

Postoperative care and long-term follow-up after a rostral mandibulectomy to treat an ossifying fibroma in a horse

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ABSTRACT: *Ossifying fibroma is a disfiguring benign neoplasia of the jaw that affects young animals of several species, including horses. The present report described the postoperative care and long-term follow-up after a rostral mandibulectomy (RM) that was performed to treat an ossifying fibroma in a horse. A 3-year-old crossbred horse presented a hard, well-defined, 14.5×10.0×9.5cm ulcerated mass attached to the rostral mandible. Radiographic findings were compatible with a nonaggressive mandibular bone deformity (benign neoplasia). Histological features confirmed the diagnosis of the ossifying fibroma. After the RM, the horse slowly adapted to the new feeding conditions and was discharged when it fully recovered and was capable of feeding on the paddock and drinking water on its own on day 60. This slow adaptation was crucial for post-surgical recovery and required hard labor to manage the feeding and hydration by nasogastric tube during the hospital stay.*

Key words: benign neoplasia, mandibular growth, postoperative adaptation, rostral mandible.

Cuidados pós-operatórios e acompanhamento a longo prazo após mandibulectomia rostral no tratamento de fibroma ossificante em um equino

RESUMO: *Fibroma ossificante é uma neoplasia benigna desfigurante da mandíbula, que afeta animais jovens de várias espécies, incluindo equinos. O presente relato descreve os cuidados pós-operatórios e o acompanhamento a longo prazo após mandibulectomia rostral (MR) no tratamento de um fibroma ossificante em um equino. Um cavalo mestiço de três anos de idade apresentou massa ulcerada, dura, bem definida, medindo 14,5x10x9,5cm, contígua à mandíbula rostral. Os achados radiográficos foram compatíveis com uma deformidade óssea mandibular não agressiva (neoplasia benigna). As características histológicas confirmaram o diagnóstico de fibroma ossificante. Após a MR, o equino adaptou-se lentamente às novas condições de alimentação e recebeu alta clínica totalmente recuperado, sendo capaz de se alimentar em piquetes e beber água por conta própria, no 60º dia. Esta lenta adaptação foi crucial para recuperação pós-cirúrgica e exigiu trabalho árduo no manejo da alimentação e hidratação por meio de sonda nasogástrica durante o período de internação hospitalar.*

Palavras-chave: adaptação pós-cirúrgica, crescimento mandibular, mandíbula rostral, neoplasia benigna.

An ossifying fibroma is a proliferative, fibro-osseous, tumor-like lesion that develops most commonly in the rostral mandible causing distortion of the lip and adjacent teeth. This neoplasia occurs more often in horses younger than one year of age (ROBBINS et al., 1996; SPONSELLER et al., 2006; CRIJNS et al., 2015), but has been reported in several other species (ROGERS & GOULD, 1998; McCAULEY et al., 2000). Unilateral rostral maxillectomy and bilateral rostral mandibulectomy (BRM) with adequate margins have been considered curative surgical procedures and the best approaches to treat this neoplasia (AUER, 2006; WITTE, 2014). Radiation alone has also been reported to be successful (ROBBINS et al., 1996) and may be helpful as an

adjuvant therapy in cases of incomplete surgical resection (WITTE, 2014). Although, successful BRM has already been performed in horses and is described in the literature (AUER, 2006; SPONSELLER et al., 2006; DIXON & REARDON, 2015), these reports fail to mention any complications or the difficulty of the horse to adapt and feed properly after surgery. Therefore, this case report describes the postoperative care and long-term follow-up after BRM involved in the treatment of an ossifying fibroma in a horse.

A 3-year-old crossbred horse, weighing 230kg, had a large mandibular mass evaluated. Medical records and information from the owner revealed that dogs had attacked the foal when he was 2 months old causing lacerations in the lips and gum, and complete

mandibular fracture. At the time, osteosynthesis was performed with transcortical pins and external fixation. Seventy days later, the foal presented with an exuberant gingival tissue growth in the rostral mandible. The foal underwent surgery and the mass was debulked, but no histopathological exam was performed. Two years later, the mandibular growth had increased substantially causing lip distortion and difficulty feeding (Figure 1A and 1B). Physical examination revealed that the horse was alert with a moderate body condition score (scale 5 of 9; HENNEKE et al., 1983). The only change, restricted to the oral cavity, was the presence of a hard, well-defined, ulcerated mass attached to the rostral mandible. The horse showed no signs of pain upon palpation or manipulation of the mass. Size of the mass hampered adequate mouth opening and oral exploration. Results of hematological analysis (erythrogram and leukogram evaluation) and serum biochemistry

(serum urea, creatinine, total protein, and albumin concentrations, along with alanine aminotransferase, aspartate aminotransferase, and glutamyl transferase activity) showed no significant abnormalities.

