

Mandibular osteosarcoma in a goat



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SUMMARY

Introduction - A few large surveys on tumour prevalence in goats indicate that tumours in general are quite common in this species. Reviews of neoplastic diseases in goats indicate a prevalence ranging from 0,8 to 11%. However, osteogenic tumours arising from facial bones in goats are rare. Regarding oral localization only a few mesenchymal tumours have been described arising from the gingiva.

Case presentation - A 4-year old, female crossbred goat was referred with a history of dysorexia and a slow growing painful mass on the face. On physical examination the animal showed poor body condition and the left side of the face was deformed by a voluminous mass which, at the inspection of the oral cavity, displaced the maxillary teeth. Differential diagnoses included osteomyelitis and benign (osteoma, chondroma, ossifying and non ossifying fibroma, odontogenic tumours) as well as malignant (osteosarcoma, chondrosarcoma) mesenchymal tumours arising from either the connective tissue and bone. The goat was euthanized because of the extension of the lesion and a complete necropsy was performed. Grossly, the face was deformed by the presence of a hard mass arising from the branch of the left mandible. Histologically the oral mass was composed of heterogeneous proliferation of malignant osteoblasts intermingled with brightly eosinophilic strands or island of osteoid matrix. Neoplastic cells, interpreted as malignant osteoblasts, were characterized by plump to round or spindle-shape morphology, with moderate basophilic cytoplasm and an eccentrically located voluminous nucleus containing a large prominent nucleolus. Mitotic figures were found and were either bipolar and atypical. At necropsy no metastases were found and the final diagnosis was non-metastasizing mandibular osteoblastic osteosarcoma.

Conclusion - In conclusion, regardless the type of tumour, the goat was euthanized because of the extension and the severity of the lesion. Necropsy and histological examination were necessary to correctly classify the tumour as a non-metastasizing mandibular osteosarcoma.

KEY WORDS

Goat, mandible, osteosarcoma, osteoblasts.

A few large surveys on tumour prevalence in goats have been recently published which indicate that tumours in general are quite common in this species. On a 1146 caprine necropsy or biopsy specimens obtained in a 25 year period, tumour growth was detected in 100 goats (8.7%), moreover a review of neoplastic diseases in goats in India showed an incidence of neoplasms ranging from 0.8 to 7.6%^{1,2}. In 2011 Howerth and Butler surveyed goat biopsy or necropsy submissions and found a prevalence of 11%³. Among caprine tumours lymphoma, squamous cell carcinoma, thymoma, mammary carcinoma, pheochromocytoma, melanocytic tumours and vascular neoplasms are the most represented but round and mesenchymal tumours of muscular and fibroblastic differentiation have also been described^{1,4}. Regarding oral localization only two mes-

enchymal tumours, both of the undifferentiated sarcomatous type were observed in the oral cavity arising from the gingiva in one survey, while Howerth and Butler identified one case of gingival fibroma out of 188 goats¹. In the Pawaiya and Kumar review, no mention of tumours arising from oral cavity was made².

Among mesenchymal tumours, those arising from bone, either benign and malignant, are rarely documented in goats and include primary bone neoplasia originating from long and facial bones as well as tumours arising in extraskelatal locations^{5,6,7}. A metastatic chondrosarcoma of the scapulohumeral joint in a Saanen goat and a primary osteosarcoma in the metacarpus of an Alpin goat were described, furthermore an osteogenic sarcoma was reported in the humerus of an adult Toggenburg goat at the fracture site, five years after surgery; other than long bones, an extraskelatal osteosarcoma arising from the thorax, cranially to the heart, was found in a miniature goat^{5,6,8}.

Osteogenic tumours arising from the facial bones in goats are even more rarely described. A bone mandibular osteoma has

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been reported in a Toggenburg-cross goat inducing subluxation of the temporal mandibular joint and contralateral mandibular deviation⁷. Moreover a nonossifying fibroma was described arising from the mandible in a Nubian goat⁹.

The aim of this report is to describe a primary slow growing osteosarcoma affecting the mandibular bone in a goat.

A 4-year old, female crossbred goat was referred with a history of dysorexia and a slow growing painful mass on the left side of the face, noticed one month before. The involvement of the oral cavity by the expanding mass and the consequent malocclusion led to progressive decrease of feed intake and consequent weight loss.

On physical examination the animal showed poor body condition and the left side of the face was deformed by a voluminous mass (Figure 1a). The oral cavity inspection showed an expansive mass displacing the maxillary teeth.

Differential diagnoses included osteomyelitis and benign (osteoma, chondroma, ossifying and non ossifying fibroma, **odontogenic tumours**) as well as malignant (osteosarcoma, chondrosarcoma) mesenchymal tumours arising from either the connective tissue and bone. Laboratory analysis **and imaging** were not done **due to the scarce compliance of the owner**. The goat was euthanized because of the extension of the lesion and a complete necropsy was performed.

