Case Report

jfms OPEN REPORTS

Journal of Feline Medicine and Surgery Open Reports
1–7
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DOI: 10.1177/20551169241283542
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Tubulotrabecular adenocarcinoma of the nasopharynx operated by transoral and transpalatal approach in a cat

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Abstract

Case summary A 10-year-old castrated male crossbreed Birman cat was presented for respiratory difficulties, nasal discharge, dysphagia and wheezing. An obstructive nasopharyngeal mass invading the caudoventral nasal cavity and the left sphenoid sinus was observed on a CT scan. Surgical treatment via a ventral rhinotomy and curettage was performed. Histopathology revealed an adenocarcinoma with tubulotrabecular architecture. The cat's clinical signs significantly improved postoperatively. After 10 months, a recurrence was documented and a second surgical procedure was performed that allowed the patient to live an additional 6 months without clinical signs and an overall survival time of 19 months after first presentation.

Relevance and novel information This case report describes a nasopharyngeal adenocarcinoma treated by ventral rhinotomy in a cat. To our knowledge, there is only one other report describing this surgery on a nasal adenocarcinoma in a cat. The tomodensitometric, endoscopic and unusual histological appearance of the mass are reported. The prognosis after surgical removal of nasal adenocarcinomas in cats is only sparsely documented. This case demonstrates that ventral rhinotomy might be considered if first-line treatment is declined.

Keywords: Nasal tumour; nasopharynx; adenocarcinoma; tubulotrabecular architecture; ventral rhinotomy

Accepted: 28 August 2024

Introduction

Nasal tumours are rare in cats. Lymphoma is the most common tumour, followed by epithelial neoplasms, such as adenocarcinoma and squamous cell carcinoma.[1] Nasal adenocarcinomas are locally invasive and associated with a low metastatic rate at the time of diagnosis.[2] Although radiotherapy is considered the therapy of choice in feline nasal tumours, no study compares the outcome after radiotherapy or surgery alone. This article describes a nasopharyngeal adenocarcinoma treated by ventral rhinotomy in a cat.

Case description

A 10-year-old castrated male crossbreed Birman cat was presented for a 2-week history of respiratory difficulties, serous nasal discharge, dysphagia and wheezing. Thoracic radiographs were unremarkable. A week of corticosteroid therapy (prednisolone 0.5 mg/kg PO q24h) did not result in any improvement.

Clinical examination revealed respiratory distress and nasal congestion associated with a fluctuating stertor and stridor, which indicated nasopharyngeal involvement. The differential diagnosis included chronic rhinitis, infectious rhinitis, foreign body, nasal polyp, nasopharyngeal stenosis, trauma, tumour or an inflammatory process. To explore the different hypotheses, a