A ventrodorsal (intraoral) radiograph (Figure 1C) of the rostral mandible showed a well-defined osseous mass with intense radiopaque areas and different degrees of ossification, visualized as dispersed radiolucent points inside the mass. Laterolateral radiograph (Figure 1D) showed a single pedunculated well-margined bony proliferation with a delimited transition zone, a distance of 3cm from premolar teeth 306 and 406. The four mandibular incisors (301, 302, 303 and 401) and the right canine (304) were not seen in the radiographic examination. Periodontal ligaments appeared radiographically normal. These radiographic findings were consistent with a nonaggressive mandibular

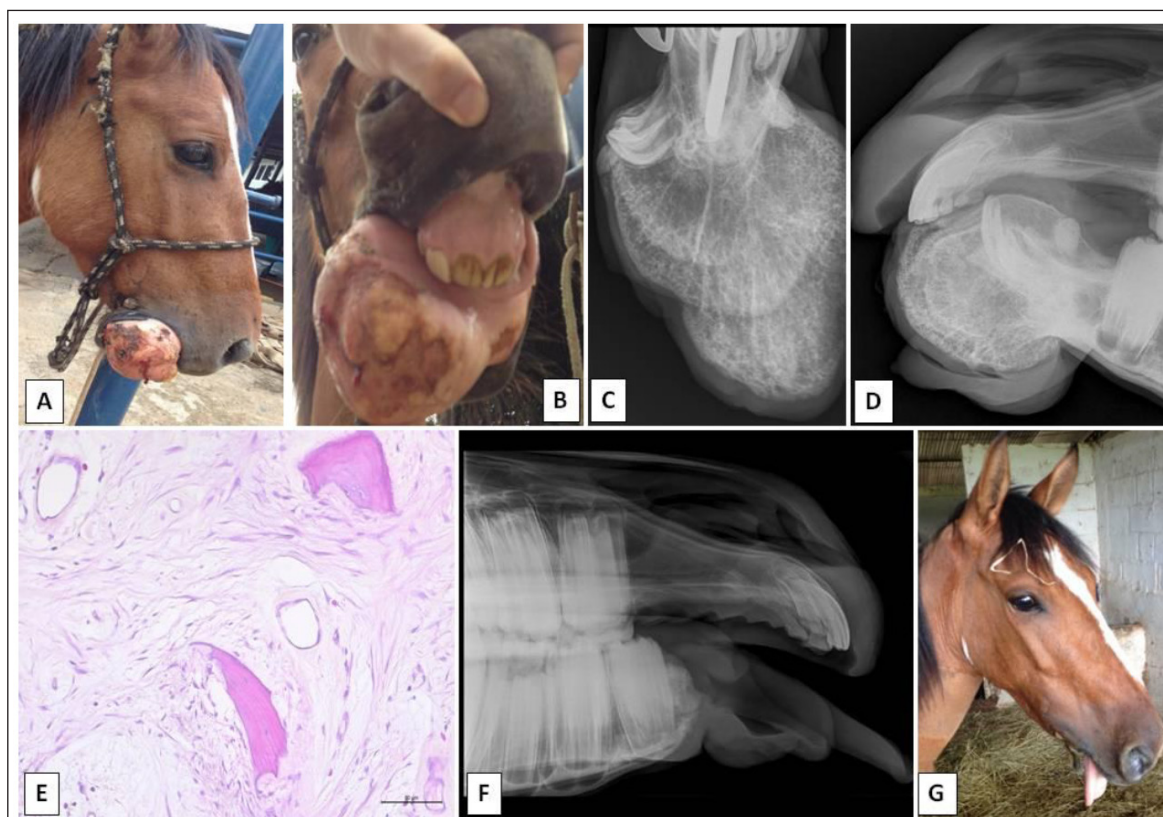


Figure 1 - A, B. Lateral and frontal aspect of the mandibular mass causing lip distortion and feeding difficulty in a 3-year-old crossbred horse. C, D. Intraoral and laterolateral radiographs of the mandibular mass presenting a well-defined osseous mass with intense radiopaque areas and different degrees of ossification. E. Notice the unencapsulated, infiltrative, and moderately cellular neoplastic mass composed by fibroblasts and numerous irregular trabecular bone containing osteocytes, osteoblasts, and osteoclasts (H&E, Bar = 80µm). F. Laterolateral radiograph showing the absence of the rostral mandible and bone remodeling at the mandibular stumps forming the fibrous-osseous union (45 days post surgery). G. The horse at 60 days postoperatively showing tongue protrusion as the only cosmetic sequelae.

bone deformity (benign neoplasia) and/or mineralized mass (dystrophic calcification) of the rostral aspect of the mandible. Based on the horse's medical history, physical evaluation, and radiographic findings, the tentative diagnosis was a benign mandibular neoplasia as an ossifying fibroma, while osteoma and fibrous dysplasia were considered as the differential diagnoses. Therefore, the mass was surgically removed and sent for pathological examination.

