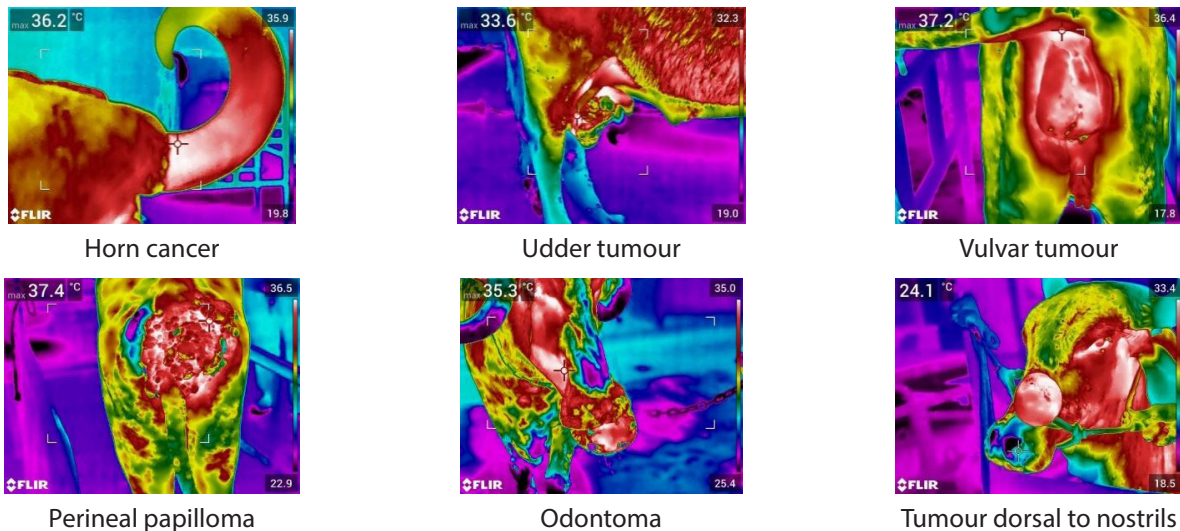


Illustration 3: Thermographic image of different tumours

Surgical Management

Different types of neoplastic conditions either benign or malignant were found located at different parts of the body during the study. Therefore, different treatments were followed to manage different types of tumours (Illustration 4). Surgical management was carried out by keeping the animal off-feed and off-water for 24 h and 12 h, respectively. The surgical site was prepared aseptically before the surgery. Pre-operatively, Inj. Strepto-penicillin @ 25000 IU/kg BW, IM and Inj. Meloxicam @ 0.3 mg/kg BW, IM was administered.

Eye Cancer: Seven cases of eye cancer were treated by performing enucleation of the eyeball in a standing position. The procedure involved administering retrobulbar and auriculopalpebral nerve blocks using 2% lignocaine HCl as anaesthesia. After enucleation of eyeball cryotherapy was done, as an adjunct treatment, by applying liquid nitrogen up to ice ball formation. Similarly many workers (Sivaseelan *et al.*, 2009; Schulz and Anderson, 2010; Tsujita and Plummer, 2010; Ali *et al.*, 2015; Kumar *et al.*, 2023) performed retrobulbar and auriculopalpebral nerve blocks for enucleation of an eyeball by using the transpalpebral technique, and found uneventful recovery. Swamy (2016) opined that the combination of surgical excision followed by cryotherapy proved to be effective in preventing the recurrence of malignant tumours.

Horn Cancer: In 52 cases affected with horn cancer, amputation of the horn was carried out using the flap method in a standing position. Anaesthesia was administered through a corneal nerve block using 2% lignocaine HCl. In 9 cases, Inj. Vincristine Sulphate @ 0.025 mg/kg, BW, IV diluted in normal saline was given as an adjunct to horn amputation at an interval of seven days post-operatively for four weeks. Udharwar *et al.* (2008) and Singh *et al.* (2017) found that adjuvant chemotherapy with Vincristine sulphate was found to be more effective than surgery alone to prevent the recurrence of horn cancer.

Odontoma: Four cases of odontoma were treated by chiselling out of the affected part of the mandible along with the removal of affected incisor teeth. Dabas *et al.* (2014), Kumar *et al.* (2019) and Pooniya *et al.* (2020) used the same approach for the treatment of odontoma in bovine and found uneventful recovery. In one case Inj. vincristine sulphate @ 0.025 mg/kg, BW, IV diluted in normal saline was given as an adjunct to surgical excision at an interval of seven days post-operatively for four weeks which was found to be effective in preventing the reoccurrence of odontoma. Kumar *et al.* (2019) found that the combination of vincristine sulphate and anthiomaline showed promising results, particularly in cases involving small-sized oral tumours in bovines.

Tumours of Genitalia and Perianum: Among 8 cases, 4 were vulvar tumours, 2 were rectal tumours and 2 were perineal papillomas. The vulvar and rectal tumours were surgically removed under epidural anaesthesia using 2% lignocaine HCl (3-5 mL). In the cases of perineal papilloma, tail amputation was performed due to the papilloma covering the entire tail and the surrounding areas. Gulbahar *et al.* (2002), Sharma and Sharma (2006), Musal *et al.* (2007), and Sahoo *et al.* (2018) treated the same type of tumours under epidural anaesthesia with local infiltration and found recovery in cases of genital tumours.