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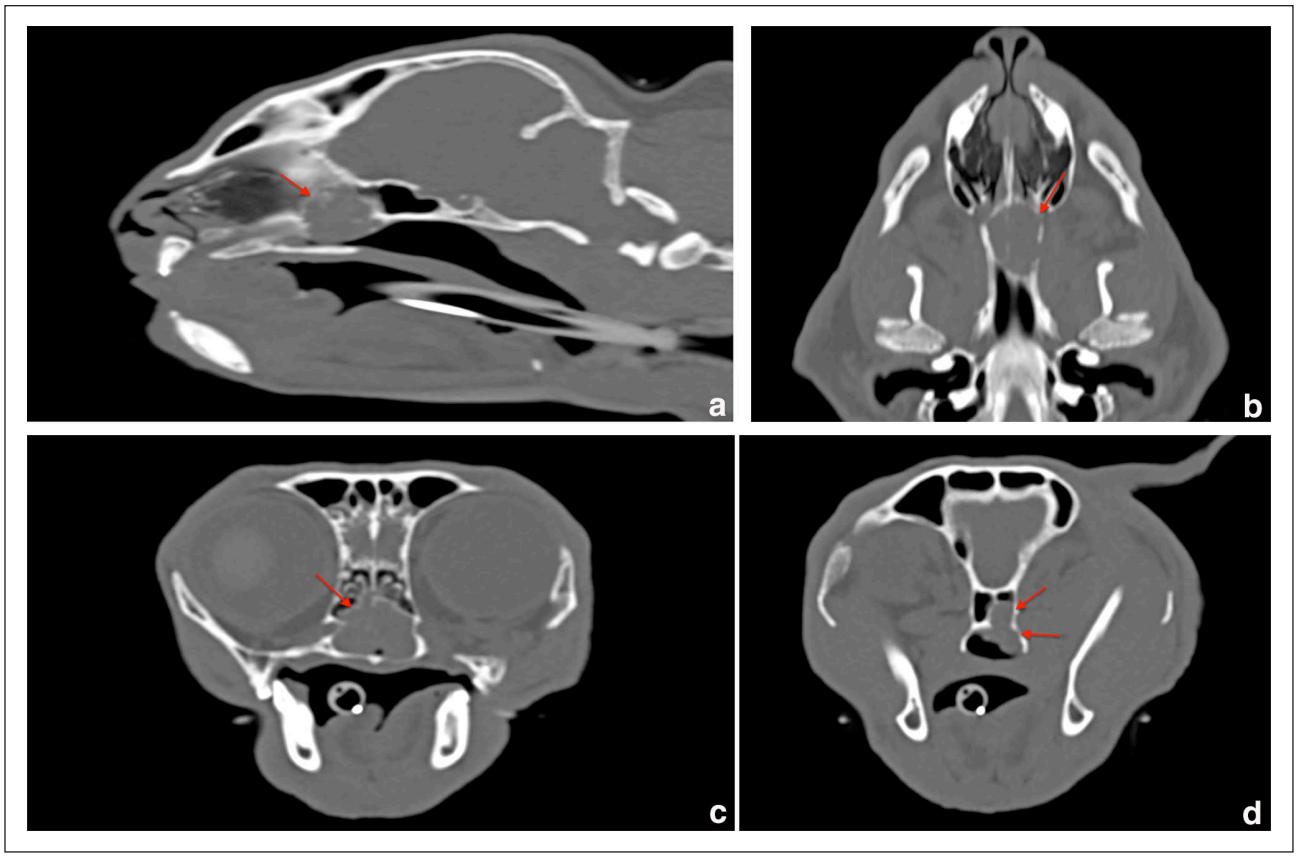

Figure 1 CT imaging of the head. (a) Sagittal section. The arrow indicates the presence of a mass in the nasal cavity extending from the choanae to the proximal aspect of the nasopharynx. (b) Dorsal section. The arrow indicates the presence of a mass in the nasopharynx invading part of the right and left nasal cavities. (c) Transverse section. The arrow indicates the presence of a mass at the caudoventral part of the nasal cavities and the nasopharynx. (d) Transverse section. The arrows indicate osteolysis of the bony walls of the nasopharynx and invasion of the left sphenoid sinus by the lesion

tomodensitometric evaluation of the head and a respiratory fibroscopy were recommended.

A nasopharyngeal mass (11 × 19 mm) of tissue attenuation with a diffuse, discretely heterogeneous enhancement after injection of contrast agent, extending from the choanae to the beginning of the nasopharynx, was observed on the CT scan (Figure 1a–c). Osteolysis of the bony walls of the nasopharynx was present with invasion of the left sphenoid sinus and the caudoventral part of the nasal cavity (Figure 1d). No lymphadenomegaly was documented.

On retrograde rhinoscopy, the nasopharyngeal mass appeared parietal and bilobed and almost completely obstructed the nasopharyngeal lumen in its rostral part. Endoguided transpalatal needle punctures were performed and cytological examination revealed a population of atypical epithelial cells associated with a pyogranulomatous inflammatory context.

Surgical resection via a ventral rhinotomy was performed. After injection of morphine (0.1 mg/kg) and propofol (4 mg/kg), the cat was intubated and anaesthesia was maintained with isoflurane. Antibiotic prophylaxis was provided with ampicillin sulbactam (20 mg/kg IV) and fluid therapy with lactated Ringer's solution. The cat was placed in dorsal recumbency. The mouth was held open with tape in a submaximal position at the last moment (Figure 2). Mid-procedure, tension on the tape was released for 2 mins.

A 3 cm incision of the buccal mucosa and mucoperiosteum was made at the junction of the soft and hard palates along the midline with a number 11 blade. The palatine bone of the hard palate was removed along the midline with Kerrison forceps (Figure 3).

The mass was removed using a curette within the choanae and caudoventral part of the right and left nasal cavities (Figures 4 and 5). Osteolysis of the left orbital plate ventrally was noted.