The horse underwent general anesthesia in dorsal recumbence. After routine pre-operative preparation, mandibular nerves were blocked with ropivacaine^a (0.6mg kg⁻¹) and ketamine^b (0.2mg kg⁻¹). The surgical procedure followed the recommendations of AUER (2006). A transverse incision was made in the oral mucosa on the lingual side of the incisors. The gingiva was incised on the labial surface of the incisors ventrally to the lesion, continued laterally and dorsally on both sides, 2cm from premolar teeth 306 and 406. Both incisions were thus connected and continued down to the bone on the mandibular symphysis. Soft tissues were elevated and reflected caudally with a periosteal elevator on the mandibular symphysis to expose the normal bone. Then, a sterile saw wire^c was used to transect the mandible. The mandibular stumps were rounded and the soft tissue on the lingual surface of the mandible was folded rostrally over the exposed mandible and closed with simple, interrupted, 2-0 polyglycolic acid sutures. After that, the incisions on the lingual and labial mucosa were closed with simple, separated, 0 polyglycolic acid sutures. Postoperative antibiotic therapy consisted of ceftiofur^d (4.4mg kg⁻¹, intravenous [IV], once a day [*s.i.d.*], 7 days). In addition, the anti-inflammatory and analgesic therapies consisted of flunixin meglumine^e (1.1mg kg⁻¹, IV, *s.i.d.*, 5 days) and dipyrone^{vi} (20mg kg⁻¹, IV, *b.i.d.*, 3 days). Oral lavage with 0.12% chlorhexidine solution^f was performed twice daily for 20 days.

After removal, a 14.8×11.5×10.0cm fragment of the mandible was sent for pathological examination. It contained a hard, ulcerated, well-defined mass measuring 14.5×10.0×9.5cm with whitish to brownish coloration. After dissection, the mass had an irregular, heterogeneous features, and whitish coloration, consistent with osseous tissue. Samples were taken from the mass, fixed in formalin, decalcified, and sent for further histopathological analysis. Microscopically, an unencapsulated, infiltrative, and moderately cellular neoplastic mass, which sharply expanded the lamina propria and adjacent tissues, was observed. The mass was composed of well-differentiated contiguous clusters

of mesenchymal cells (fibroblasts) and joined merged by numerous irregular trabecular bone containing osteocytes surrounded by osteoblasts and osteoclasts (Figure 1E). The histological features confirmed the diagnosis of an ossifying fibroma.

Postoperatively, the horse could not feed properly or drink water. Therefore, enteral feeds by a nasogastric tube were initiated five times a day (a blended mixture of 5 liters of grass tips, pelleted ration, and water). Despite the enteral feeds, the horse lost approximately 40kg during the first 15 days. In this period, the mandibular swelling gradually diminished and the horse was able to capture grass tips and pelleted rations. The feeding management consisted of 5cm grass tips (*Pennisetum purpureum*) and amounts of Tifton grass (*Cynodon dactylon*) placed in a 25cm depth feeder to facilitate food capture. Pelleted rations (1kg) were offered four times daily in the same feeder. Concomitantly, the number of nasogastric intubations also diminished gradually, but nasogastric hydration remained. During this period the horse began to gain weight. On day 30, in order to stimulate water ingestion, the horse was deprived of water for 8h and given 15g of oral electrolyte paste^g. Then a volumetric bucket with water was offered to measure the amount of ingested water. In the first attempt, the horse began to drink water on its own (approximately 8 liters). Therefore, the horse was accompanied for one more month and discharged fully recovered 60 days postoperatively. The owner was advised to continue with the feeding management and offer water *ad libitum*. During the hospitalization, the formation of a fibrous-osseous union connecting the mandibular branches was observed (Figure 1F). The only cosmetic sequelae was tongue protrusion (Figure 1G). A new evaluation was performed 12 months after surgery. The horse gained more weight (280kg and body condition score 6 - moderately fleshy) (HENNEKE et al., 1983) and presented no signs of tumor recurrence. A dental examination revealed an overgrowth of the upper incisors and some premolars and molars with dental tips that were properly trimmed. Clinical evaluation of the jaw showed enlargement of the mandibular stumps forming a wider fibrous-osseous union connecting the mandibular branches. The owner stated that the horse is leading a normal life and can also capture short grass in the paddock by itself.

