



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.03

TPI 2019; 8(11): 53-56

© 2019 TPI

www.thepharmajournal.com

Received: 01-09-2019

Accepted: 05-10-2019

Dr. Sandeep Kumar

Scientist, Department of Veterinary Surgery and Radiology, College of Veterinary and Animal Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar

RN Chaudhary

Associate Professor, Department of Veterinary Surgery and Radiology, College of Veterinary and Animal Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Ram Niwas

Assistant Professor, Department of Veterinary Surgery and Radiology, College of Veterinary and Animal Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Dinesh

Assistant Professor, Department of Veterinary Surgery and Radiology, College of Veterinary and Animal Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Corresponding Author:

Dr. Sandeep Kumar

Scientist, Department of Veterinary Surgery and Radiology, College of Veterinary and Animal Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Update on oral tumours in bovine

Dr. Sandeep Kumar, RN Chaudhary, Ram Niwas and Dinesh

Abstract

Bovine tumour are of great concern as they may cause economic losses due to negative impact on productivity, animal health and thus may reduce profit to individual farmer and dairy industry. Tumours of odontogenic origin in domestic animals are rare but common in bovine and difficult for accurate diagnosis. Histopathology and immunohistochemistry is helpful to confirm the type of tumour and also to know the oncogene responsible for the cause. Unlike humans, evolution and application of advanced diagnostic techniques for early detection of tumour in animals have rarely been attempted except canine mammary gland tumour. Early diagnosis of tumours in bovine and research on molecular characterization of neoplastic cells will be of clinical help to take corrective or remedial measures for prevention and to find early assessment of cancer therapies in bovine.

Keywords: Ameloblastoma, bovine, oral tumour, vincristine sulphate

Introduction

A review of literature on bovine oral tumours reveals that there is paucity of literature particularly on incidence of oral tumours in bovines and application of advanced diagnostics techniques for detection of oral tumours in domestic animals and bovine in particular. A cancer or tumour is a tissue mass characterized by persistent, excessive and disorganized cell growth that is unresponsive to normal control mechanisms. Systematic study to find out the specific pattern of tumour occurrence and its effective treatment in animals is sparse in India. However, the occurrence of animal neoplasms such as squamous cell carcinoma including horn cancer, papilloma, fibroma, fibrosarcoma, Myxoma, leiomyoma, canine transmissible venereal tumour, chondrosarcoma, Odontoma and several others has been reported from the Haryana state [1]. The frequency of these tumours is in ascending tendency. Incidence of tumours in bovine is relatively increased and occupied second place after canine tumours [2].

Oral cancer appears as a growth or sore in the mouth that does not proliferate away from oral cavity. Oral cancer, which includes cancers of the lips, tongue, cheeks, floor of the mouth, hard and soft palate, sinuses and pharynx (throat) can be life threatening if not diagnosed and treated early. Tumours of odontogenic origin in domestic animals are rare and difficult for accurate diagnosis [3,4]. Epithelial odontogenic neoplasms account for <1% of oral neoplasm in many species [5]. Though rare in all species, they are the most common neoplasms in cattle. Tumours are seen as mass-like lesions interfering with mastication in young cattle [4]. These tumours have also been reported in human [6], cat [7], dog [8], horse [9], sheep [10] and non-human primates [11].

The most odontogenic tumours develop in cattle near two years of age and primarily in the mandibular incisor region [12]. These tumours interfere with normal mastication of feed because of their location and induced pain sensation in adjoining areas. At times animal tries to avoid taking feed. This causes production and economic losses to the farmers. The tumour may occupy a position anywhere in mandible or maxilla but mostly involves lower jaw [13]. Oral tumours in bovine are more common at mandible region and rostral mandible is the most affected part [14].