Lavage of the surgical site was performed. The mucoperiosteum and the buccal mucosa were sutured in two layers with absorbable sutures (Monosyn 3-0 and 4-0; B Braun) in an interrupted pattern (Figure 6). No attempt was made to close the underlying bony defect.

Postoperatively, fluid therapy, analgesia (morphine 0.1 mg/kg q4h for 24 h), antibiotic therapy (amoxicillin clavulanic acid 12.5 mg/kg q12h for 10 days) and anti-inflammatory therapy (prednisolone 0.5 mg/kg q24h for

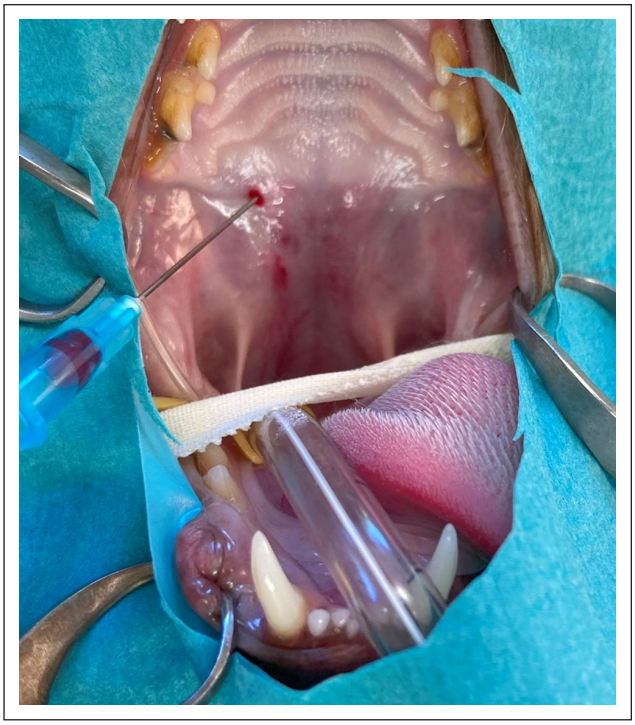

Figure 2 Patient in dorsal recumbency with the tongue and endotracheal tube lateralised to its left. Submaximal opening of the mouth allowed sufficient access to perform a ventral rhinotomy. A needle marked the junction between the hard and soft palate

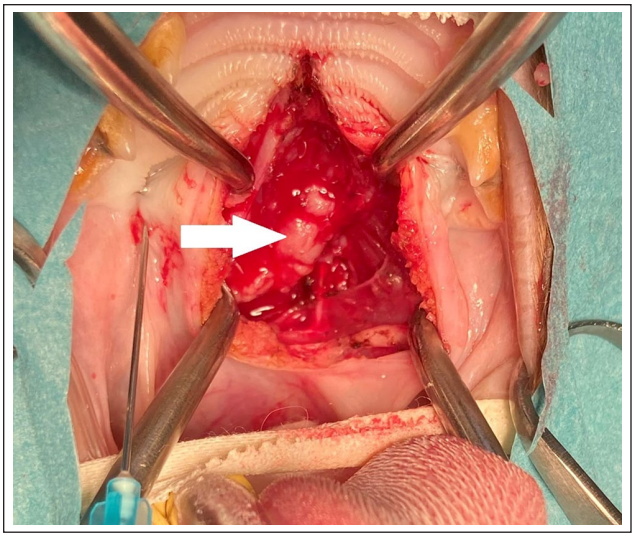

Figure 3 After incising and retracting the buccal mucosa and mucoperiosteum along the midline at the junction of the soft and hard palates, the palatine bone was partially removed. The arrow indicates the presence of a mass in the nasopharynx

7 days) were initiated. A soft diet was recommended for 4 weeks.

Histopathology revealed a nasopharyngeal adenocarcinoma with tubulotrabecular architecture. The tissue was mainly composed of dense layers of cubic to polygonal cells, spindle-shaped, punctuated by small tubular structures, alternating with areas of clearly more tubuloacinar architecture (Figure 7).

A clear improvement of the respiratory signs was observed 3 days after the procedure. Within 2 months, the patient's clinical condition and behaviour had returned to normal. For 10 months, the patient did not have any respiratory disorder, nasal discharge, dysphagia or wheezing. After 10 months, the owner reported occasional sneezing after drinking and an episode of snoring. A 1 mm oronasal fistula was visible on the midline of the palate at the junction between the hard and soft palate (Figure 8). On a CT scan, a recurrence of the nasopharyngeal mass was documented (Figure 9). The mass was partially obstructive with local invasion of the left sphenoid sinus and the caudoventral part of the nasal cavity. No evidence of pulmonary metastatic spread was visible.

