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CASE REPORT

Food/farmed animals

Metastatic cornual melanoma in a Valesian copperneck goat

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Abstract

A 10-year-old, neutered, male Valesian copperneck goat was presented to the Clinic for Ruminants, Vetsuisse Faculty, University of Bern for a chronic wound at the base of the right horn first noticed 3 weeks before presentation. Clinical examination revealed a firm mass with ulcerations and malodorous discharge at the base of the right horn, and a duller sound on percussion of the right frontal sinus. Radiography revealed a soft tissue opacity filling the right cornual diverticulum of the frontal sinus. Upon wound debridement, tissue of grey to black discoloration was noticed and sent in for histopathological examination, which confirmed the presence of a melanoma. Subsequent ultrasonography of the liver and radiography of the thorax revealed no sign of metastatic disease. Given the poor prognosis, the goat was euthanased, and postmortem examination revealed the presence of multiple metastatic lesions in the regional lymph nodes.

KEYWORDS

goats, melanoma, neoplasia, skin

BACKGROUND

Neoplasia is not a common problem in goats, and melanoma is considered a rare disease.[1–3] Brandly and Migaki[1] reported 70 cases of neoplasia in 800,000 slaughtered goats, of which five were identified as melanomas. Cutaneous melanomas have previously been reported at the level of the perineum,[3,4] the ears,[3,7] the hoof,[2,5] the horn,[2,6,7] the tail,[4] the udder[4] and the eye.[3,8] Reports of non-cutaneous forms of melanomas are rare,[9,10] and in some goats with melanoma and metastatic disease, no primary tumour could be found. Spontaneous regression of the primary cutaneous lesion has therefore been hypothesised.[4] Exposure to sunlight is considered as a risk factor for the development of cutaneous melanoma,[3,7] and goats with a lighter skin colour seem to be more often affected.[4] Angora goats are suspected to have a predisposition for the development of melanomas, with a reported prevalence of 2.2% in an Australian study.[3] Melanomas in goats seem to be mainly malignant,[1–4,7] with frequent development of metastases in the regional lymph nodes, the liver and the lungs.[4,6,7,10] It is therefore important to consider cutaneous melanoma as a differential diagnosis in the case of conspicuous skin changes, and initiate the appropriate investigative steps in order to formulate a correct diagnosis as soon as possible.

CASE PRESENTATION

A 10-year-old, 80 kg, neutered, male Valesian copperneck goat was referred to the Clinic for Ruminants, Vetsuisse-Faculty, University of Bern, Switzerland for a chronic ulcerative wound at the base of the right horn, first noticed 3 weeks before presentation. The owner did not observe any trauma before detection of the wound. The goat was isolated from the rest of the herd and initial treatment consisted of regular cleaning of the affected area and frequent topical administration of an antibiotic chlortetracycline spray (Chlor-Tetracyclin-Spray Stricker; Biokema). The referring veterinarian did not initiate any further treatment.

Upon clinical examination, the goat was bright, alert and responsive, and in a good general condition with a rectal temperature of 40.5°C (normal range 38.5°C–39.5°C), a heart rate of 100 beats per minute (normal range: 70–110) and a respiratory rate of 40 respirations per minute (normal range: 15–40). Examination of the head revealed a skin lesion located adjacent to the cranio-medial aspect of the base of the right horn, presenting as a firm protruding mass of tissue, approximately 5 × 5 × 3 cm in diameter, with a rugged surface that included oozing, ulcerative areas with malodorous discharge. The area was largely covered by scabs and painful at touch. The head showed no visible asymmetry or nerve deficits, and

the right horn was firmly attached. On sinus percussion, a marked difference in the quality of sound between the left and right frontal sinuses was observed, with a duller sound on the right.

INVESTIGATIONS

Head radiographs showed a mild soft tissue swelling rostrolaterally at the base of the right horn (Figure 1) and a homogeneous soft tissue opacity filling the right cornual diverticulum of the frontal sinus, extending over the whole diverticulum, with only a small amount of gas remaining in the medial aspect at the base (Figure 2). No clearly demarcated fluid line was visible in the frontal sinus.