Ameloblastoma is a rare, clinically significant, benign, locally invasive epithelial odontogenic tumour reported both in animals and humans [15]. This odontogenic tumour occurs predominantly in the mandibular incisor region of bovine [16]. Ameloblastoma is the most common odontogenic neoplasm and arises from the epithelium of the dental lamina affecting mainly the posterior mandible (80%) and to a lesser extent the posterior maxilla (20%) [17]. Ameloblastoma displays a strong tendency to recur especially if not adequately removed [18] and even metastasize in rare conditions [19]. There are two basic histopathologic patterns; the follicular and plexiform without any clinical relevance [20].

Among domestic animals, it has been reported in cattle, horse, dog and cat; but most frequently in cattle [21]. The tumour usually occurs in adults, but young animals may also be affected [21].

Management of ameloblastoma has been controversial because of the unique biological behaviour of this tumour as it is slow-growing, locally invasive and have high rate of recurrence [22]. Recurrence rates of ameloblastoma are reportedly as high as 15-25% after radical treatment [23] and 75-90% after conservative treatment [24]. Therefore, wide resection of the jaw in accordance with the treatment of malignant tumours is usually recommended for ameloblastoma. Typically, aggressive surgical treatments, such as marginal or segmental resection, have been implemented, but some conservative surgical methods are also being introduced, including decompression, enucleation or curettage [25].

Odontogenic myxoma is a rare benign tumour that may arise in the maxilla or mandible, and can be locally aggressive. It accounts for 3-6% of all odontogenic tumours [26] but the third most common oral tumour found in cattle [14]. Reports of surgical treatment of odontogenic myxoma vary from simple enucleation and curettage to segmental resection and hemimandibulectomy. Recurrence rates are reportedly high, at around 25%, especially when a more conservative approach is taken [27]. Nonetheless, a more conservative approach exemplified by enucleation and curettage has several advantages over more radical treatments like segmental mandibulectomy and mandibular reconstruction with fibular microsurgical flap formation in odontogenic myxoma [27].

Soft-tissue chondroma is a rare soft-tissue tumour also called extra-skeletal chondroma or chondroma of soft-tissue parts. Soft-tissue chondroma constitutes only 1.5% of benign soft-tissue tumours [28]. Oral soft-tissue chondroma is uncommon. If it occurs intra-orally, then the most common intraoral site is tongue. In the oral cavity, only few cases of soft-tissue chondroma have been reported in the literature till date, with very few cases in the gingiva [29]. Soft-tissue chondroma is characterized by benign clinical behaviour. Surgical excision is the treatment of choice and once excised adequately, would rarely recur [14, 30].

A central odontogenic fibroma (COF) is a rare benign tumour accounting for only 0.1% of all odontogenic tumours [31] but most common oral tumour in bovine [14]. It may evolve from the dental follicle, the dental papilla, or the periodontal membrane [32]. The lesion appears both in the maxilla and mandible; in the maxilla, it appears in the anterior region whereas in the mandible, it involves the premolar and molar area [31]. The treatment of fibroma in the literature mainly involves conservative surgery. Fibroma origin tumours are well managed by surgical excision followed by chemotherapy and small size tumour responds well to chemotherapy alone [14].

The term epulis is used inconsistently for localized exophytic gingival growths, both reactive and neoplastic [16]. According to the World Health Organization the diagnosis of epulis is limited to the fibromatous epulis of periodontal ligament origin. However, classification of these gingival lesions in the literature varies greatly [33]. Epulides usually contain osteoid, cementum-like material or osteoclastic giant cells [14, 21].

Oral tumours in bovine are mostly benign in nature; fibroma, ameloblastoma and myxoma are the most common types of bovine oral tumours but fibromatous epulis, adenoma and

papilloma are also common [14]. Malignant tumours are not common in oral cavity of bovine [14]. But one or two cases reported earlier of squamous cell carcinoma in cattle and the aetiology was presumed as bracken fern poisoning [21]. Mixed origin tumours are also very common in oral cavity of bovine like chondromyxoma, fibropapilloma and fibromyxochondroma [14].