An ossifying fibroma is a disfiguring benign tumor of the jaw that affects young animals of several species (ROGERS & GOULD, 1998). Although, benign and painless, it expands progressively and may interfere with chewing, leading to decreased

food consumption and weight loss. The mass distorts the normal contour of the affected bone resulting in displacement or loss of teeth, disruption of mastication, or obstruction of airflow through the nares (McCAULEY et al., 2000). The present report is consistent with the characteristics of ossifying fibromas since the horse was referred after a 2-year progression when it presented with difficulty feeding and initial weight loss.

Radiography is the most commonly used ancillary diagnostic technique to investigate mandibular growths and, in particular, to help differentiate between mandibular swellings caused by apical infections, traumatic lesions, and growths (DIXON & REARDON, 2015). Lateral, ventrodorsal, and intraoral radiographs of masses of the skull and mandible are necessary to determine precise location within the bone, extent of bony involvement, margination of the lesion, and the presence or absence of a periosteal reaction or bone lysis (McCAULEY et al., 2000). In this particular case, radiographic findings were compatible with a nonaggressive mandibular bone deformity (benign neoplasia) and surgical margins could be precisely planned. The use of computed tomography can greatly help the diagnosis of such lesions, especially to determine the size of the growth and margins, which are important parameters when surgical treatment and/or radiotherapy are planned (CRIJNS et al., 2015; DIXON & REARDON, 2015). In the future, we hope that this technology will be more accessible to veterinary hospitals worldwide.

This report presents an unusual case, in which the foal was submitted to a mandibular fracture repair, removal of loose incisive teeth, and wound debridement. Subsequently, there was progressive mandibular growth. There are no risk factors associated with ossifying fibromas in horses since the prevalence of mandibular growths in the general equine population is unknown (DIXON & REARDON, 2015). The possibility that previous and repetitive trauma predisposes to the occurrence of ossifying fibromas could not be dismissed and should be investigated.

Successful treatment is especially dependent on early detection and immediate treatment, which helps facilitate complete removal of the growth without affecting the functional integrity of the mandible (AUER, 2006; SPONSELLER et al., 2006). Because of the 2-year progression and the size of the neoplasia, the BRM reached 2cm from premolar teeth 306 and 406. Stabilization of the remaining mandible was a concern and placement of orthopedic devices was too complex. Nevertheless,

a fibro-osseous union of the transected margins was obtained during hospitalization. In the literature, several authors stated that horses can survive with few sequelae following BRM (AUER, 2006; SPONSELLER et al., 2006; DIXON & REARDON, 2015), but there are no reports on the difficulties of adapting to new feeding and drinking conditions. This slow adaptation was the crucial post-surgical complication and required hard labor to manage the nasogastric feeding and hydration associated with the length of the mandible transected.

SOURCES AND MANUFACTURES

- a - Cetamin — Syntec, Santana da Parnaíba, São Paulo, Brazil.
- b - Ropi — Cristal Pharma, Contagem, Minas Gerais, Brazil.
- c - Bovivet saw wire — Jørgen Kruuse A/S, Langeskov, Denmark.
- d - Topcef — Eurofarma, Itapevi, São Paulo, Brazil.
- e - Flunixin Injetável UCB — Uzinias Químicas Brasileiras, Jaboticabal, São Paulo, Brazil.
- f - Febrax — Lema-InjexBiologic, São Paulo, Brazil.
- g - Periovet — Vetnil, Louveira, São Paulo, Brazil.
- h - Eletrolítico Booster JCR — Vetnil, Louveira, São Paulo, Brazil.

BIOETHICS AND BIOSECURITY COMMITTEE APPROVAL

We, authors of the article titled “Postoperative care and long-term follow-up after rostral mandibulectomy to treat an ossifying fibroma in a horse,” declare, for all due purposes, that the project that gave rise to the present data of the same has not been submitted for evaluation to the Ethics Committee of the Universidade de Brasília (UnB), but we are aware of the content of the Brazilian resolutions of the Conselho Nacional de Controle de Experimentação Animal (CONCEA) <<http://www.mct.gov.br/index.php/content/view/310553.html>> if it involves animals.

Thus, the authors assume full responsibility for the presented data and are available for possible questions, should they be required by the competent authorities.

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