A second surgery, a ventral rhinotomy, was performed similarly to the first one. The patient remained well for an extra 6 months without respiratory disorders, but a subsequent 3 months of recurrence of respiratory distress led to euthanasia 19 months after first presentation.

Discussion

Very few reports exist on feline nasal tumours treated by ventral rhinotomy.[3–5] These tumours are rare in cats and the median age at the time of diagnosis is 10 years. Similar to the cat in the present report, 90% of feline nasal neoplasms are malignant. The most commonly diagnosed tumour type is lymphoma followed by epithelial neoplasms,[1,2,6] mainly adenocarcinoma and squamous cell carcinoma.[2] Adenocarcinomas are locally invasive and associated with a low metastatic rate at the time of diagnosis.[2] Less frequently reported tumour types include sarcoma, mast cell tumour, melanoma, plasmacytoma, olfactory neuroblastoma and benign lesions.[2]

Clinical signs related to feline nasal tumours include nasal discharge, upper respiratory tract dyspnoea, sneezing, epistaxis, facial swelling, ocular discharge and weight loss.[1,2,6] These clinical signs are non-specific and the median duration of clinical signs before diagnosis is several months. Antibiotic and/or corticosteroid therapy often temporarily improves clinical signs.[1,2,6]

Radiographs of the nasal cavity may reveal midline structure displacement, unilateral soft tissue opacity, loss of turbinate detail and evidence of bone invasion in cats with nasal neoplasia.[7] However, CT is currently the most relevant imaging tool for nasal disease. It is an

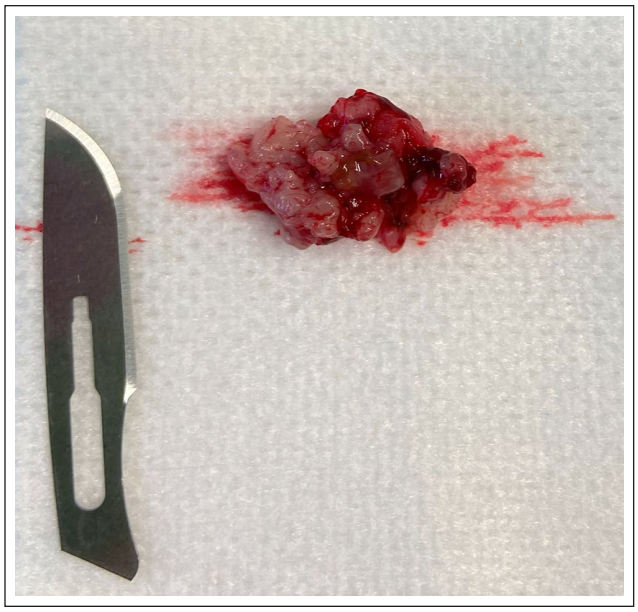

Figure 4 Macroscopic appearance of the nasal mass. Blade (41.7 mm) shown for scale

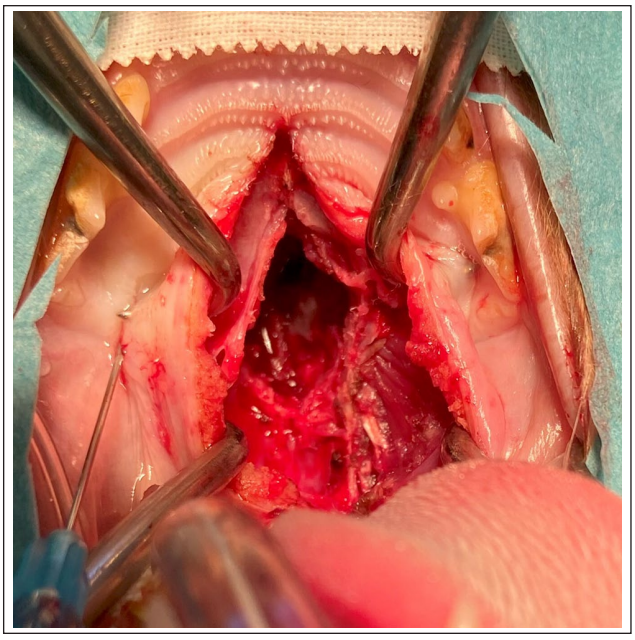

Figure 5 Appearance of the surgical site after removal of the mass. No airway obstruction was visible

excellent modality for localising and determining the extent of disease. Although MRI is less widely available, it may be helpful in differentiating nasal tumours in cats. Indeed, higher apparent diffusion coefficient values and a large area of non-enhancement seem more in favour of adenocarcinoma than lymphoma.[8]

