

Modified technique for lateral resection of the ear canal in six horses with auricular stenosis

Técnica de ressecção lateral do conduto auditivo modificada para o tratamento de estenose auricular em seis equinos

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ABSTRACT: The external ear extends from the pinna to the tympanic membrane, where it is supported and shaped by an arrangement of cartilages including the conchal, annular, scutiform, and external acoustic meatus. Environmental exposure can often lead to diseases of the external ear canal in animals. In horses, otitis primarily occurs due to infestation by ectoparasites, promoting local inflammation and infection. Chronic conditions can result in ear deformation, including auricular canal stenosis. While operative techniques for treating auricular stenosis are known, they are limited to companion animals, with few reports on horses. This study aimed to describe the modified lateral resection technique of the ear canal, which is commonly performed in small animals, for treating auricular canal stenosis in six horses. As a methodology, the intertragic notch was used as a reference for the incision due to species disparity. The ear canal cartilage was dissected, followed by resection of the lateral wall and the cartilaginous flap adhered to the skin. Excess skin was removed, and the ear canal was sutured to the skin with nylon thread. Our results indicated a significant improvement in the treatment of otitis in the treated horses, demonstrating a favorable evolution in the healing process and resolution of bacterial infections in all cases. In conclusion, the use of the modified lateral resection technique of the ear canal was successful in all six treated horses, providing access to clinical treatment of the canal without any occurrences of recurrence or postoperative complications.

KEYWORDS: Ear canal; external ear; ectoparasites; otitis; reconstructive surgery.

RESUMO: A orelha externa se estende desde a pina até a membrana timpânica, onde sua sustentação e forma são garantidas pela disposição das cartilagens conchal, anular, escutiforme e meato acústico externo. Animais frequentemente apresentam doenças do canal auricular externo devido à exposição ambiental. Em equinos, a otite ocorre principalmente pela infestação de ectoparasitas favorecendo a inflamação e infecção local, que em condições crônicas, pode proporcionar deformações do ouvido, incluindo a estenose do canal auricular. Apesar de conhecidas, as técnicas operatórias indicadas na abordagem terapêutica de estenoses auriculares se limitam às espécies de animais de companhia, sendo escassos os relatos em equinos. Objetivou-se com esse trabalho descrever a técnica modificada de ressecção lateral do conduto auditivo, amplamente realizada em pequenos animais, no tratamento de estenose do canal auricular em seis equinos. Como metodologia, devido a disparidade entre espécies, utilizou-se a incisura intertrágica como referência para a incisão. Realizou-se a dissecação da cartilagem do canal auditivo, seguido pela ressecção da parede lateral e do retalho cartilaginoso aderido à pele. Foi removido o excesso de pele e suturado o canal auditivo à pele com fio de nylon. Os resultados obtidos indicaram melhora significativa na condução do tratamento de otite dos equinos tratados, demonstrando evolução favorável no processo de cicatrização e resolução das infecções bacterianas em todos os casos. Concluiu-se que a utilização da técnica de ressecção lateral do canal auditivo foi bem-sucedida nos seis animais tratados deste trabalho, promovendo o acesso para tratamento clínico do conduto, sem ocorrência de recidiva ou complicações pós-operatórias.

PALAVRAS-CHAVE: Canal auricular; ouvido externo; ectoparasitas; otite; cirurgia reconstrutiva.

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INTRODUCTION

The ear (vestibulocochlear organ) is composed of highly organized cutaneous, nasopharyngeal, bony, and nervous tissues, and is a sensory organ of great importance in animal life (NJAA, 2018). It is divided into three main components: the external, middle, and inner ear (FAILS, 2019). The external ear is composed of various structures, including the pinna, a funnel-shaped cartilage, external acoustic meatus, and tympanic membrane separating the canal from the middle ear cavity. The pinna has a convex base attached to the external acoustic meatus, two faces, two edges, and an apex. The conchal, annular, scutiform, and external acoustic meatus cartilages provide support and shape to the external ear (FAILS, 2019; ELLENPORT, 1986).

Due to constant exposure to the external environment, numerous animals are brought to hospitals daily due to ear canal diseases such as traumas, infections, neoplasms, and primarily otitis (MCCARTHY; MCCARTHY, 1994). In horses, ear infestations by ectoparasites are common and can cause local inflammation and infection, known as otitis (REED; BAYLY, 2018), and in chronic conditions, the normally flexible auricular cartilage can become firm and deformed, including the stenosis of the external acoustic meatus (NJAA, 2018).

Clinical management is the first choice for treatment, including thorough cleaning of the ear canal and systemic and local therapy with antimicrobials and anti-inflammatories if necessary (WALKER et al, 2002). In small animals, surgical approaches are recommended for recurrent or chronic otitis, especially in cases of partial or complete auricular stenosis that prevents proper hygiene and treatment of the disease (MACPHAIL; FOSSUM, 2019).

