



NOTE

Internal Medicine

# A nasal osteoma with an acute course in a Japanese Black heifer

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**ABSTRACT.** A 14-month-old Japanese Black heifer presented with unilateral epistaxis and mild swelling of the right face. Radiography revealed a mass with increased radiopacity on the right side of the nasal bridge, extending to the left side. Intranasal endoscopy confirmed a large tumor-like structure protruding into the nasal cavity. Following euthanasia, cranial computed tomography (CT) was performed, revealing a tumor 24.3 × 17.5 × 14.8 cm in size. The tumor occupied the entire right nasal cavity and the frontal and sphenoid sinuses. Histopathological examination revealed that the tumor consisted of well-differentiated trabecular bones and loose connective tissue. Based on these findings, a diagnosis of osteoma was established. This report describes a case of osteoma with an acute course in a Japanese Black heifer.

**KEY WORDS:** computed tomography, endoscopy, heifer, nasal cavity, osteoma

Bone-forming tumors are uncommon in farm animals, and only a few cases have been described in the literature [13, 14, 19]. An osteoma is a benign tumor that is mainly found in horses [2, 12, 16], cattle [14, 19], sheep [5, 6, 13], dogs [9] and cats [7, 8]. In farm animals, an osteoma is a dense, smoothly contoured, protruding and slowly progressing mass of well-differentiated bone tissue [10, 15]. The most commonly affected site is the head, particularly the jaw, nasal sinuses, and bones of the face and cranium [10, 17]. Here, we describe a rare case of an osteoma with an acute course that occurred in a juvenile heifer.

A 14-month-old female Japanese Black heifer presented to a local clinic with epistaxis that had been occurring for one month prior, and a rapidly growing protuberance on the right side of the nasal bridge resulting in a facial deformity. The heifer was administered ampicillin and vitamin K in order to treat pyrexia and anorexia, but the systemic and local symptoms did not improve. On day 38 after the onset of epistaxis, the animal was brought to Azabu University Veterinary Teaching Hospital with the primary complaint of right-sided facial swelling and epistaxis.

On admission, the heifer weighed 252 kg and presented with pyrexia, low-energy, and tight swelling of the right nasal bridge (Fig. 1A and 1B). The heifer also showed a mild protrusion of the right eyeball, occasional open-mouth breathing, right nasal

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**Fig. 1.** Unilateral facial swelling in a 14-months-old Japanese Black heifer. The front facial view of the cow (A). The right side was swollen and the right eye showed a slight overhang (B).



**Fig. 2.** Intranasal endoscopic image (right wall is the nasal septum). A tumor-like structure was observed protruding into the nasal cavity; the surface was smooth and mucosa was slightly hyperemic (asterisk).

cavity epistaxis and a purulent odor upon exhalation.

A blood test showed a reduced hematocrit (24%; reference range: 27–36%), an increased leukocyte count (13,900/ $\mu$ l; reference range: 6,000–9,500/ $\mu$ l), hyperfibrinogenemia (1,200 mg/dl; reference range: 300–700 mg/dl) and a high glucose concentration (111 mg/dl; reference range: 45–75 mg/dl).

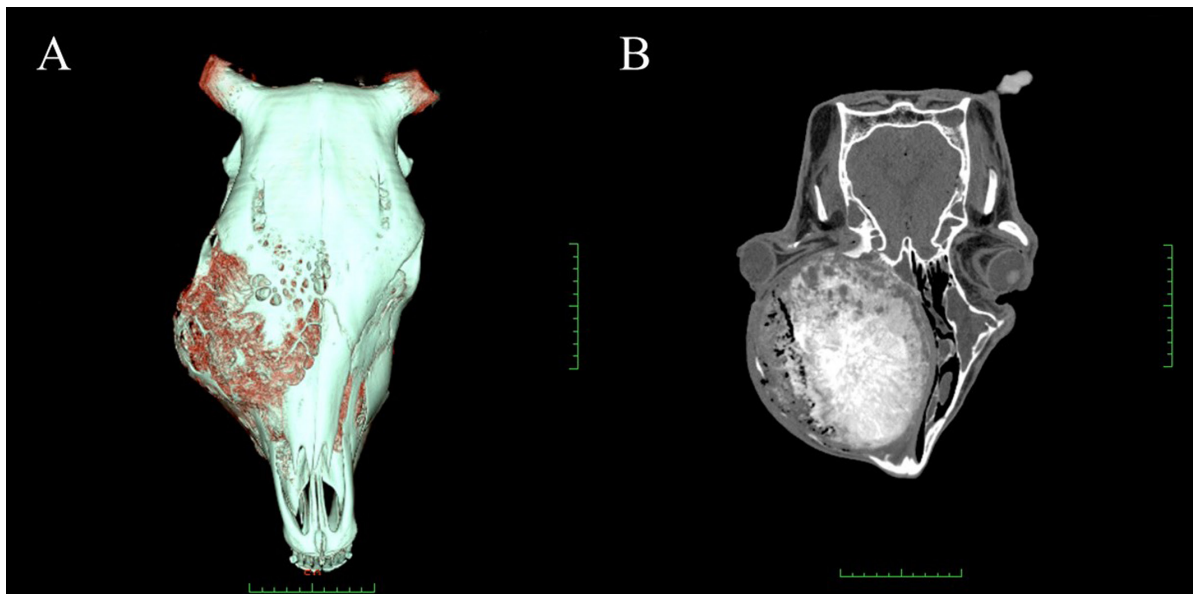
One day after admission, radiography (KXO-80S/40, Toshiba, Tokyo, Japan) was performed to examine the intracranial lesion in detail. This revealed a mass with increased radiopacity on the right side of the nasal bridge, extending to the left side.