Radiographic studies

X-rays work well for imaging bones, foreign objects, tumours and large body cavities. In X-ray examination ameloblastic odontoma was seen as a relatively homogenous, semitransparent image with scattered small radio-opaque foci concentrated in posterior half of the tumour, however in the anterior half of the tumour scattered cyst like transparent images of varying size is also observed [34]. Radiographic findings in metastatic tumours to the jaw may range from the absence of any manifestation to a lytic or opaque lesion with ill-defined margins. The entire mandible may have a moth-eaten appearance [35]. The cortical bone of adjacent structures such as the mandibular canal, maxillary sinus and nasal floor is resorbed. Extension through the cortical plate of the jaws may stimulate a speculated periosteal reaction [36]. Displacement of neighbouring teeth due to tumour expansion is much more common than root resorptions in oral tumours and peripheral lesions may show some erosions of the adjacent cortical bone [37]. Calcified deposits are seen in approximately 78% of adenomatid odontogenic tumour [38]. Radiography is helpful to diagnose the invasiveness of oral tumours, osteolytic changes, calcification, teeth displacement or any other changes to undertake the surgery accordingly [14].

Histopathological studies

Histopathology is the gold standard for the confirmation and type of tumour. An oral tumour shows discrete islands of tall columnar, palisading basal cells with apical nuclei (reverse polarization), characteristics of ameloblastoma [39, 40]. Fibroma in oral cavity of cattle composed of spindle cells arranged in long, thick, interlacing streams and bundles and supported by an abundant collagenous matrix [40, 41]. Odontogenic myxoma in a cow is characterized by large, stellate or triangular fibroblast like cells with cytoplasmic process, vesicular nuclei and small nuclei [42, 43]. Ameloblastic fibro-odontoma in a cow showed long cords and discrete islands of odontogenic epithelium in a background of loose mesenchymal tissue reminiscent of dental pulp [44]. Fibromatous epulis in a buffalo revealed eosinophilic osteoid tissue surrounded by collagen fibres and fibroblasts at margins, engorged blood vessels with erythrocytes, haemorrhage and focal areas of necrosis with marked mononuclear cells and growth appeared to originate from periodontal region [14, 45]. Fibro-odontoma in a cow shows odontogenic hard tissue in fibromatous areas, composed of enamel structures [46]. Histologically, ameloblastic odontoma shows enamel organ of dental tooth germ, and accompanied by irregular, small amount of osteodentine and abundant enamel with fine prism [34]. Ameloblastic fibro-odontoma is characterized by islands of epithelium with peripheral palisading of elongated columnar cells with reverse polarity and basal clearing. Centrally the islands contained loosely arranged stellate cells (stellate reticulum). Epithelial component are separated by fibrovascular stroma. Along the basilar aspect of odontogenic epithelium, dentin and enamel like material are deposited [41].

Molecular studies

Tumour markers are proteins produced by the tumour cells or by other cells of the body in response to cancer or certain benign (noncancerous) conditions. These substances can be found in the blood, urine, tumour tissue or in other tissues. Different tumour markers are found in different types of cancer and levels of the same tumour marker can be altered in more than one type of cancer^[47]. p53 over-expression is seen in oral squamous cell carcinomas which is a significant marker of carcinogenesis and can be considered as an important marker for clinical evaluation, diagnosis as well as prognosis of disease^[48]. Expression of anti-pancytokeratin and p53 was not detected in odontogenic myxoma in a cow^[42]. All oral tumours shown negative immunoreactivity for p53 antibody which indicates p53 mutants may not play important aetiology in oncogenesis of bovine oral tumours^[14]. Ameloblastoma in eight year old bullock diagnosed immunohistochemically positive for cytokeratin CK8, CK18 and Vimentin^[39]. The significant expression of CK18, parenchymal MMP-2, stromal MMP-9, and Ki-67 could provide useful markers for differentiating Ameloblastic carcinoma from ameloblastoma^[49]. Immunopositive reaction for CK14 was observed in ameloblastoma, papilloma and adenoma (epithelial tumours); however, no immunoreactivity was noticed in fibroma, myxoma and Chondroma (mesenchymal tumours)^[14].