The animal was sedated with a combination of 0.1 mg/kg xylazine intramuscularly (Xylasol; Dr. E. Gräub), 2.5 mg/kg ketamine intravenously (IV) (Ketasol-100; Dr. E. Gräub) and 0.05 mg/kg butorphanol IV (Morphasol-10; Dr. E. Gräub) in order to examine the wound. Additionally, a cornual nerve block with 100 mg of lidocaine HCl (Lidocain 2%; Streuli Pharma) was performed. After clipping, the area was thoroughly cleaned with iodine soap (povidone-iodine) (Figure 3). No communication between the wound and the frontal sinus could be detected by wound probing. The protruding ulcerated part of the skin lesion was therefore excided with a scalpel, followed by curettage of the whole area and simultaneous flushing with 0.05% chlorhexidine solution. On closer examination, the excided tissue was markedly black in colour, and the skin directly adjacent to the wound appeared vital but showed a grey-to-black discoloration. The mass communicated with the interior of the horn capsule through an opening of approximately 1 × 1.5 cm. The mucosa of the cornual diverticulum of the frontal sinus was markedly black. Three tissue samples were therefore submitted for histopathological examination.

Histopathological examination revealed an infiltrative neoplastic proliferation with multifocal necrosis and bacterial colonisation. Cells were polygonal to spindle shaped with moderately distinct borders and eosinophilic cytoplasm with granular brown pigment. Anisocytosis and anisokaryosis were frequent.

Subsequent ultrasonographic examination of the liver and the lungs as well as a radiographic examination of the thorax were carried out but did not reveal any visible signs of metastatic disease.

DIFFERENTIAL DIAGNOSIS

Although there was no known history of trauma, a traumatic injury with subsequent infection of the wound as well as a fracture of the frontal bone with subsequent sinusitis or abscess formation were considered as differential diagnoses and supported by hyperthermia (40.5°C) at the time of admission. However, the discovery of large areas of black tissue on wound exploration as well as the communication between the mass and the interior of the horn capsule was strongly suggestive of a neoplastic origin of the lesion, which was confirmed by histopathological examination as a malignant melanoma.

LEARNING POINTS/TAKE HOME MESSAGES

- Neoplasia in general and melanoma in particular are considered rare diseases in goats.
- Malignant melanoma at the base of the horn shows a rapid progression, has the potential to reoccur after excision of the primary lesion and is frequently accompanied by metastatic disease, which is associated with a fatal prognosis.
- To ensure a rapid diagnosis in affected animals, cutaneous melanoma should be considered as a differential diagnosis in unusual skin lesions in goats, even though it is a rare disease.
- After histopathological confirmation of the presence of a malignant melanoma, euthanasia should be considered even for animals where no signs of metastatic disease are visible yet.

TREATMENT

The animal received medical treatment with 30,000 IE/kg benzylpenicillin IV three times a day (Penicillin Natrium; Streuli Pharma) and 3 mg/kg ketoprofen IV daily (Rifen 10%, Streuli Pharma), starting from the day of wound revision until the biopsy sample histopathological results arrived 48 hours later. The animal did not show hyperthermia during hospitalisation. Given the poor prognosis and the high risk of metastases, the goat was euthanased with 150 mg/kg pentobarbital IV (Esconarkon; Streuli Pharma) and submitted for postmortem examination.

OUTCOME AND FOLLOW-UP

Necropsy findings

Rimming the cranial and medial aspects of the base of the right horn was a black uniform mass, arranged as a 2 cm thick, band-like shape, extending over the proximal portion of the horn stem. On the rostral surface of the same horn, there was a wedge-shaped 4 × 3 × 1.5 cm sized area where the horn wall was not present anymore (secondary to a previous biopsy sampling) (Figure 4). A sagittal cut through the skull revealed an infiltrative, firm, black, well-demarcated mass extending from the base of the right horn into the horn wall (i), within the dermis adjacent to the horn base (ii), within the frontal bone (iii), the sinuses mucosae (iv) and into the ethmoidal region (v) (Figure 5). The left mandibular (a), both parotid (b), the retropharyngeal (c) and the right superficial cervical lymph nodes were markedly enlarged up to 5 × 2.5 × 1 cm and revealed a black coloration on cut surface (Figure 6).