Various surgical techniques have been described for the treatment of ear disease in dogs and cats (TOBIAS, 2010; MACPHAIL; FOSSUM, 2019), but reports on the use of this therapeutic approach in horses are scarce (ZWINGENBERGER; PARKS; DOWNS, 2002; FARIAS et al., 2014).

In small animals, lateral resection, vertical ablation, and total ablation of the ear canal are routinely used (MCCARTHY; MCCARTHY, 1994; MACPHAIL; FOSSUM, 2019). However, expectations of animal owners regarding surgical procedures should be considered. Total ablation of the ear

canal, for example, can reduce or maintain reduced auditory perception in the animal. Similarly, the aesthetic outcome of these techniques can cause auricular deformity (MACPHAIL; FOSSUM, 2019).

Lateral resection of the ear canal involves the removal of the lateral wall of the ear canal. This technique modifies the anatomical structure of the ear canal, allowing for access and drainage of its contents, as well as facilitating the application of topical medications (MCCARTHY; MCCARTHY, 1994). This approach can also be used to correct congenital lesions and resect auricular tumor masses (TOBIAS, 2010).

This study aimed to describe the modified lateral resection technique of the ear canal, which is used in small animals, for treating auricular canal stenosis diagnosed in six horses referred for hospitalization.

MATERIAL AND METHODS

Six adult horses (Table 1) were referred for hospitalization due to unilateral ear canal stenosis, associated or not with local infection. The animals had a history of ectoparasite infestation in the auricular pavilion (n=6), which progressed to left ear canal stenosis in all animals. The animals' mean age and weight were 14 ± 6 years and 290 ± 60 kg, respectively.

During the specific evaluation of ears in the clinical examination, total ear canal stenosis was observed on inspection and palpation in two horses (Figure 1A), while white-greenish purulent discharge was drained upon auricular manipulation in four animals with partial stenosis (Figure 1B).

As a therapeutic approach, surgical lateral resection of the ear canal was indicated, as all animals presented different degrees of auricular stenosis, which made effective topical treatment impossible.

The animals were subjected to an inhalation general anesthesia protocol and positioned in lateral recumbency with the affected ear facing up. After completing the trichotomy and antiseptics of the surgical area, including the auricular pinna and adjacent skin surface, the surgical technique described by MCCARTHY & MCCARTHY (1994); TOBIAS (2010); and MACPHAIL, FOSSUM (2019) in small animals was performed, modified due to anatomical differences between species.

Table 1. Individual clinical characteristics of horses diagnosed with ear canal infection and stenosis

Horse	Sex	Weight (kg)	Age (years)	Ectoparasite	Special physical examination of the ears
1	Male	300	20	Sim	Total stenosis of the left ear canal.
2	Male	310	8	Sim	Partial stenosis of the left ear canal and white-greenish purulent discharge.
3	Male	350	16	Sim	Partial stenosis of the left ear canal and white-greenish purulent discharge.
4	Female	336	8	Sim	Total stenosis of the left ear canal.
5	Female	230	20	Sim	Partial stenosis of the left ear canal and white-greenish purulent discharge.
6	Female	242	10	Sim	Partial stenosis of the left ear canal and white-greenish purulent discharge.

Two parallel skin incisions were made with a No. 23 scalpel blade on the ear canal, starting and ending at the intertragic notch and extending 1.0 cm ventrally to the palpable auricular cartilage base of the canal, in a “U” shape (Figure 2A). The skin and subcutaneous tissue were then separated with a blunt Mayo scissors, and the skin flap was flipped dorsally, allowing visualization of the lateral wall of the ear canal and part of the parotidoauricular muscle (Figure 2B).

After dissecting and identifying the ear canal cartilage, a hemostatic clamp was inserted to serve as a guide to make two parallel incisions in the cartilage, from the edge of the intertragic notch to the base of the canal, with a No. 23 scalpel blade. The incisions were completed with a straight Mayo scissors until the ventral aspect of the canal (Figure 2C).

After verifying the complete excision of the lateral wall of the canal, the lateral cartilaginous flap adhered to the skin was removed (Figure 2C), leaving only the intact skin tissue for tissue coverage. It was also necessary to remove excess skin, leaving only a flap enough to ventrally cover the ear canal opening.



Source: Author's collection.

Figure 1. Ear stenosis. A – Total stenosis of the ear canal. B – Partial stenosis of the ear canal.

After that, the ear canal epithelium was sutured to the skin with 0 nylon thread using a simple continuous suture pattern (Figure 2D). During the surgery, the canals were also washed with saline solution (0.9% NaCl).