Nasal Granuloma: Two cases of nasal granuloma were identified and subsequently removed under sedation using Inj. Xylazine HCl @ 0.03-0.1 mg/kg, BW, IV along with an infraorbital nerve block. Similar surgical procedures for nasal granuloma excision were carried out successfully by Sharma *et al.* (2012) and Kumar *et al.* (2016).

Cutaneous Tumours: 20 cutaneous tumours including 5 tumours of head region, 4 cases of udder tumours, 4 cases of neck tumour, 4 cases of tumours at different parts of limb and 3 tumours at abdominal region were excised in standing position or in lateral recumbency. Analgesia was achieved with field block using 2% lignocaine HCl alone or in combination with Inj. Xylazine HCl @ 0.03 mg/kg, BW,

IV. An elliptical incision was made around the base of the tumour with a wide margin. The tumour mass was carefully separated through blunt dissection while simultaneously ligating the blood vessels, followed by complete excision. Surgical wound was sutured in routine manner. In cutaneous tumours, uneventful recovery was observed during the study.

Histopathological Examination

After retrieval of biopsy samples of different tumours, histopathological analysis was conducted which revealed that 48 (51.61%) cases exhibited a benign characteristic, whereas 45 (48.39%) cases showed malignant nature

(Illustration 5). Similarly, Shruthi *et al.* (2018) found 56.14% benign and 43.86% malignant tumours in their study. Among a total of 93 cases, there were 45 (48.39%) cases of squamous cell carcinoma, 15 (16.13%) cases of myxoma, 14 (15.05%) cases of fibroma, 10 (10.75%) cases of melanoma, 8 (8.60%) cases of papilloma and one (1.08%) case of haemangioma. Similarly, in their respective studies, Gharagozlou *et al.* (2007), Sivaseelan *et al.* (2009), Ozsoy *et al.* (2011), Tozato *et al.* (2013), Hemanth *et al.* (2014) and Vadalia *et al.* (2016) also observed various tumours such as squamous cell carcinoma, myxoma, fibroma, melanoma and papilloma on histopathological examination.



Horn cancer



Eye cancer



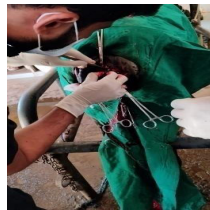
Udder tumour



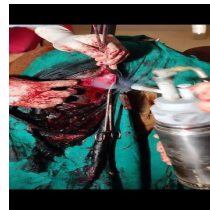
Tumour dorsal to elbow



Odontoma



Tumour at vulva

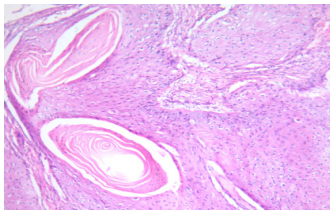


Cryotherapy in eye cancer

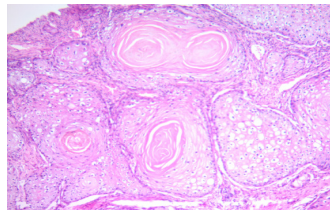


Cryotherapy in oral tumour

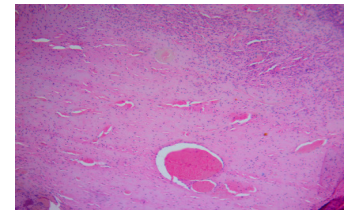
Illustration 4: Surgical management of different tumours



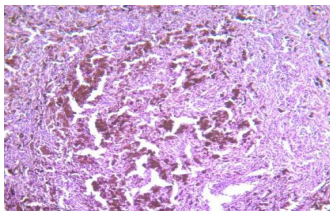
Squamous cell carcinoma (Udder)



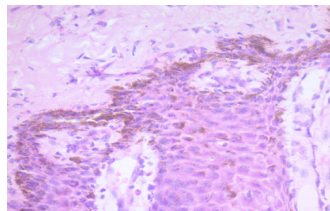
Squamous cell carcinoma (Eye)



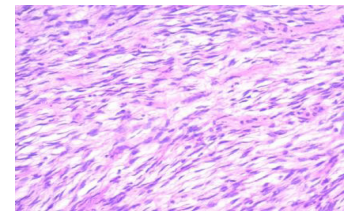
Haemangioma (At horn base)



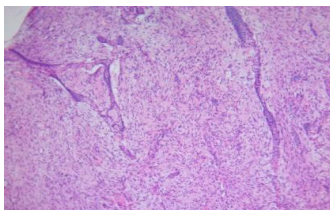
Melanoma (Vulvar tumour)



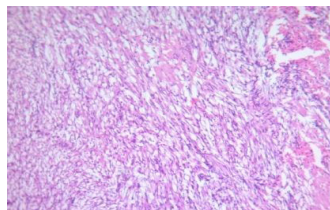
Melanoma (Oral tumour)



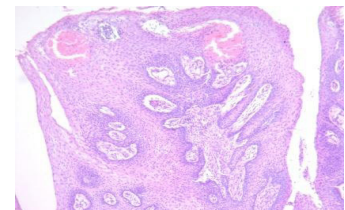
Fibroma (Udder tumour)



Myxoma (Odontoma)



Myxoma (Rectal tumour)



Papilloma (Oral tumour)

Illustration 5: Results of histopathological examination



CONCLUSION

The findings of the present study concluded that detailed clinical evaluation with ultrasonography and thermography were found beneficial for confirmative diagnosis of bovine tumours. Different surgico-therapeutic management was found to be effective for the management of bovine tumours as it improved the life of affected animals.

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