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Scientific Report

Peripheral ameloblastic fibro-odontoma in a cow

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Summary

Tumours of odontogenic origin have been reported in various domestic animals. Ameloblastic fibro-odontoma is a rare tumour derived from odontogenic epithelium and pulpal mesenchyme. Plain and formalised sections from masses on the front of the cranial aspect of the jaw and the end of the tongue of a castrated beef cattle from an abattoir was submitted to Mt Pleasant laboratories, Launceston, Australia. Histologically long cords and discrete islands of odontogenic epithelium in a background of loose mesenchymal tissue reminiscent of dental pulp were observed. Based on microscopic and macroscopic features, the tumour was diagnosed as ameloblastic fibro-odontoma.

Key words: Ameloblastic fibro-odontoma, Tumour, Cattle

Introduction

Tumours of odontogenic origin in domestic animals are rare and difficult for accurate diagnosis (Head *et al*., 2002). Classification systems declare that the differentiation should be categorised as neoplasm (Gardner, 1992). In the WHO classification, however, ameloblastomic fibro-odontoma is classified as a benign odontogenic tumour with odontogenic epithelium and odontogenic mesenchyme with dental hard tissue formation and marked inductive effect on connective tissue.

Ameloblastic fibroma and ameloblastic fibro-odontoma (AF-O) are variations of the same tumour derived from odontogenic epithelium and pulpal mesenchyme. Though rare in all species, they are the most common odontogenic neoplasms in cattle. Tumours are seen as mass-like lesions interfering with mastication in young cattle (Head *et al*., 2002). These tumours have been reported in human (Ide and Kusama, 2002), cattle (Masegi *et al*., 1994; Tetens *et al*., 1995), cat (Nysva and Dayan, 1995), dog (Nold *et al*., 1984), horse (Lingard and Crawford, 1970; Roberts *et al*., 1978), sheep (Dubielzig and Griffith, 1982), non-human primates (Splitter *et al*., 1972; Baskin and Hubbard, 1980) and rat (Boorman and Hollander, 1973). The tumour often occurs in immature animals (Walsh *et al*., 1987). In many species epithelial odontogenic neoplasms account for <1% of oral neoplasms (Gorlin *et al*., 1961). Because most odontogenic tumours develop in cattle less than two years of age and they are primarily in the mandibular incisor region, it has been speculated that they are associated with development of mandibular permanent incisors (Tetens *et al*., 1995).

Materials and Methods

Plain and formalised sections from masses on the front of cranial aspect of the upper jaw and end of the tongue of a 3-year-old castrated beef cattle from an abattoir was submitted to Mt Pleasant laboratories, Launceston, Australia as part of National granuloma survey in February 2004. Grossly the lesion from the tongue appeared as a

white 8 × 4 × 6 cm firm mass with an irregular area of smooth trabecular areas and a granular matrix. The specimen was trimmed and processed routinely. Sections of paraffin-embedded tissues, 4-μm thick, were stained with haematoxylin and eosin (H&E) and Masson's trichrome and were examined under light microscopy.

Results

Histologically, H&E sections of the mass on the tongue revealed two distinct patterns; a highly cellular mesenchymal-stroma resembling dental pulp containing both thin long inter-branching strands with discrete islands of odontogenic epithelium (Fig. 1). Strands consisted of rows of polygonal cells with large hyperchromatic nucleus surrounded by peripheral palisades columnar cells with the nucleus polarized away from the basement membrane resembling ameloblastoma. Within the connective tissue, there were scattered islands of odontogenic epithelium. Rimming the basal lamina around the islands of odontogenic epithelium, there were strands of eosinophilic acellular material suggesting an induction of the adjacent mesenchyme.

Long cross-section of larger islands revealed central areas of epithelial cells joined by extended intercellular bridges. Masson's trichrome staining revealed low density of collagen fibres in stroma of this part. The other parts consisted of follicular and irregular growth patterns of well-differentiated odontogenic epithelium (Fig. 2). The central cells component consisted of a loose, primitive mesenchymal tissue with stellate nuclei like the tissue forming dental papilla of the tooth germ. The matrix around the epithelial cells was more basophilic, consisted of loose mesenchymal stroma and consisted of stellate and elongated mesenchymal cells with scant collagen in a clear background deposition similar to the dental pulp that contained islands of dentin and enamel inclusions. An amorphous hyaline-like material of varying thickness was seen surrounding the islets of odontogenic epithelium in some parts that was negative via the alkaline conjured procedure. Masses of irregular mineralised atubular dentin-like substance was observed in some parts of the mass that were separated from mesenchymal tissue by an irregular layer of polarised columnar cells resembled ameloblasts. Enamel-like matrix was deposited over the dentin-like

Fig. 1: Interdigitating epithelial cords of odontogenic epithelium. Showing branching epithelial cords with peripheral columnar cells (arrows) surrounding a central stellate reticulum like tissues, (H&E, ×120)

Fig. 2: Epithelial follicles consisting of stellate cells bordered by columnar cells. Note immature dentine (long arrows) and enamel-like substance (short arrows), (H&E, ×48)

substance.

Microscopic examination of the mass on the jaw revealed proliferating strands and clumps of odontogenic epithelium lying in highly cellular fibroblastic tissue stroma resembling dental papilla of the developing tooth.

Based on the macroscopic and microscopic features, and considering the anatomical position of the tumour, it was diagnosed as AF-O.

Discussion

Our knowledge of odontogenic tumours in animals is limited and often confusing (Gardner, 1992). AF-O is a combination of ameloblastic fibroma and an odontoma and has the biological behaviour of an ameloblastic fibroma (Head *et al*., 2002). AF-O should be differentiated from complex odontoma, compound odontoma, ameloblastic odontoma and ameloblastoma. Tumours with pattern resembling normal teeth are compound odontomas, whereas a more disorganised arrangement is characteristic of complex odontomas (Gorlin *et al*., 1961). Separate areas of ameloblastic epithelium are not present in complex and compound odontomas (Barker and Dreumel, 1993) that can be used in differentiation of these tumours from AF-O. Ameloblastic fibroma corresponds to that stage of odontogenesis when dental epithelium invests the dental papilla, but odontoblasts have not yet been differentiated (Barker and Dreumel, 1993).

Presence of dentin and enamel is the differentiating point between AF-O and ameloblastic fibroma and ameloblastoma (Walsh *et al*., 1987).

AF-Os are locally invasive and rarely metastasis. However, they may recur locally (Nold *et al*., 1984). Metastasis of AF-O to distant organs has been reported in a dog (Ueki *et al*., 2004). It is not clear that the presence of the tumour on the tongue in our case was attributed to local invasion or metastasis.

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