Endoscopy allows direct observation of the nasal cavity, nasopharynx and sometimes the sinuses, and the identification of tumours. Cytology from endoscopic biopsies of feline nasopharyngeal masses is in good agreement with histopathology, with an overall accuracy of 90%.[9] Nevertheless, as in the present report, cytology does not always provide a diagnosis. Histopathology from biopsies is the gold standard for diagnosing feline nasal tumours. However, misdiagnosis between carcinoma and lymphoma has been reported.[10] Immunohistochemistry after disagreement between pathologists revealed that the original diagnoses were incorrect in 67% of cases.[10] In this case report, immunohistochemistry was not deemed necessary because the neoplasm was well differentiated with clearly defined morphological characteristics.

Radiotherapy is considered the treatment of choice for feline nasal carcinomas. Palliative coarse fractionated radiotherapy,[11] definitive-intent radiotherapy with either fractionated or stereotactic radiotherapy[12] and cyclical hypofractionated radiotherapy[13] has provided long-term median survival times (342, 721 and 460 days, respectively). In the present case, radiotherapy alone or combined with surgery was declined because of its high cost and the need for repetitive anaesthesia. It could have been beneficial, especially after the second surgery.

Surgical removal of a tumour from the nasal cavity is not considered curative because clean margins will not be obtained. Very few reports exist on feline nasal tumours treated by ventral rhinotomy.[3–5] The ventral approach provides direct access to the nasal cavity and the nasopharynx.[5] However, the frontal sinus cannot be explored. Postoperatively, there is no visible scar and no development of subcutaneous emphysema, which is common after dorsal rhinotomy.[3,5] The major complications of ventral rhinotomy are chronic nasal discharge, chronic bacterial and fungal rhinitis, osteomyelitis and haemorrhage. To prevent excessive haemorrhage, it is important to minimise surgery time, avoid damaging the major palatine vessel and manage bleeding with digital pressure, electrocoagulation and haemostatic compress.[5] To avoid aspiration pneumonia, the patient's head should be slightly lowered in the immediate postoperative period.[5] Maximal opening of the mouth or the use of spring-loaded mouth gags should be avoided in cats, as it will compress the maxillary artery responsible for cerebral perfusion, which can lead to neurological signs.[14–16] Another uncommon complication is the development of an oronasal fistula, possibly leading to chronic nasal infection and nasal discharge.[4] In this case report, the oronasal fistula was an incidental finding and was corrected during the second procedure. Recurrence of a malignant tumour is expected in most cases and clinical signs may recur within 6–12 months postoperatively.[5] A long median survival time of 15 months was achieved in five cats with nasal tumours treated by ventral rhinotomy.[4] In the present case, ventral rhinotomy provided

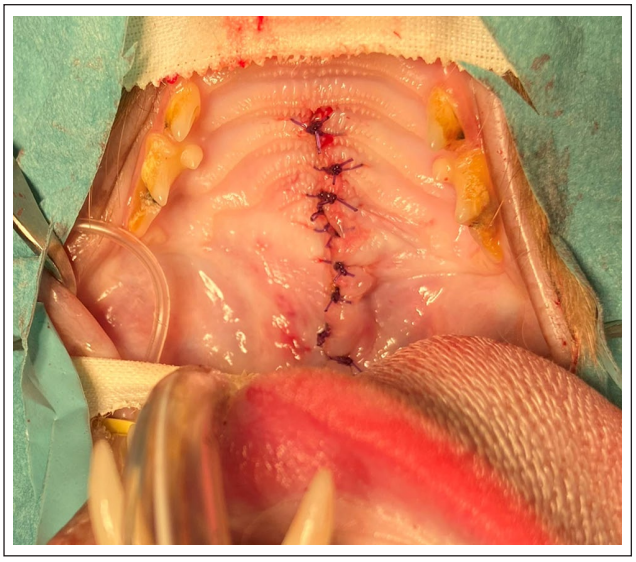

Figure 6 The mucoperiosteum and the buccal mucosa were sutured in two layers using absorbable sutures in an interrupted pattern