Intranasal endoscopy (bronchofiberscope, KARL STORZ GmbH & Co. KG, Tuttlingen, Germany) confirmed a large tumor-like structure protruding into the nasal cavity. The surface of this structure was smooth, and the mucosa was slightly hyperemic (Fig. 2). Tissue samples were obtained using endoscopic biopsy. Histopathological examination revealed that the nasal mass resulted from the proliferation of trabecular bones and loose connective tissue with mild cellular atypia, suggesting the presence of benign osseous lesions such as an osteoma.

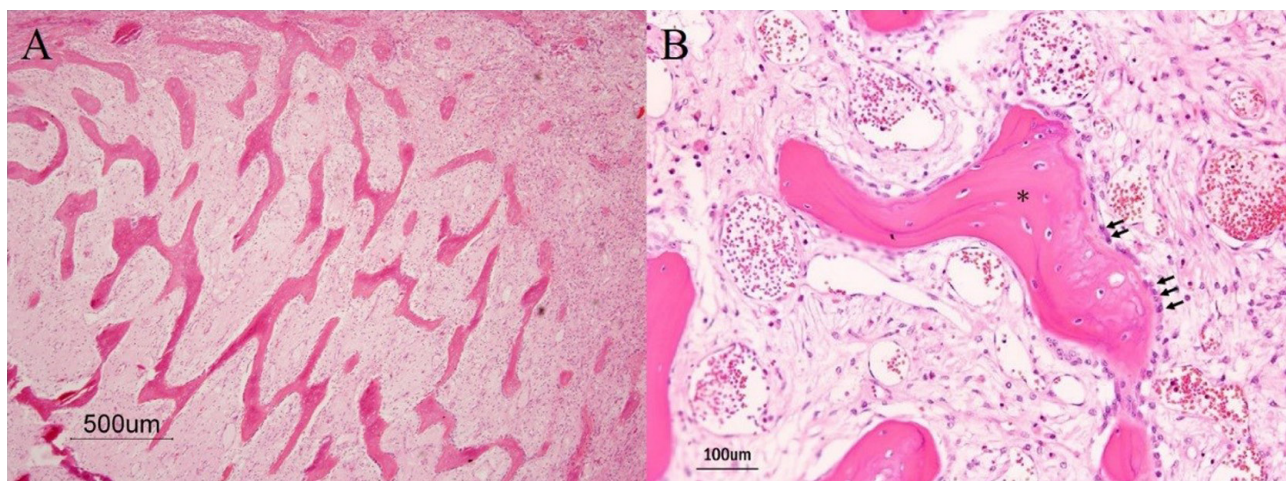
On Day 2 after admission, the swelling on the right side of the face exacerbated rapidly. On Day 7, the heifer presented with dyspnea. The prognosis was poor and thus, the heifer was euthanized and submitted for a postmortem examination.

Post mortem, a cranial computed tomography (CT; BrightSpeed16, GE Healthcare, Port Washington, NY, U.S.A.) scan revealed a mass (24.3  $\times$  17.5  $\times$  14.8 cm) occupying the entire right nasal cavity and the frontal and sphenoid sinuses (Fig. 3A and 3B). The





**Fig. 3.** Computed tomography images. Three dimensional volume reconstruction of the skull. Ventral view of the skull (A). Coronal two-dimensional image (B).



**Fig. 4.** Histopathology of the osteoma. Proliferation of trabecular bones and loose connective tissues (A). Well differentiated trabecular bones (asterisk) surrounded by osteoblasts (arrows) (B). Hematoxylin and eosin stain.

mass itself consisted of soft tissue and diffuse ossification. The mass had also infiltrated the right orbital cavity and nasopharynx, and it pushed posteriorly on the brain. The nasal septum was broken down, and part of the mass had crossed the midline to enter the left nasal cavity. The rapid growth and expansion of tumor cells exerted pressure on the eye sockets, resulting in mild exophthalmos. However, the pressure to the brain had not caused any detectable neurological symptoms.