Treatment

Chemotherapeutic drugs can be administered as a sole treatment in small size of tumour, but larger tumours must be surgically debulked prior to drug treatment^[40, 50, 51]. Mandibulectomy for treatment of oral tumours in cattle can result in acceptable cosmetic appearance without functional impairment; chemotherapy, radiation therapy, cryotherapy and thermocautery in conjunction have also been recommended^[52].

Vincristine sulphate is currently the most commonly used chemotherapeutic drug now a day in canines but literature on bovine is very limited. Mechanism of action of vincristine sulphate has been related to the inhibition of microtubule formation in mitotic spindle, resulting in an arrest of dividing cells at the metaphase stage^[53]. Vincristine sulphate is effective for the treatment of small size bovine oral tumours^[40]; however, vincristine sulphate along with anthiomaline have better results than vincristine sulphate alone^[43]. Surgical excision is required for large size bovine oral tumours along with vincristine sulphate and anthiomaline^[43]. Surgical excision in odontoma in cattle at mandible region is successful with good recovery^[54, 55].

Conclusion

The reporting of oral tumours in bovine will bring more awareness to prevent economic and productive losses, have better management and treatment regimen.

References

1. Singh P, Singh K, Sharma DK, Behl SM, Chandna IS. A survey of tumours in domestic animals. *Indian Veterinary Journal*. 1991; 68:721-725.
2. Marosfoi L, Baba AI, Catoi C. Morphological study of bovine tumours. *Bulletin UASVM*. 2009; 66:1.
3. Venugopalan A. *Essentials of Veterinary Surgery* (8th Edn). Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi, 2000, 307.
4. Head KW, Else RW, Dubiezig RR. Tumors of the alimentary canal. In: Meuten, DJT (Ed.), *Tumors in domestic animals*. (4th. Edn.), Iowa, Iowa State Press, 2002; 402-404.
5. Gorlin RJ, Pindborg JJ, Clausen FP, Vickers RA. The calcifying odontogenic cyst- a possible analogue of the cutaneous calcifying epithelioma- an analysis of fifteen cases. *Oral Surg Oral Med Oral Pathol*. 1962; 15:1235-1243.
6. Ide F, Kusama K. Hyalin bodies in ameloblastic fibro Odontoma. *Histopathology*. 2002; 40:204.
7. Nysva A, Dayan A. Ameloblastic fibroma in a young cat. *Journal of Oral Pathology*. 1995; 24:233-236.
8. Nold JB, Powers BE, Eden EL, McChesney AE. Ameloblastic Odontoma in a dog. *Journal of American Veterinary Medical Association*. 1984; 185:996-998.
9. Roberts MC, Groenendyk S, Kelly WR. Ameloblastic odontoma in a foal. *Equine Veterinary Journal*. 1978; 10:91-93.
10. Dubielzig RR, Griffith JW. An Odontoameloblastoma in an adult sheep. *Veterinary Pathology*. 1982; 19:318-320.
11. Baskin GB, Hubbard GB. Ameloblastic Odontoma in a baboon (*Papio Anubis*). *Veterinary Pathology*. 1980; 17:100-102.
12. Tetens J, Ross MW, Sweeney RW. Rostral Mandibulectomy for treatment of an ameloblastic fibro – Odontoma in a cow. *Journal of American Veterinary Medical Association*. 1995; 12:1616-1617.
13. Tyagi RPS, Singh J. *Ruminant Surgery*. 1st ed. CBS Publishers and Distributors, New Delhi, 1993, 418.
14. Kumar S. Studies on diagnosis and management of oral tumours in bovine. Ph.D. thesis submitted to Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (Haryana), 2019.
15. Gardner DG. An orderly approach to the study of odontogenic tumours in animals. *Journal of Comparative Pathology*. 1992; 107(4):427-38.
16. Gardner DG. Ameloblastic fibromas and related tumors in cattle. *Journal of Oral Pathology and Medicine*. 1996; 25(3):119-24.
17. Brown NA, Brayn B. Ameloblastoma: a review of recent molecular pathogenetic discoveries. *Biomarker Cancer*. 2015; 7(2):19-24.
18. Regezi JA, Kerr DA, Courtney RM. Odontogenic tumors: analysis of 706 cases. *Journal of Oral Surgery*. 1978; 36(10):771-8.
19. Gharagozlou MJ, Hekmati P, Ashrafihelan J. A clinical and histopathological study of ocular neoplasms in dairy cattle. *Vet. Arhiv*. 2007; 77:409-426.
20. Gardner DG, Heikinheimo K, Shear M, Philipsen HP, Coleman H. *World Health Organisation classification of tumors–pathology and genetics of head and neck tumors*. Lyon, France: IARC press, 2005, 296-300.
21. Moulton JE. *Tumors in domestic animals*. 5th ed. (University of California Press, Berkeley), 2017, 499-601.
22. Shatkin S, Hoffmeister FS. Ameloblastoma: A rational approach to therapy. *Oral Surg. Oral. Med. Oral. Pathol*. 1965; 20:421-35.
23. Mehlich DR, Dahlin DC, Masson JK. Ameloblastoma: A clinicopathologic report. *Journal of Oral Surgery*. 1972; 30:9-22.
24. Sehdev MK, Huvos AG, Strong EW, Gerold FP, Willis GW. Ameloblastoma of maxilla and mandible. *Cancer*.