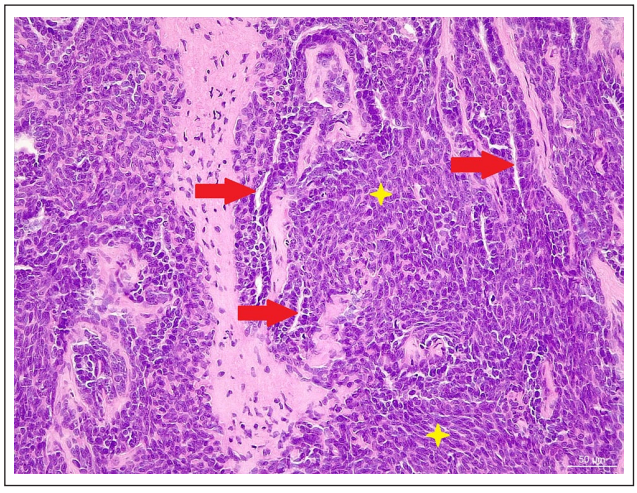

Figure 7 Photomicrograph of a biopsy sample: dense layers of cubic to polygonal cells (star), sometimes more elongated, spindle-shaped, punctuated by small tubular structures with narrow lumens, supported by a small stroma, alternating with areas of clearly more tubuloacinar architecture (arrows), with lumens occupied by pale eosinophilic secretory material, supported by an abundant fibrous stroma, with clear images of continuity between the different architectures. Tumour cells had a round to ovoid, euchromatic and discretely nucleolated nucleus, with sparse eosinophilic cytoplasm. Cytonuclear atypia were moderate, restricted to anisocytosis and anisokaryosis. Mitosis figures were common. Haematoxylin and eosin × 20

adequate access to successfully remove the tumour the first time and again 10 months later when recurrence was documented, resulting in significantly improved clinical signs for 16 months without respiratory disorders and a 19-month survival after first presentation. A

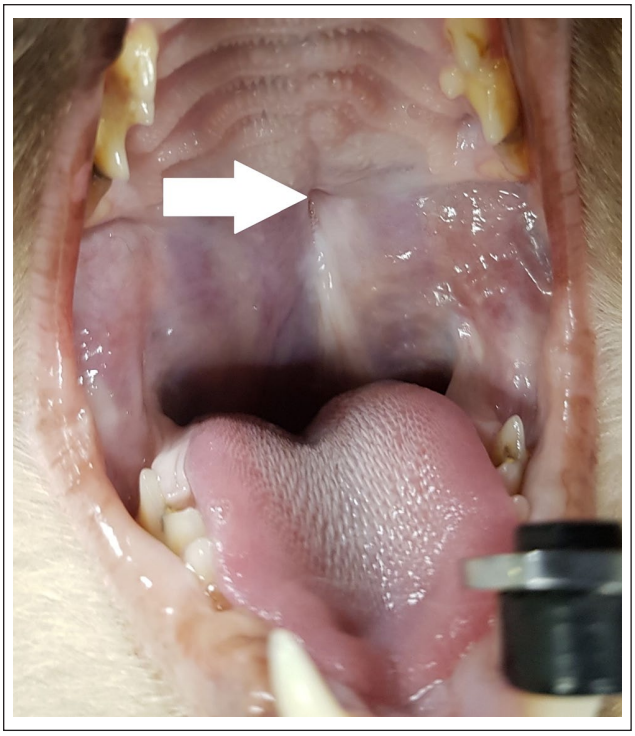

Figure 8 A 1 mm oronasal fistula was visible on the palate along the midline at the junction between the hard and soft palate (arrow) 10 months after the first surgical procedure

large-scale study is necessary to confirm the therapeutic benefit of ventral rhinotomy on the survival of cats with nasopharyngeal adenocarcinomas and to compare the outcome and complications between surgery and radiotherapy.

Exenteration of the nasal cavity following radiotherapy for the treatment of dogs with nasal tumours was well tolerated and provided a similar median survival time (457 days with definitive fractionated radiotherapy)[17] or prolong median survival time (48 months with accelerated radiotherapy) compared with radiotherapy alone.[18]

Functional endoscopic sinus surgery is a minimally invasive technique that seems to decrease pain and bleeding and clears the visual field of blood and debris.[5] Under endoscopic guidance, a partial ethmoidectomy was performed to remove a nasal tumour from a cat without major complications and no recurrence was observed for 15 months.[19] This technique would have been very challenging in the present case because of the tumour's location and the specialised equipment required.

