Oral Squamous Cell Carcinoma in a Budyonny horse: A case report

Seyed Mahdi Ghamsari[a], Omid Azari[a*], Fariborz Moayer[b], Ali Rostaei[a] ,Seyedeh Houra Mortazavi[c]

[a] Department of Surgery and Radiology, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran

[b]Department of Pathobiology, Faculty of Veterinary Medicine, Islamic Azad University, Karaj Branch, Karaj, Iran

[c] Student of Veterinary Medicine, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran

Corresponding author: Dr. Omid Azari
Postal address: Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran
University/organization email address: Omid.azari@ut.ac.ir
ORCID ID: 0009-0000-9975-8476
Tel. number: +98(91)2318-5781

Abstract

Squamous cell carcinoma (SCC) is a cancerousgrowth originating from the stratified squamous epithelium and is the most frequentlydiagnosed oral tumor in horses. This case report describes the clinical and histopathological characteristics of gingival SCC in a 23-year-old Budyonny horse with a history of multiple ineffective treatments, including an unsuccessful tumor excision attempt. The horse presented with a large, space-occupying soft tissue mass, excessive drooling, and lateral tongue protrusion. Laboratory findings were consistent with cancer-related anemia, and diagnostic imaging revealed extensive mandibular bonelysis due to the tumor's destructive nature. Histopathological examination confirmed the diagnosis of gingival SCC, characterized by keratin pearl formation and a high mitotic index. The owner declined further intervention owing to the poor prognosis and high treatments costs associated with the condition, and the horse died 6 months after presentation. This case highlights the challenges of managing advanced gingival SCC in equines and underscores the need for early detection and intervention.

Keywords

Equine, Oral Tumor, Squamous Cell Carcinoma

Abbreviations

SCC: squamous cell carcinoma

OSCC: oral squamous cell carcinoma

EDTA: Ethylenediaminetetraacetic Acid

WBC: White Blood Cell

Hct: Hematocrit

H&E staining: hematoxylin and eosin staining

Introduction

Squamous cell carcinoma (SCC), marked by the abnormal and rapid proliferation of the stratified squamous epithelium [1], is recognized as the second most common tumor and the most prevalent primary oral neoplasm in horses [2]. SCC tumors typically grow slowly but may sometimes exhibit a more rapid clinical course [1]. They initially exhibit a tendency for proliferation; however, they typically evolve into a highly destructive form, characterized by significant ulceration and extensive infiltration into surrounding tissues[1,3]. Oral squamous cell carcinoma (OSCC) is a malignant neoplasm originating from the oral keratinocytes within the stratified squamous epithelium, predominantly impacting the oral mucosa. This report outlines the clinical, histopathological, and imaging features of a significant, invasive grade III OSCC tumor observed in a gelding.

Case Presentation

History:A 23-year-old Budyonny gelding was brought to the Veterinary Teaching Hospital at the University of Tehranwith a large, space-occupying soft tissue mass in the rostral mandible, which impeded a complete examination of the mouth. The owner's statements reported that the mass had appeared following the extraction of a loose the left lower canine tooth several months ago. The owner complained of the rapid and aggressive growth of the mass and a persistent fetid odour, despite previous surgical and medical treatments. The initial

treatments included cleaningthe tooth extraction sitewith salt and disinfecting with chlorhexidine, diluted betadine solution and co-trimoxazolefollowing the development of the mass; however, it hadproven resistant to all therapeutics.

Clinical findings: The results of the clinical examination were found to be within normal parameters, with a rectal temperature of 37.6°C, a heart rate of 35 beats per minute, and a respiratory rate of 12 breaths per minute.The patient was able to defecate and urinate without difficulty. Upon close observation and palpation, a tumourwasidentified on the dental alveolus of the right mandibleaccompanied bya large fistula connecting the oral cavity to the cutaneous aspect of the intermandibular space. Additionally, suppurative discharge was observed at the defect site, resulting in excessive drooling and lateral protrusion of the tongue (Figure1.A,B).Despite these findings, the patient's body condition remained good, with no significant loss of weight or appetite.

