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Scientific Report

Mandibular primitive neuroectodermal tumor in an adult dog

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Summary

This is the report of a mandibular neuroectodermal/ewing sarcoma in an 8-year-old male cross breed dog that is unique because of tumor origin location. Pedunculated, ulcerative, firm 6.0 × 4.0 × 5.5 cm tumor mass effaced the bone at the rostral part of the mandible and had a white-sanguineous color at cross section appearance. Histopathologically, small round blue cell tumor was diagnosed. Immunohistochemically, tumor cells were positive for vimentin, S100 and Glial fibrillary acidic protein (GFAP) and negative for neuron specific enolase (NSE) and desmin. Mandibular location is a rare event in these types of tumors.

Key words: Dog, Primitive neuroectodermal tumor, Mandible

Introduction

Primitive neuroectodermal tumors (PNETs) are rare and aggressive, with a tendency to recur and metastasize, especially to lungs, bone marrow, brain and lymph nodes (Devoe and Weidner, 2000; De Cock *et al*., 2004; Pereira *et al*., 2008). There are some PNETs that occur in animals such as a 5-month-old and a 2.5-year-old puppy, an adult Beagle dog, a 2-month-old heifer, a 2-month-old Colobus monkey and a 9-year-old Dromedary camel (Hosokava *et al*., 1998; Long *et al*., 1998; Katayama *et al*., 2001; Lucas *et al*., 2003; De Cock *et al*., 2004; Weiss and Walz, 2009). The most common histological pattern of Ewing's sarcoma and PNET was a lobular arrangement of uniform, small, hyperchromatic cells in a fibrous background. Some of these tumors were rich in cytoplasmic glycogen (He *et al*., 2005). The evaluation of 28 human cases of EWS/PNET by use of vimentin, CD99, NSE, S-100 protein, leu7, neurofilaments, GFAP, and chromogranin A as primary antibodies revealed that there is a relationship between the number of positive reaction of immunohistochemical antibodies and rate of differentiation of tumor (Franchi *et al*., 2001; Quinlan *et al*., 2004). Invasion and metastasis were characteristic features of all reported described cases. The prognosis of EWS fared significantly better than the pPNETs.

Case report

The pedunculated and ulcerated tumor mass, 7.0 × 4.0 × 5.5 cm was removed from the origin site on the mandibular bone by surgery in an 8-year-old male cross breed dog. This mass was firm, effaced the mandibular gingiva and incisors and had a white-sanguineous color at cross section appearance. Some radiographs were taken of its skull, thorax and abdomen. There was a large radiolucent mass on the rostral part of the mandibular bone that was infiltrated to the surrounding bone and soft tissues. The thoracic and abdominal organs appeared normal without any radiographic finding for metastasis. After removal of tumor mass, the

samples were fixed in formalin and embedded in paraffin. Histological sections (5 µm) were stained with haematoxylin and eosin (H&E) and were also evaluated immunohistochemically. The antibodies included vimentin (V9, mouse monoclonal, dilution: 1/50, Dako, Denmark), desmin (D33, mouse monoclonal, dilution: 1/50, Dako, Denmark), S-100 protein (Z0311, rabbit polyclonal, dilution: 1/500, Dako, Denmark) neuron specific enolase (NSE) (BBS/NC/VI-H14; dilution 1:100; DAKO) and glial fibrillary acidic protein (GFAP) (Z0334, rabbit polyclonal, dilution: 1/500, Dako, Denmark). Microscopically, the tumor was characterized by the sheets of small round cells with irregular borders, slight cytoplasm and round to oval dark nuclei with prominent nucleoli (Fig. 1). The sheets were composed of rarely small perivascular pseudo-rosettes features and large areas of necrosis. Mitotic figures were 1 per 10 random high power fields. The immunohistochemistry of this tumor showed positive reaction for vimentin, S100 and GFAP (Fig. 2) expression and negative reaction for NSE and desmin expression.