Nasal hydropulsion may represent an appropriate palliative, last-resort treatment of obstructive nasal carcinomas in cats, when radiation therapy or surgery is not affordable, available or desired.[20] This technique was repeated four times in a cat, allowing a long-term survival of 12 months with minor complications.[20]

The use of chemotherapy alone for nasal carcinomas has never been described. Surgical drainage, piroxicam

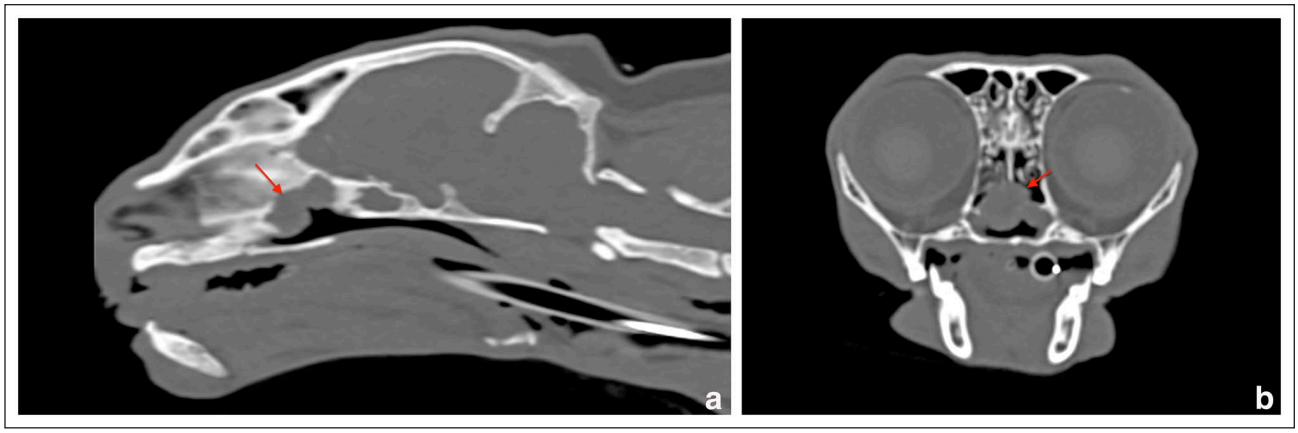

Figure 9 CT imaging of the head: (a) sagittal section and (b) transverse section. The arrows indicate the recurrence of a mass at the caudoventral part of the nasal cavities and the nasopharynx 10 months after the first surgical procedure

and chemoembolisation for the treatment of a cat with a cystic nasal adenocarcinoma allowed a 2-year survival (but only 50 days after chemoembolisation).[21] The use of piroxicam could have been interesting in the present case but the antitumour effect is unknown in cats.

Conclusions

Repeated surgical resections of a nasopharyngeal adenocarcinoma were achieved using a ventral rhinotomy approach and significantly improved clinical signs for 16 months without respiratory disorders in the 10-year-old cat described in this case report. Clean margins cannot be obtained and recurrence of nasopharyngeal adenocarcinoma was expected after ventral rhinotomy. A large-scale study is necessary to confirm the therapeutic benefit of ventral rhinotomy on survival of cats with nasopharyngeal adenocarcinomas and to compare the outcome between surgery and radiotherapy.

Acknowledgements The authors would like to thank Marie Noëlle Lucas DVM, DipECVP for providing the photomicrographs of the biopsy sample.

Conflict of interest The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding The authors received no financial support for the research, authorship, and/or publication of this article.

Ethical approval The work described in this manuscript involved the use of non-experimental (owned or unowned) animals. Established internationally recognized high standards ('best practice') of veterinary clinical care for the individual patient were always followed and/or this work involved the use of cadavers. Ethical approval from a committee was therefore not specifically required for publication in *JFMS Open Reports*. Although not required, where ethical approval was still obtained, it is stated in the manuscript.

Informed consent Informed consent (verbal or written) was obtained from the owner or legal custodian of all animal(s) described in this work (experimental or non-experimental animals, including cadavers, tissues and samples) for all procedure(s) undertaken (prospective or retrospective studies). No animals or people are identifiable within this publication, and therefore additional informed consent for publication was not required.

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