- 1974; 33:324-33.
25. Kumar V. Conservative surgical approach to aggressive benign odontogenic neoplasm: a report of three cases. *Oral Maxillofacial Surgery*. 2015; 41:37-42.
 26. Boffano P, Gallesio C, Barreca A, Bianchi FA, Garzino-Demo P, Roccia F. Surgical treatment of odontogenic myxoma. *Journal of Craniofacial Surgery*. 2011; 22:982-987.
 27. Rocha AC, Gaujac C, Cecchetti MM, Amato-Filho G, Machado GG. Treatment of recurrent mandibular myxoma by curettage and Cryotherapy after thirty years. *Clinics*. 2009; 64:149-152.
 28. Hondar HT, Wu W, Chen OL, Chang CY. Imaging and pathological correlation of soft-tissue chondroma: a serial five-case study and literature review. *Clin. Imag*. 2006; 30(1):32-36.
 29. Khadim MT, Asif M, Ali Z. Extraskelatal soft tissue chondromas of head and neck region. *Annals of Pakistan Institute of Medical Sciences*. 2011; 7:42-44.
 30. Kawano T, Yanamoto S, Kawasaki G, Mizuno A, Fujita S, Ikeda T. Soft tissue chondroma of the hard palate: a case report. *Asian Journal of Oral Maxillofacial Surgery*. 2011; 23(2):92-95.
 31. Kaffe I, Buchner A. Radiologic features of central odontogenic fibroma. *Oral Surg. Oral Med. Oral Pathol*. 1994; 78:811-818.
 32. Dahl E, Wolfson S. Haugen central odontogenic fibroma: review of literature and report of cases. *Journal of Oral Surgery*. 1981; 39:120-124.
 33. Vezzali E, Federico M, Fabio R, Giuseppe S, Cinzia B. Fibrous epulis (Gingival Hyperplasia) in a horse. *Online Journal of Veterinary Research*. 2010; 14(2):299-301.
 34. Masegi T, Kudo T, Yamaguchi T. A bovine ameloblastic odontoma in mandibular incisor region. *Japanese Journal of Veterinary Science*. 1990; 52(3):635-637.
 35. Ougetsen-Toller M, Metin M, Yildiz L. Metastatic breast carcinoma mimicking periodontal disease on radiographs. *Journal of Clin Periodontol*. 2002; 29:269-71.
 36. Gaver A, Polliack G, Pilo R, Hertz M, Kitai E. Orofacial pain and numb chin syndrome as the presenting symptoms of a metastatic prostate cancer. *Journal of Postgrad. Med*. 2002; 48:283-284.
 37. Philipsen HP, Reichart PA, Zhang KH, Nikai H, Yu QX. Adenomatoid odontogenic tumor: biologic profile based on 499 cases. *Journal of Oral. Pathol. Med*. 1991; 20(4):149-158.
 38. Toida M, Hyodo I, Okuda T, Tatematsu N. Adenomatoid odontogenic tumor: report of two cases and survey of 126 cases in Japan. *Journal of Oral Maxillofacial Surgery*. 1990; 48(4):404-408.
 39. Chavan CA, Kaore MP, Ingle AD, Kurkure NV, Akhare SB, Bhandarkar AG. Immunohistochemical study of a rare case of bovine ameloblastoma. *Indian Journal Veterinary Pathology*. 2014; 38(4):275-277.
