Acta Scientiae Veterinariae, 2024. 52(Suppl 1): 981.

CASE REPORT
Pub. 981

ISSN 1679-9216

Extensive Orbital Exenteration in a Bitch: Correction with Subdermal Pattern Rotation Flap

Jéssica Francielle Camargo[1], Rafael Kretzer Carneiro[2], Matheus da Rosa Pippi[3], Luciana Teixeira Gonçalves[4], Cristiano Gomes[5] & Stella de Faria Valle[5]

ABSTRACT

***Background*:** Reconstructive surgery techniques for dogs have been a notable increase in recent years. Managing extensive surgical wounds can be challenging for many surgeons, particularly due to limited skin mobility. For these cases, reconstructive emerges as a viable solution. Traditionally, two methods are employed in closing wounds using surgical reconstruction techniques: skin flap or grafts. In skin flap surgery, segments of skin and subcutaneous tissue with their own vascularity are used, connected through a pedicle to the donor area. This report illustrated the use of a rotation skin flap to close an extensive wound in a bitch following exenteration due to tissue damage caused by myiases.

***Case*:** A 5-year-old Mongrel bitch was referred to the Veterinary Medical Teaching Hospital (HCV) of the Universidade Federal do Rio Grande do Sul (UFRGS) after undergoing a previous exenteration surgery due to ocular myiases. The animal was referred to the HCV due to the extensive skin loss in the previous procedure, mandating reconstructive surgery. Preceding the surgery, the wound bed was managed for 2 weeks of treatment with a wet dressing with petrolatum gauze, promoting the formation of healthy granulation tissue on the wound through dressing changes every 48 h. Upon the development of granulation tissue, the wound was prepared for flap transplantation. The bitch was prepared for surgery, and the Propofol was used for anesthetic induction protocol. Firstly, the wound debridement was performed followed by the application of a polypropylene mesh graft to the orbit using nylon thread and simple interrupted sutures. A semicircular incision was made, and a flap was created from the area above the other healthy eye. The flap borders were fixed with a Backhaus towel clamp and sutured using simple interrupted and nylon thread. At the end of the procedure, the flap was iced, and a bandage was applied. The bitch received antibiotics until the course of treatment was completed. Bandage changes occurred within the initial 24 to 96 h. Around the 5th day post-surgery, a small section of the flap displayed a purple color, for which a specific therapeutic cream was applied until the color normalized. Bandage changes continued every 5 days from the 6th day until sutures were removed on the 14th day. A re-examination on the 55th day post-surgery confirmed the complete acceptance of the flap.

***Discussion*:** Reconstructive surgery is widely used in oncology surgery to address significant skin defects. However, only a small percentage of veterinarians employ reconstructive surgery for non-oncology wound-repairing procedures. This limited use of this procedure is due to limited acknowledgment of the technique. Consequently, some veterinarians opt to let wounds heal naturally, which can be time-consuming for complete healing. While the literature discusses various types of flaps, selecting an appropriate flap for extensive head skin defects should be a challenge. In this case, a rotation flap was chosen to cover the peri-orbital wound. Important to mention that the use of the flaps is not free of complications such as necrosis or dehiscence. In this case, minor post-surgical complications occurred and, both wound and the bitch were fully recovered. This suggests that employing a rotation skin flap technique can efficiently achieve rapid wound closure in the head area, minimizing infection risks and the need for extended care.

Keywords: canine, eyeball orbital region, healing, reconstructive surgery, wound.

DOI: 10.22456/1679-9216.138197

Received: 26 March 2024 Accepted: 6 August 2024 Published: 10 September 2024

[1]Programa de Pós-Graduação em Ciências Veterinárias (PPGCV) & [5]Faculdade de Veterinária, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, RS, Brazil. [2]Universidade do Estado de Santa Catarina (UDESC), Lages, SC, Brazil. [3]Unidade Central de Educação Faem Faculdade (UCEFF), Itapiranga, SC. [4]Centro Universitário Ritter dos Reis (UniRitter), Porto Alegre. CORRESPONDENCE: J.F. Camargo [jessicavetcamargo@gmail.com]. Hospital de Clínicas Veterinárias (HCV) - UFRGS. Av. Bento Gonçalves n. 9090. CEP 91540-000 Porto Alegre, RS, Brazil.

INTRODUCTION

In dogs and cats, the skin is abundant and viscoelastic, allowing the closure of numerous wound types using basic surgical principles. The rapid closure of wounds using a simple, cost-effective, and low-morbidity technique is a primary goal of reconstructive surgery. Although highly recommended, simpler techniques with lower morbidity are not a low cost in long term and should not compromise the treatment success [6].

Reconstructive surgery for facial defects often becomes necessary following radical tumor resection, burn repair, chemical damage to the skin, or closure of traumatic wounds. Nevertheless, the repairing procedure can be challenging due to wound being close to structures that limit skin elasticity and extension, such as the eyes, nostrils, lips, and ears. The objective is to perform a repair without causing secondary defects or compromising the normal function of these structures [8]. When primary closure of a wound is not possible, alternative options include secondary healing, local tissue transposition (flaps), or grafts [5].

The principle underlying the surgical technique of a cutaneous flap involves using the skin from an area abundant in elasticity or tissue to close the primary wound. This allows for tension-free closure of the resulting secondary wound. Advancement, rotation, and transposition flaps are examples of local flaps procedures derived from adjacent skin [7].