Histopathological findings

Within the deep dermis, there was an infiltrative, unencapsulated, densely cellular proliferation composed of neoplastic cells arranged in cords and nests and supported by moderate

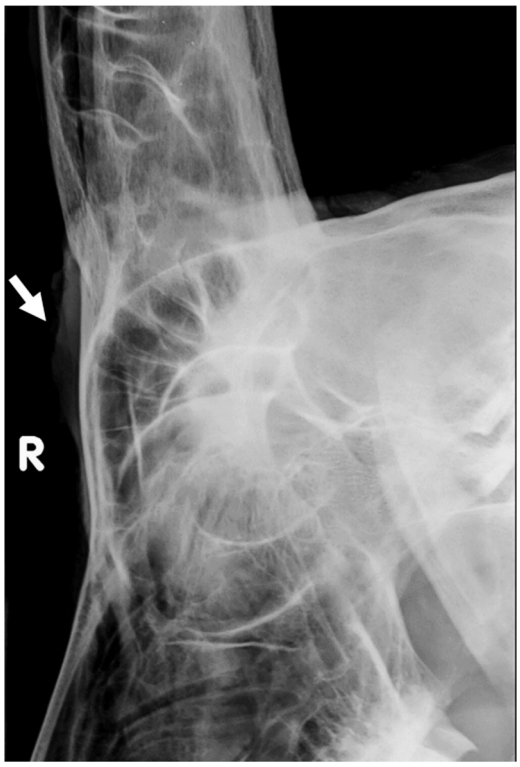

FIGURE 1 Latero-lateral projection of the dorsocaudal aspect of the head. Mild irregular soft tissue swelling is visible rostrolaterally at the base of the right horn (arrow)

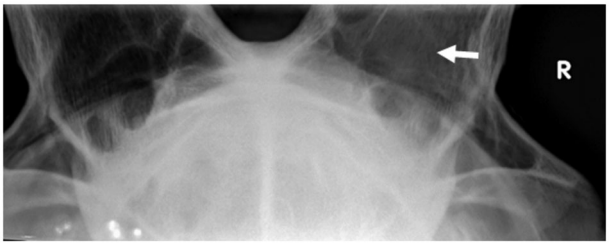

FIGURE 2 Rostrocaudal projection of the caudodorsal aspect of the head. The right cornual diverticulum of the frontal sinus is filled with homogeneous soft tissue opacity (arrow)

FIGURE 3 Dorsal view of the mass at the level of the base of the right horn after cleaning with iodine soap. Multiple ulcerative areas and areas of darker coloration are visible on the surface

FIGURE 4 Dorsal view of the head at the level of the horn bases after biopsy sampling. A wedge is visible in the area where a communication between the mass and the interior of the right horn capsule was discovered during wound debridement

amounts of fibrovascular stroma. Cells were round to polygonal and occasionally spindeloid with well-demarcated cell borders, moderate amount of eosinophilic cytoplasm together with variable amounts of dark brown, granular pigment. Nuclei were round, with finely stippled chromatin and up to three nucleoli. Anisocytosis and anisokaryosis were moderate to severe. Mitosis were 12 per 10 high-power field (HPF). The overlying epidermis was focally extensively ulcerated and covered with a thick serocellular crust. Neoplastic cells were seen in the medullary sinuses of the examined lymph nodes (Figure 7), and neoplastic melanocytes were infiltrating the frontal bone (iiia) and the hornwall (ia) (Figure 5).

DISCUSSION

Here, we report a case of melanoma at the level of the right horn base in a Valesian copperneck goat, which had already developed multiple metastases at the time of referral. The Valesian copperneck goat is a rare variation of the Valesian blackneck breed with lighter, brownish-coloured skin in the cranial half of the body. This could have served as a predisposing factor for the development of the disease, as malignant melanoma occurs more frequently in goats with a lighter skin colour.[4]