Discussion

To the best of our knowledge, only two reports of PNET involving the mandible have been published in the medical literature

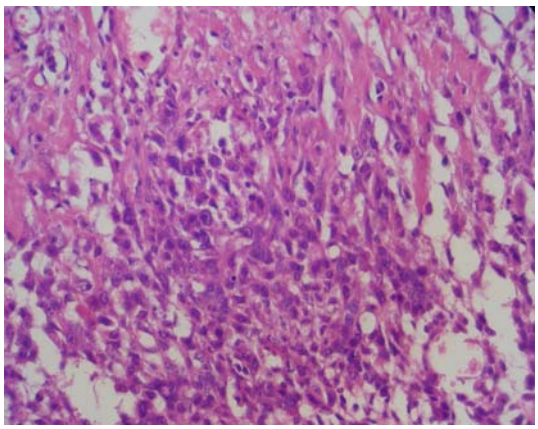

Fig. 1: Mandibular primitive neuro-ectodermal tumor (PNET), Dog. The sheets composed of cohesive lobules. Uniform cells with darkly staining nuclei and very scanty cytoplasm infiltrate the marrow spaces around lysed bone trabeculae, (H&E, original magnification ×400)

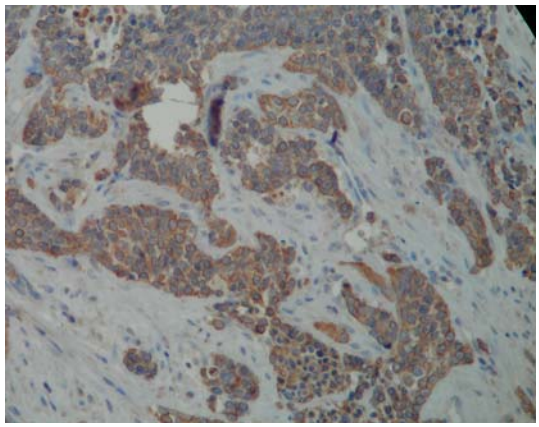

Fig. 2: Mandibular primitive neuro-ectodermal tumor (PNET), Dog. Intra-cytoplasmic immunoreactivity of the round tumor cells for GFAP antibody (×250)

(Jones and McGill, 1995; Sundine and Bumpous, 2003), but there is no report of mandibular PNET in the veterinary literature. The PNETs are highly aggressive and have a propensity for invasion and metastasis to the lung, bone, and bone marrow which has been reported in deferent species in animals (Long *et al*., 1998; Katayama *et al*., 2001; Lucas *et al*., 2003; De Cock *et al*., 2004). The tumor in the presented case, in contradistinction to PNETs was locally invasive to the mandibular bone only. The neoplastic cells in PNETs were composed of round nuclei and cytoplasm, both with irregular border and also mitotic activity and focal necrosis might be identified in the parenchyma (Devoe and Weidner, 2000; Lucas *et al*., 2003; De Cock *et al*., 2004; Pereira *et al*., 2008) that were also shown in this report except the low mitotic activity and necrosis. The presented case, similar to the case of camel, was not in the early age of its life, but, in contrast, had been locally invasive to the mandibular bone, gingiva and lower incisors, without any evidence of relapse or metastasis to other organs which was shown in radiographs. Immunolabelling was positive for vimentin and GFAP, in agreement with previous reports of PNETs in human beings and animals (Lucas *et al*., 2003). The expression of neuronal or neuroendocrine cell specific marker antigens such as synaptophysin, chromogranin A and NSE is not a usual finding in PNETs (Brinkhuis *et al*., 1995; Devoe and Weidner,

2000). GFAP could be a useful antigenic marker to determine the rate of differentiation of PNETs but is not useful in EWS (Franchi *et al*., 2001; Quinlan *et al*., 2004). GFAP expression in primitive neuroectodermal brain human tumors is indicative of the greater risk of relapse (Janss *et al*., 2004). This tumor is not small cell osteosarcoma or lymphoma because of GFAP positivity. In addition, the negative reaction of this tumor with desmin antibodies revealed that this tumor was not a rhabdomyosarcoma (Devoe and Weidner, 2000; De Cock *et al*., 2004; Pereira *et al*., 2008). Then it can be PENT because of simultaneous S100 and GFAP expression and was a rare form due to its mandibular location.

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