Grossly, the face was deformed by the presence of a hard mass arising from the branch of the left mandible. After removing the overlying skin and dissecting the cheek, large, yellowish to brown, partially calcified, confluent masses expanded outside the bone surface were detected. The mass displaced the last molar teeth occupying the mouth cavity and almost the entire pharyngeal space (Figure 1b). The cut surface of the mass was solid and irregular with yellowish necrotic areas and few haemorrhages. Based on the macroscopic features a tumour was suspected.

The inspection of body cavities showed encapsulated abscesses on the left apical lung lobe and on the subaortic lymph node. No evidence of metastasis of oral mass was seen macroscopically. Samples from the left lung, subaortic lymph node and intestine were collected for microbiological examination.

Multiple samples of the oral mass and representative samples from the prescapular, subaortic and mediastinic lymph nodes, lung, intestine, liver, kidneys, heart, pancreas, spleen and central nervous system were collected, fixed in a 10% buffered formalin solution (pH 7.4) and routinely processed for histological examination.

Polimicrobism was revealed from the lung and lymph node samples while no pathogens were detected in the intestine.

Histologically the oral mass was composed of heterogeneous

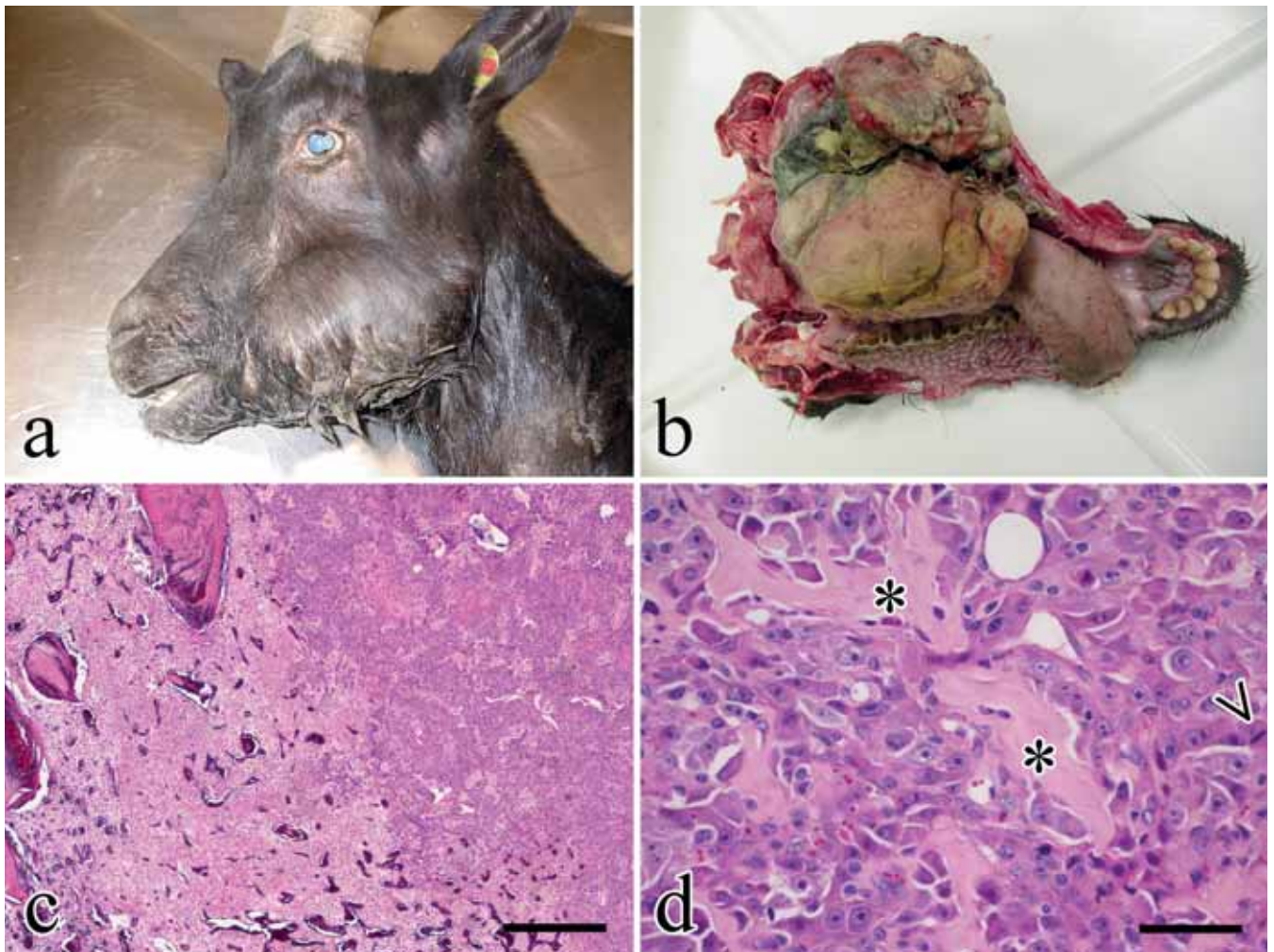


Figure 1 - Goat, head. Unilateral facial swelling of the left mandible branch (a); dorsal view of the mass after removal of the upper jaw. Multilobulated disomogeneous masses with yellowish necrotic areas occupying the oral cavity (b); mandible osteosarcoma, histology. Osteoid producing osteosarcoma (right side) with a severely congested area at its periphery (left side) (HE, bar 500µm) (c); irregular eosinophilic osteoid strands (asterisk) surrounded by atypical osteoblasts with round peripheral nuclei and prominent nucleoli; one of the osteoblasts shows a mitotic figure (arrow) (HE, bar 50µm) (d).