Laboratory findings: Blood samples were obtained from the jugular vein using vacuum tubes containing 10% EDTA for the assessment of complete blood count parameters and plasma protein concentrations.The results of the blood sample were as follows: Haemoglobin8.6g/dL, Red blood cells5.2× 10^6/µL,Hct27%, WBC 12800 /µL,Band neutrophils640/µL, segmented neutrophils 10800 /µL, lymphocyte 1280/µL, monocyte 128/µL, and Fibrinogen0.4g/dL. The haematological profile was indicative of normocytic normochromic anaemia, possiblysecondary to cancer (i.e., cancer-related anaemia). Furthermore, a relatively elevated band neutrophil count with a degenerative left shift was observed, suggesting a systemic inflammatory response [4].

Diagnostic imaging findings: Lateral and dorsoventral views of the mandible demonstrated severe mandibular bone lysis between the incisor and premolar check teeth, along withsignificant bone proliferation in the soft tissue mass distal to the mandible (Figure1.C). These radiographic findings raised suspicions of neoplasia.

Histopathological findings:A preliminary mass biopsy was performed with the horse in a standing position under sedation (xylazine 2%,0.5mg/kg) and local analgesia (lidocaine 2%). The tissue samples were subsequently preserved in 10% neutral buffered formalin, processed accordingly, embedded in paraffin, sectioned to a thickness of 5µm, and stained using Hematoxylin and Eosin. Following this, the slides were analysed under a light microscope. (Olympus,CX33). Histopathological analysis of the specimens indicated the presence of grade III oral squamous cell carcinoma (OSCC), characterized by tumor development originating from peripheral basal-like cells. This progression occurred through the layers of the stratified squamous epithelium, ultimately resulting in the formation of a central keratin pearl due to keratinization. (Figure2.A). There was also a transition from intact, viable-appearing OSCC tumor cells to areas of necrosis, characterized by a loss of structural integrity and replacement with eosinophilicproteinaceous material and cellular debris (Figure2.B). Additionally, small blood vessels were observed near the tumour cells with inflammatory cellsmarginating along the endothelial surfaces. The tumour cells displayed significant nuclear polymorphism, indicating a moderately to highly abundant number of mitotic cells, with the mitotic count ranging from 5 to 9 per high-power field. Furthermore, lymphovascular invasion was present, as the tumour cells were identified within endothelial-lined spaces (lymphatics or blood vessels).

Given the patient's condition, a rostral hemimandibulectomy was recommended;however, the owner declined the procedure because of the poor prognosis,high surgical costs, and emotional considerations. Unfortunately, our follow-up revealed that the patient died 6 months after presentation.

Results and Discussion

This study describes the clinical, laboratory, and histopathologicalfeatures of an invasive case of OSCC in a 23-years-oldBudyonny horse, highlighting the challengesofmanaging and treating oral cavityneoplasia in horses.

SCC is a cancerous growth that originates from epithelial cells derived from either ectodermal or endodermal tissues[5]. OSCChas been documented in avariety of specious, including horses, cattle, sheep, goats, rats, hamsters, rabbits, ferrets, hedgehogs, as well as several other laboratories, domestic and wild animals[6]. SCC ranks among the three most prevalent oral cancers in dogs and is the most frequently occurring oral cancer in cats[7]. Equine SCC primarily arises from the genitalia, ocular and periocular tissues, and stomach;less frequently, it appears in locations such as the oesophagus, skin, hard palate, arytenoid cartilage, guttural pouch, maxillary sinus, perineal tissues, peritoneal cavity, maxilla, lymph nodes, nasal cavityandmucosal surfaces (including the gingiva, tongue, larynx, pharynx, and palate)[3,8,9]. OSCCis the most prevalent primary neoplasm found in horses; however, it is still considered a relatively uncommon condition within the oral cavity, representing merely 7% of all equine cases of SCC [2,10].Nonpigmented regions of the skin, especially those subjected to elevated ultraviolet light exposure, exhibit a greater vulnerability to the development of oral squamous cell carcinoma (OSCC). For instance, mucocutaneous junctions are frequently affected in areas beyond the oral cavity[11].Older horses have a higher susceptibility to OSCC, and in the present case, the patient was 23 years old, which increased its susceptibility to the disease. The exact pathogenesis of OSCC in horses remains unclear[1].

The simultaneous presence of long-standing infection or granulation tissue proliferation can complicate the accurate diagnosis of mandibular tumors[12].Differential diagnoses for equines OSCC encompass a range of conditions, including equine sarcoid, papilloma, mast

cell tumor, exuberant granulation tissue, habronemiasis, phycomycosis, cutaneous lymphoma, melanoma, ossifying fibroma, hemangiosarcoma, myxomatous tumors, salivary adenocarcinoma, and basal cell carcinoma[11,12,14,15].