 40. Kumar S, Bisla RS, Singh P, Jakhar KK. Pathological studies and therapeutic management by vincristine sulphate for oral tumours in bovine. *The Pharma Innovation Journal*. 2019a; 8(4):836-839.
 41. Raval SH, Joshi DV, Patel BJ, Patel JG, Sutariya P, Soni M, Rathod AS. Bovine dental tumors: A report of four cases. *Indian Journal of Veterinary Pathology*. 2017; 41(2):119-122.
 42. Sharma S, Gupta RP, Jangir BL. A rare case of odontogenic myxoma in a cow. *Indian Journal of Veterinary Pathology*. 2015; 39(4):349-351.
 43. Kumar S, Bisla RS, Singh P, Chaudhary RN, Jangir BL, Niwas R. Role of vincristine sulphate along with anthiomaline for treatment of oral tumours in bovine. *The Pharma Innovation Journal*. 2019b; 8(6):1249-1252.
 44. Mahjour AA, Pear Craft S. Peripheral Ameloblastic fibro-Odontoma in a cow. *Iranian Journal of Veterinary Research*. 2007; 8(3):282-284.
 45. Jakhar KK, Kumar S, Singh P, Lather D, Sharma V, Jangir BL. A rare case of Fibromatous Epulis in a buffalo. *The Haryana Veterinarian*. 2015; 54(1):91-92.
 46. Sharma A, Bhardwaj HR, Dwivedi DK. Fibro-odontoma in a cow and its surgical management. *Intas Polivet*. 2010; 11:153-154.
 47. Pelkey TJ, Frierson HF, Bruns DE. Molecular and immunological detection of circulating tumor cells and Micrometastasis from solid tumours. *Clinical Chemistry*. 1996; 42(9):1369-1381.
 48. Ghanghoria S, Ghanghoria A, Shukla A. p53 Expression in Oral cancer: A study of 50 cases. *Journal of Pathology Nepal*. 2015; 5:747-751.
 49. Yoon HJ, Jo BC, Shin WJ, Cho Y, Lee J, Hong S. Comparative immunohistochemical study of ameloblastoma and ameloblastic carcinoma. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2011; 112(6):767-776.
 50. Theon AP, Pascoe JR, Carlson GP, Krag DN. Intratumoral chemotherapy with cisplatin in oily emulsion in horses. *Journal of Animal Veterinary Medical Association*. 1993; 202:261.
 51. Theon AP. Cisplatin treatment for cutaneous tumours. In: *Current Therapy in Equine Medicine*, 4th ed, (N.E. Robinson, ed), WB Saunders Ltd, Philadelphia USA, 1997, 372-377.
 52. Tetens J, Ross MW, Sweeney RW. Rostral mandibulectomy for treatment of an ameloblastic fibro – Odontoma in a cow. *Journal Animal Veterinary Medical Association*. 1995; 12:1616-1617.
 53. Jordan MA, Thrower D, Wilson L. Mechanism of inhibition of cell proliferation by vinca alkaloids. *Cancer Research*. 1991; 51:2212-2222.
 54. Dabas VS, Thakor DB, Suthar DN. Surgical management of Odontoma in a cow. *Intas Polivet*. 2014; 15(1):11-12.
 55. Tanwar M, Bishnoi P, Palecha S, Sangwan A, Kachwaha K. Surgical Management of Odontoma in Bovines. *Intas Polivet*. 2016; 17(2):585-586.