Parsons et al.[7] reported the finding of a malignant melanoma at the base of the left horn in an Angora goat, and the tumour was excised for further histological studies. Two months later, the animal showed a swelling of the parotid and the prescapular lymph node on the same side. The goat was euthanased, and in postmortem examination an extensive invasive growth of grey-to-black tissue was observed in the parotid and in the retropharyngeal region. Metastases were detected in the lower cervical and prescapular lymph node on the left side, as well as in the liver and the lungs. There was, however, no visible regrowth at the level of the primary skin site. In a similar case, Mavangira et al.[6] found a malignant melanoma at the base of the left horn in a Pygora goat with no visible regional lymphadenopathy. The mass was excised and submitted for histopathologic evaluation. Three and a

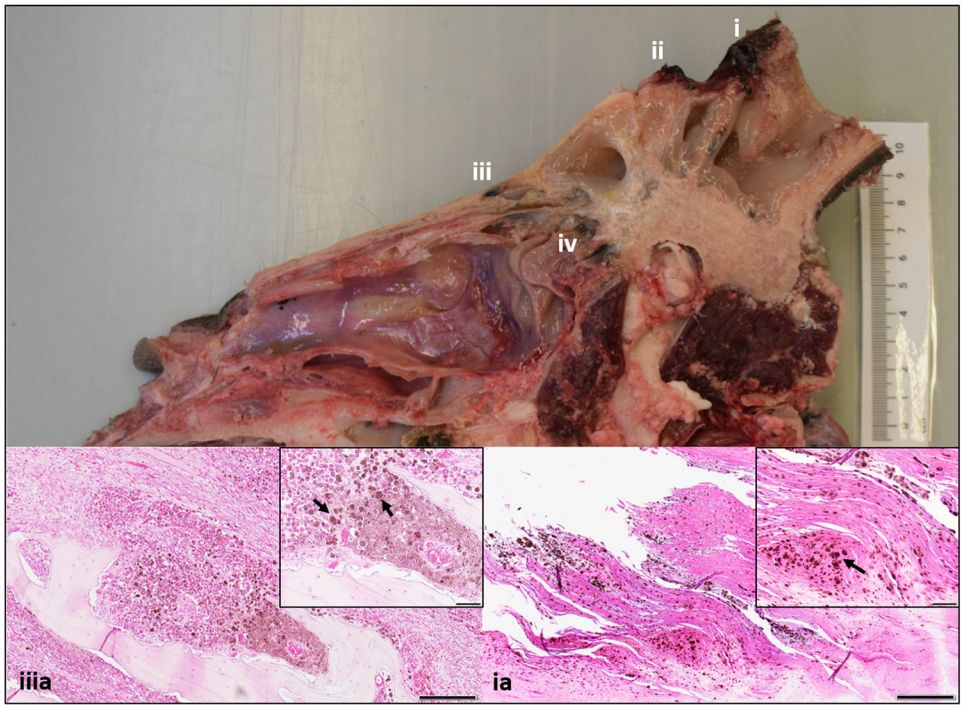

FIGURE 5 Sagittal cut through the skull at the level of the right horn. The mass at the basis of the horn extends into the horn wall (i), within the dermis adjacent to the horn basis (ii), within the frontal bone (iii), the sinuses mucosae (iv) and into the ethmoidal region (v). Neoplastic melanocytes (arrows, inlets) are infiltrating the frontal bone (iiia, HE, 20×) and the hornwall (ia, HE, 10×)

FIGURE 6 Ventral view of the head. Visible enlargement and black coloration of the left mandibular (a), both parotid (b) and the retropharyngeal lymph nodes (c)

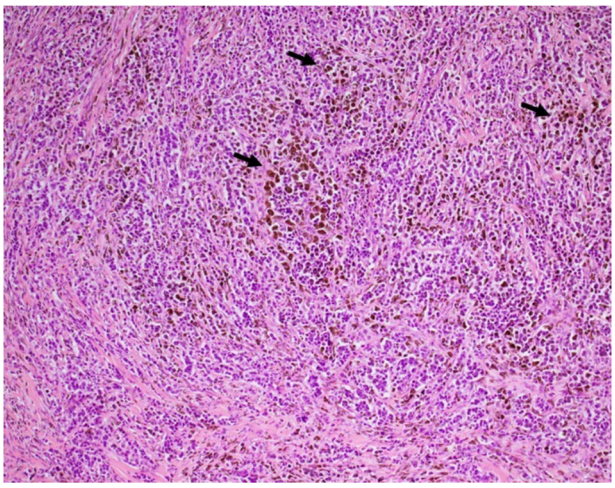

FIGURE 7 Supported by small amounts of fibrovascular stroma are multiple nests of neoplastic cells frequently containing a brown, pigmented cytoplasm (arrow)