The mass measured  $16.5 \times 20 \times 5$  cm and filled the entire right nasal cavity; it extended through the nasopharynx into the larynx. It had caused osteolysis of the nasal and orbital bones, resulting in the protrusion on the right side of the face and displacement of the right eye. The pressure due to the tumor had raised the cortical bone of the maxilla. The mass in the right nasal cavity had enlarged to the extent that the septum deviated significantly toward the left, causing a crescent-shaped deformation.

Histologically, the mass consisted of trabecular bones enclosed by osteoblast cells and loose connective tissues (Fig. 4A and 4B). These showed mild lymphocytic infiltration and mild angiogenesis. The proliferating cells contained homogeneous nuclei with low cellular atypia. Severe suppuration was observed in the tumor tissues from the cerebral base and posterior nasal aperture.

Neoplasms of the nasal passages and paranasal sinuses in large animals have been infrequently reported in epizootic and pathologic studies, and account for less than 0.1% of all respiratory neoplasms [14]. Nasal tumors that result in facial deformation include osteoma [11, 14], osteosarcoma [20], ossifying fibroma and fibrous dysplasia. In sheep, bone tumors are very rare [5, 6].

Several extensive ovine neoplasm surveys carried out in different geographical areas have found no cases of osteoma [1, 3], and only one report describes an osteoma in the frontal bone of a sheep [13]. In equine, Pascoe and Summers [12] recorded only one nasal sinus tumor in 472 horses that presented with tumors or tumor-like lesions, at a general practice in Australia. In contrast, Boulton [2] recorded 85 cases of nasal cavity and paranasal sinus diseases out of 8,023 horses over an 8-year period at Washington State University. These included 16 cases of neoplasia (0.2% of all referred horses). In two previous studies on cows with osteomas [14, 19], the cows were at least 4 years of age and the disease course was gradual. Nasal tumors in cows, horses and small ruminants may be differentially diagnosed based on the clinical course, including the age of onset, proliferation speed and site. Osteomas usually develop slowly, growing progressively larger over several months [11]. Additional useful information includes bone destruction findings, the presence of lamellar bone formation and metastasis, and tumor cell polymorphisms.

Previously, radiological imaging was the most useful ancillary diagnostic technique, but it was not always able to differentiate between the more common non-neoplastic sinonasal masses and true neoplasms. The advent of more advanced imaging techniques, such as CT in equine medicine [18], allows specialized centers to perform earlier and more accurate diagnoses of these tumors. In the present case, the imaging and pathological examinations supported the diagnosis of a nasal osteoma. The CT examination allowed clear visualization of a large proliferated tumor mass extending from the right nasal cavity to the left septum. Although plain x-ray imaging could detect the presence and the approximate size of the neoplastic lesion, it was challenging to measure the precise size and extent of invasion and/or bone destruction due to the malignant cells. Although these observations could be measured using CT, it was still difficult to differentiate between neoplastic and non-neoplastic lesions. Thus, histopathological examination was required in order to make a definitive diagnosis.

The histopathological examination of the endoscopic biopsy specimens revealed short-spindle cells among collagenous fibers, which were mesenchymal cells, and several trabecular bones, including immature trabecular bones. Thus, we considered the diagnosis of osteoma. Given the acute clinical course in this case, the likelihood of bone osteosarcoma was considered; however, the tumor showed no evidence of active invasion or metastasis. Furthermore, there was only mild polymorphism and nuclear atypia in the proliferating cells, with few findings indicating division.

The diagnosis of nasal neoplasia using an endoscopic biopsy is not always successful due to the small size and superficial nature of the obtained specimen. Additionally, a biopsy may reveal a tumor, but the histological appearance of the main tumor mass may be atypical [4]. In the present case, tissue samples obtained by endoscopic biopsy were useful for diagnosis. When the tumor is still small, and the biopsy specimen obtained reflects almost all the tumor tissue, biopsy is useful for diagnosis.

There are a variety of nasal osseous tumors in which diagnosis requires histopathological examination to distinguish them from nasal osteomas, due to clinical similarities. Fibroma, which is also a benign tumor like an osteoma, contains mainly fibroblastic cells and proliferating spindle cells. In the present case, sparse connective tissue (embryonic connective tissue-like) with non-proliferating single cells and several matured trabecular bones were observed, between the trabecular bones. Such histopathological findings are mostly consistent with previously reported cases of bovine nasal osteoma [19]. However, this case was unique in that it involved an osteoma that took an acute course in a juvenile cow.

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