Radiography is a valuable tool for evaluating the extent of a mass; however, its presentation may vary considerably.In our study, radiographic findingssuggestedneoplasia, as indicated by severe mandibular bonelysis and irregular periosteal reactions. Other potential differential diagnoses to consider include apical sepsis, osteomyelitis, and trauma[5]. Computed tomography may be helpful in differentiatingvarious forms of SCC in the skull from other abnormalities. Unfortunately, we were unable to perform computed tomography on our patient, as the horse passed away at a considerably distant location from our facility.

Histopathological tumor grading entails the assessment of cellular anaplasia in samples collected via biopsy or surgical excision. In summary, well-differentiated SCC (grade I) exhibits minimal atypia in basal or parabasal cells. In contrast, poorly differentiated SCC tumours (grade III) show little to no architectural or cellular resemblance to normal tissue. Grade II includes tumours that fall between the criteria for grade I and grade III[7]. The histologic and hematologic results of this case were described above.In the case described herein, the gelding presented with a large, destructive mass accompanied by infection, granulomatous tissue, and a discharging sinus tract containing purulent material.

Definitive diagnosis requires biopsy specimens from both the neoplastic tissue and the marginal zone, which are then prepared for histopathological examination.In the present case,histopathologyrevealed grade III OSCC.It is advisable to perform fine needle aspiration (FNA) or biopsy of the regional lymph nodes to assess the possibility of metastasis.However, in horses with oral neoplasia, mandibular lymphadenopathy is often caused by reactive inflammation rather than metastatic disease; thus, the results of lymph node biopsy or FNA are not always conclusive for metastases[1,11]. A retrospective study of 114 horses with

penile and preputial neoplasms reported that metastasis was most frequently confirmed in grade III tumors[13]. In this case, the owner declined any further diagnostic procedures, and therefore, no evidence of lymph node metastasis was available.

Successful treatment depends on many factors but mostly related to mass including type, size and accessibility[8].Multiple strategies have been suggested for the treatment of SCC, encompassing surgical intervention, cryotherapy, hyperthermia, radiotherapy, chemotherapy, and photodynamic therapy. The success of these treatment options varies by tumour aggressiveness, accessibility, and chronicity[11].Tumors located in the rostral oral cavity are often easier to treat since they are typically detected early and can be excised surgically or accessed for intralesional chemotherapy andradiotherapy. Although surgical excision has been shown effective in treating OSCC, achieving complete removal is often challenging, particularly in difficult-to-access locations, where complete excision may be impossible. Consequently, recurrence rates following these surgical interventions remains notably high[1,10]. In the case presented here, the extensive nature of the lesion, coupled with a secondary infection, significantly worsened the prognosis. As a result, the owner declined treatment owing to the associated risks and opted to allow the patient to out its remaining time in its current condition. This decision was made despite medical recommendations forpain management and surgical intervention.OSCCtypically presents a challenging prognosis for resolution, particularly when the disease has metastasized to regional lymph nodes. This progression significantly deteriorates the overall outlook and may impact the decision-making process regarding the commencement of treatment[8,11,16],whichmay affect the decision to commence treatment.These tumours extensivelyinfiltrate surroundingtissues, including bone, andmay metastasize to local lymph nodesand the lungs, compounding the unfavourable prognosis for effective treatments.

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Figure 1. Grossand radiographic images, **(A)** A prominent mass at the site of the labial gingiva in the oral cavity. **(B)** A discharging sinus tract with purulent material and pus underneath.**(C)**Lateral radiograph of the rostral aspect of the mandible,demonstrating severe osteolysis associated with squamous cell carcinoma.