After the surgery, systemic antibiotic therapy was instituted in all animals using sodium ceftiofur at a dose of 4.4 mg/kg intravenously once a day for seven days, as well as topical antibiotic therapy with sulfanilamide (1.0 g / 100 ml), three drops twice a day, also for seven days, and anti-inflammatory treatment with flunixin meglumine at a dose of 1.1 mg/kg intravenously for three days. Daily local cleaning was also performed using an antiseptic ear solution composed of 0.5 g of aqueous chlorhexidine and 100.0 ml of propylene glycol, as well as the application of a healing ointment until complete healing and suture removal, which was done ten days after the surgical procedure.

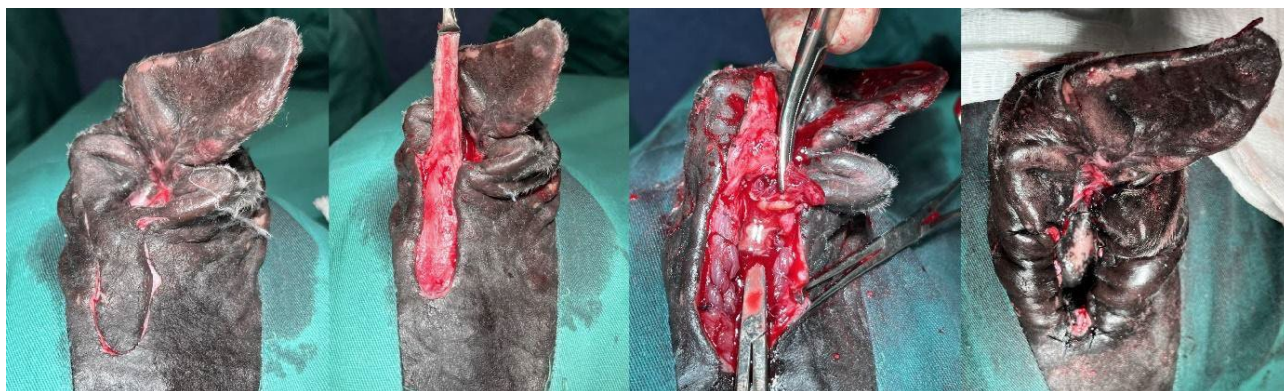
RESULTS

Through the modified technique of lateral resection of the ear canal, the animals that presented partial stenosis (n=5) achieved complete enlargement of the canal opening, allowing for drainage, and washing, as well as improvement in the clinical management of otitis, with no presence of postoperative secretion observed. In the case with total obstruction (n=1), the presence of black and fetid content was observed at the opening of the canal, which was removed after local washing.

DISCUSSION

The technique proposed in this study is a modification of the one performed in small animals. In the original technique, a “U” shaped incision is made on the vertical ear canal, starting and ending at the pre-tragic and intertragic incisures, respectively, to preserve the skin for ventral canal opening coverage and suture (MCCARTHY; MCCARTHY, 1994; TOBIAS, 2010; MACPHAIL; FOSSUM, 2019).

Due to differences in ear anatomy, the main anatomical reference for performing the technique in horses is the



Source: Author's collection.

Figure 2. Modified lateral resection of the ear canal. A - U-shaped skin incision over the ear canal. B - Lateral wall of the ear canal and skin flap. C - Parallel incisions to the ventral aspect of the canal and resection of the cartilaginous flap adhered to the skin. D - Suturing of the ear canal epithelium to the skin with a continuous simple pattern using 0 nylon thread.

intertragic incisure located ventrally to the ear cartilage (ZWINGENBERGER; PARKS; DOWNS, 2002), indicating that the incision should start and end at this location.

MCCARTHY & MCCARTHY (1994), TOBIAS (2010), and MACPHAIL; FOSSUM (2019) stated that this procedure significantly alters the anatomy and natural protection of the ear canal and is only chosen as therapy in situations where access for clinical treatment is not viable or responsive. This technique can improve drainage, aeration, and decrease temperature and humidity, hindering bacterial proliferation (TOBIAS, 2010; MACPHAIL; FOSSUM, 2019). Despite the anatomical alterations in the horses studied, lateral resection allowed better access for cleaning, treatment, and elimination of purulent secretion, and no complications were observed in the postoperative period.

According to MCCARTHY & MCCARTHY (1994), complications associated with lateral resection of the ear canal may include narrowing of the lumen of the horizontal canal due to inadequate ventral flexion of the cartilaginous flap, failure

to alter the course of the otitis, and suture failure, which may occur due to self-trauma, infection, tension in the incision, and bloody surgical technique. The horses treated with the modified technique in this study did not present post-surgical narrowing or any type of complication.

The horses treated during this study did not present recurrences, but recurrence cases may happen due to lack of topical application of medications. This is because the primary function of a surgical treatment is to alter the environment, allowing drainage and facilitating topical application of active principles with the unobstructed ear canal (MCCARTHY; MCCARTHY, 1994; TOBIAS, 2010; MACPHAIL; FOSSUM, 2019).

CONCLUSION

The modified lateral canal resection technique was successful in the six animals treated in this study, allowing access for clinical treatment of the ear canal, without recurrence or postoperative complications.

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