proliferation of malignant mesenchymal cells with variable amount of bone matrix (Figure 1c). Neoplastic cells, interpreted as malignant osteoblasts, were characterized by plump to round or spindle-shape morphology, with moderate basophilic cytoplasm and an eccentrically located voluminous nucleus containing a large prominent nucleolus (Figure 1d). Mitotic figures (**0 to 1 per HPF**) were found and were **either bipolar and atypical**. The neoplasia was characterized by foci of mesenchymal cells proliferation, individually or in clusters, intermingled with brightly eosinophilic strands or island of osteoid matrix that occasionally showed fine basophilic stippling indicative of early mineralization. Foci of chondroid differentiation were also observed. A few osteoclast-like multinucleated giant cells and several blood-filled cysts were seen throughout the neoplasia. Based on the histological features a diagnosis of osteosarcoma was made. To investigate the nature of the **blood filled cysts** and therefore to definitively exclude the possibility of a telangiectatic osteosarcoma, immunohistochemistry with factor-VIII related antigen was performed. **Positivity of endothelial cells was observed around the blood filled cysts thus confirming the non telangiectatic nature of the osteosarcoma.** A positive control, consisting of a mammary gland of a goat and a negative control, obtained by omitting the primary antibody during the labelling steps were included. Histologically the lung lesion was composed of a localized collection of neutrophils and necrotic debris, surrounded by lymphocytes, plasmacells and fibrotic tissue; moreover a multifocal verminous pneumonia was seen into the adjacent parenchyma. In the examined lymph nodes multifocal lymphocytic depletion and mild fibrosis were seen. Diffuse lymphoplasmacellular enteritis, centrolobular steatosis, mild chronic interstitial nephritis and the presence of sarcocysts in the heart wall were described in the other organs. There were no metastases in any of the microscopically examined organs. No histological lesions were detected in the pancreas, spleen and central nervous system samples.

Based on the histopathological features of the oral mass and the absence of detectable metastases, the definitive diagnosis was non-metastasizing central osteoblastic osteosarcoma.

To the author's knowledge, this case report is the first full description of a mandible bone tumour with a final diagnosis of osteogenic sarcoma with only locally invasive behaviour in a goat. In addition to dogs and cats, osteosarcomas of the head and particularly of the mandible, are also occasionally reported in horses, cattle and sheep¹⁰. In the case herein described, the age of the subject is in line with data reported by Löhr for other types of tumours in this species, since in their study the mean age of tumour presentation was 3.1¹. In this survey as well as in that by Howerth and Butler females were over-represented compared to males (respectively 74 and 61%) and the goat with the facial osteosarcoma herein described is also a female³. No reason for such occurrence has being proposed, however females are usually breed in a higher number.

Bone tumours comprise benign and malignant forms; among benign tumours osteoma, nonossifying and ossifying fibroma have been reported in goats^{7,9,11}. Regarding ossifying fibroma, Thomson and Dittmer in the recent textbook dated 2017 raised the question whether some of the mandible osteosarcomas reported in young horses might have been ossifying fibromas^{10,12}. In the present study ossifying fibroma was in the list of differential diagnosis especially considering the slow growth of the mass. Nevertheless in previous reports the ossifying fibroma

was located in the rostral part of the mandible of young horses and sheep, while in the case herein described the mass was in the caudal part of the mandible of an adult goat making a diagnosis of ossifying fibroma less likely^{10,13}.

Histology was mandatory not only to differentiate osteosarcoma from ossifying fibroma and to prevent a misdiagnosis based only on the macroscopic features, but also to determine the malignancy and the histotype of the neoplastic growth.

Besides the malignancy features observed by histology and the large dimension of the mass no metastases were detected in the other examined organs. The histological subtype of the tumour herein described is well correlated with the localized expansive growth; other histological subtypes of osteosarcoma, such as the undifferentiated and telangiectatic, have usually a more aggressive behaviour with a higher metastatic risk¹⁴. The presence of the osteoid matrix was also well represented and it is already known that osteosarcomas involving mandible are usually **productive** while those arising in the maxilla and zygomatic arch are usually osteolytic¹⁰. The non-metastatic behaviour of the mandibular osteosarcoma in this goat is well correlated with the biology of this kind of tumour in the same location in other species, in fact osteosarcoma of the maxilla and mandible in dogs has a less metastasizing behaviour than those arising from other sites¹⁵.

To conclude, regardless the type of tumour, the goat was euthanized because of the extension and the severity of the lesion. Necropsy and histological examination were necessary to correctly classify the tumour as a non-metastasizing mandibular osteosarcoma.

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