half months later, the goat was examined again and showed a recurrence of the mass at the base of the left horn, swelling of the left parotid, a ruptured left eye, anorexia and severe weight loss. While the goat was restrained for clinical examination, the left horn broke off with minimal force. Radiography of the lungs showed no visible signs of metastatic disease. The animal was euthanased and submitted for postmortem examination, which revealed a large black mass extending from the base of the horn subcutaneously over the frontal bones and into the frontal sinuses. Metastases were visible in the submandibular lymph node and the parotid salivary gland on the left side, as well as in the liver.

Similarly, the goat in the present report showed a unilateral mass at the base of the right horn, with no visible signs of swelling in the ipsilateral mandibular lymph nodes upon clinical examination. The animal was euthanased as soon as the diagnosis of a malignant melanoma was confirmed, but it is possible that the disease would have taken a similar course as previously described, especially as metastases in the regional lymph nodes were detected in postmortem examination. The affected lymph nodes appeared enlarged in postmortem examination, but were housed deep in the tissue, which could explain why there were no palpable signs of enlargement in clinical examination. In both previous reports, the animals were re-examined after only a few months due to recurrent or novel symptoms, which underlines the fast progression of the disease. In addition, the absence of visible or palpable swelling of the ipsilateral lymph nodes on clinical examination and the lack of visible signs of metastases in radiographs do not rule out the presence of metastatic disease. These findings suggest that malignant melanoma

is a rare but severe disease with rapid progression in goats, which is associated with a fatal prognosis. Treatment with excision of the main tumour should be considered carefully, the affected animal should be monitored closely for any signs of metastases or recurrence of the primary tumour, and euthanasia should be discussed early on to avoid unnecessary harm.

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CONFLICT OF INTEREST

The authors declare they have no conflicts of interest.

ETHICS STATEMENT

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REFERENCES

1. Brandly PJ, Migaki G. Types of tumors found by federal meat inspectors in an eight-year survey. Ann N Y Acad Sci. 1963;108:872–9.
2. Löhr CV. One hundred two tumors in 100 goats (1987–2011). Vet Pathol. 2013;50(4):668–75.
3. Green A, Neale R, Kelly R, Smith I, Ablett E, Meyers B, et al. An animal model for human melanoma. Photochem Photobiol. 1996;64(3):577–80.
4. Ramadan RO, El Hassan AM, Taj El Deen MH. Malignant melanoma in goats: a clinico-pathological Study. J Comp Path. 1988;98(2):237–46.
5. Derakhshanfar A, Oloumi MM, Nazem MN, Eskandari A. Dermal melanocytoma of the hoof in a goat. Iran J Vet Surg. 2007;2(5):81–4.
6. Mavangira V, Hughes JM, Middleton JR, Mitchell WJ, Kim DY. Malignant melanoma of the horn base in a Pygora goat. J Vet Diagn Invest. 2008;20:104–7.
7. Parsons PG, Takahashi H, Candy J, Meyers B, Vickers J, Kelly WR, et al. Histopathology of melanocytic lesions in goats and establishment of a melanoma cell line: a potential model for human melanoma. Pigment Cell Res. 1990;3(6):297–305.
8. El-Shafaey E, Hamed MF. Uveal Melanoma in an Aradi goat (*Capra aegagrus hircus*). J Comp Path. 2020;177:5–9.
9. Sinnott DM, Woolard KD, Heller M, Affolter VK. Congenital intradural melanoma surrounding the spinal cord of a nine-day-old Saanen goat. Vet Rec Case Rep. 2020;8:e001117.
10. Hatefi A, Seyedrasouli M, Mohajeri D, Ahmadian M. A non-cutaneous form of melanoma in a goat during meat inspection: a case report. Arch Razi Inst. 2021;76(2):407–10.

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