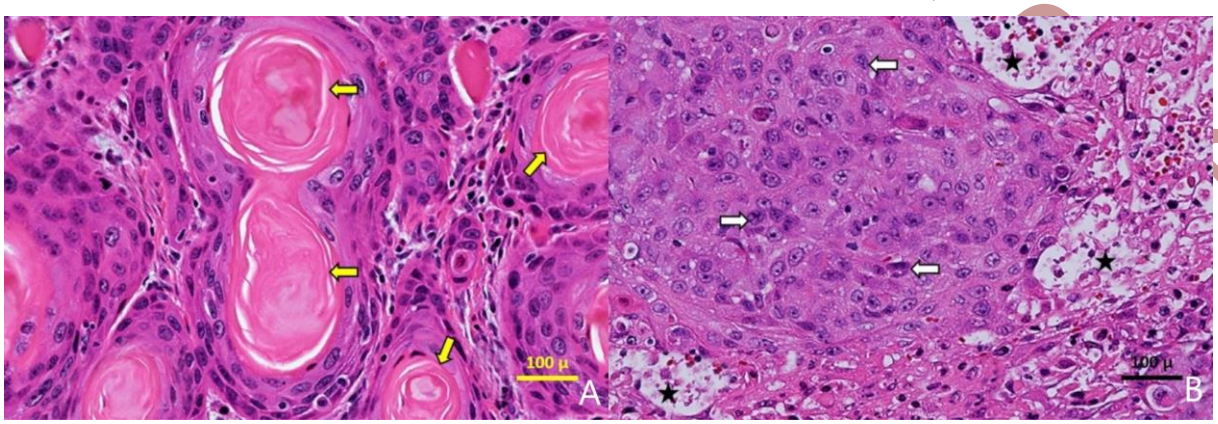

Figure 2. Histopathological images, **(A)**clusters of well differentiated malignantsquamous epithelial cells showing progression from peripheral basal like cells through stratified squamous epithelium with keratinization forming a central keratinpearl(yellow arrow) - H&E stain, 40X objective. **(B)**Tumour cells (white arrow) with mitotic figures and pleomorphism, areas of necrosis (*) characterized by loss of structure and replacement with eosinophilic (pink) proteinaceous material and cellular debris - H&E stain, 40X objective.

کارسینوم سلول سنگفرشی دهان در اسب بودونی: گزارش موردی

نویسندگان:

سید مهدی قمصری[1]، امید آذری[1]، فریبرز معیر[2]، علی روستایی[1]، سیده حورا مرتضوی[3]

[1] گروه جراحی و تصویربرداری تشخیصی، دانشکده دامپزشکی دانشگاه تهران، تهران، ایران

[2] گروه پاتوبیولوژی، دانشکده دامپزشکی دانشگاه آزاد اسلامی، واحد کرج، کرج، ایران

[3] دانشجوی دکتری حرفه‌ای، دانشکده دامپزشکی دانشگاه تهران، تهران، ایران

نویسنده مسئول: دکتر امید آذری

آدرس پستی: دانشکده دامپزشکی دانشگاه تهران، تهران، ایران

ایمیل سازمانی: Omid.azari@ut.ac.ir

شماره تلفن: +98(91)2318-5781

خلاصه فارسی:

کارسینوم سلول-سنگفرشی (Squamous Cell Carcinoma) یک نئوپلازی بدخیم است که از اپیتلیوم سنگفرشی مطبق ناشی می‌شود و به‌عنوان شایع‌ترین تومور دهان در اسب‌ها شناخته می‌شود. این گزارش موردی، ویژگی‌های بالینی و بافت‌شناسی یک کارسینومای سلول سنگفرشی لثه را در یک اسب بودیونی ۲۳ ساله با سابقه درمان‌های ناموفق متعدد، از جمله تلاش ناموفق برای برداشت تومور توسط جراحی ، توصیف می‌کند. این اسب با یک توده نرم وسیع، ترشح بیش از حد بزاق و بیرون افتادن زبان به جانب به بیمارستان ارجاع شد. یافته‌های آزمایشگاهی حاکی از آنمی مرتبط با سرطان بود و بررسی های تصویربرداری تشخیصی، تخریب استخوان فک پایین و ماهیت مخرب توده را نشان داد. بررسی بافت‌شناسی تشخیص کارسینومای سلول سنگفرشی لثه را تأیید کرد که با تشکیل مرواریدهای کراتینی و شاخص میتوتیک بالا مشخص می‌شود. صاحب اسب به دلیل پیش آگهی ضعیف و هزینه‌های بالای درمان، از مداخلات درمانی بیشتر صرف‌نظر کرد و این اسب ۶ ماه پس از مراجعه تلف شد. در این گزارش، به چالش‌های مدیریت کارسینومای سلول سنگفرشی پیشرفته لثه در اسب‌ها و اهمیت تشخیص زودهنگام این عارضه و مداخله درمانی مناسب را مورد بررسی قرار می‌گیرد.

واژگان کلیدی: اسب، محوطه دهانی، تومور، کارسینوم سلول سنگفرشی