This report aims to describe the use of a subdermal pattern rotation flap in a bitch as a method to correct an extensive cutaneous defect in the orbit after orbital exenteration due to severe myiasis infestation.

CASE

A 5-year-old mixed-breed bitch weighing 6 kg was referred to the Veterinary Medical Teaching Hospital (HCV) of the Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, RS, Brazil. The animal had previously undergone orbital exenteration due to severe ocular myiasis. High tissue tension in the orbital region resulted in an inability to close the wound, prompting the decision for a reconstructive surgical technique, requiring a second surgical procedure.

At the clinical examination, the dog presented a large wound (approximately 6.0 x 4.0 cm) in the left orbital region, with exposed bone tissue (Figure 1A). The repair procedure was conducted in 2 stages. Initially, the wound bed was prepared to receive the flap. Over 2 weeks, the dog underwent bandage changes and dressings every 48 h. These bandages consisted of 3 layers, with the 1st layer containing sterile petroleum jelly gauze until granulation tissue developed, the 'Absorbent' or 'Secondary' layer with cast padding, and the 'Support' or 'Tertiary' layer with crepe bandage. After this initial phase, the wound (Figure 1B) exhibited proper granulation tissue, indicating readiness for the

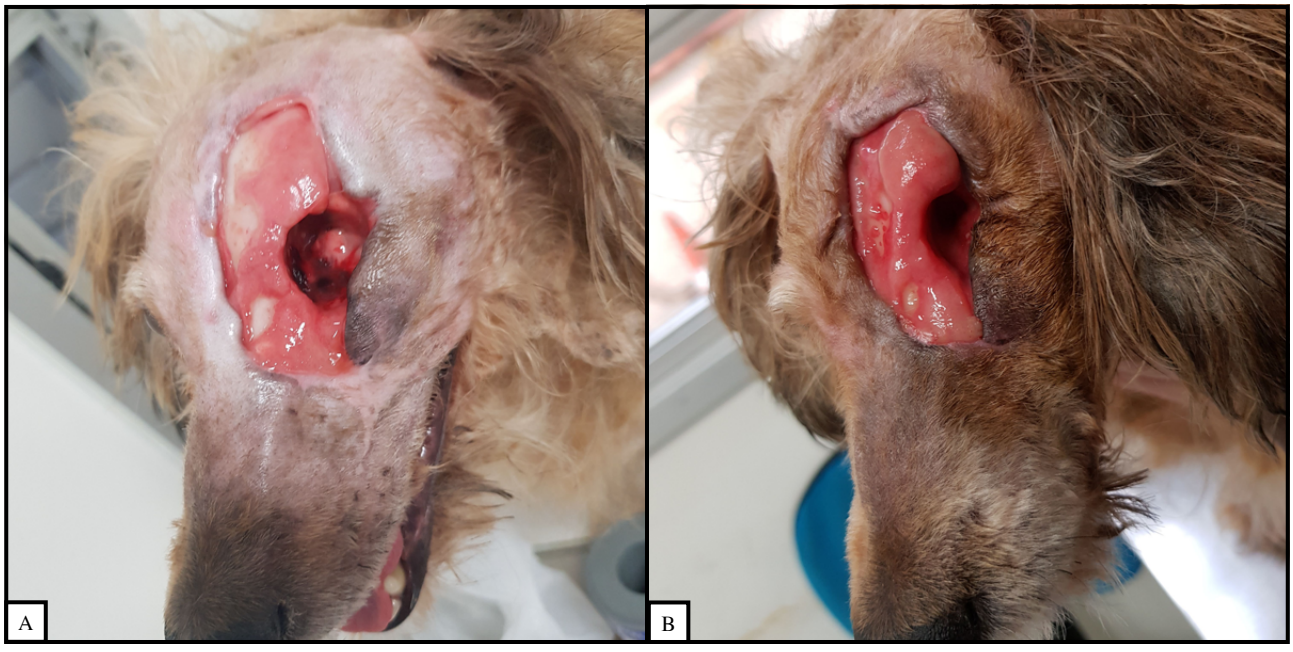

Figure 1. A-The patient's wound before starting treatment for flap surgery, showing areas without tissue and with exposed bone. B- Granulation tissue developed after 14 days of treatment with a bandage and sterile petroleum jelly gauze.

flap. Preoperative examinations, including complete blood count and serum biochemistry, are unremarkable.

For reconstructive surgery, the pre-anesthetic medication protocol includes methadone[1] [Mytedom® - 0.25 mg/kg, IM] combined with acepromazine[2] [Acepran 0.2%® - 0.05 mg/kg, IM]. Induction was achieved with propofol[1] [Propovan® - 4 mg/kg, IV], and anesthesia maintenance with isoflurane in 100% oxygen using a semi-open circuit. The flap creation area was delineated before surgery using a hypodermic pen (Figure 2A). The wound edges were removed, as there was an inversion, which could hinder the healing process. To close the orbit, a polypropylene mesh was implanted[3] [Waltex ®] (Figure 2B) using interrupted simple sutures with synthetic 2-0 non-absorbable nylon[4] [Shalon Nylon®]. After mesh implantation, the defect's length and width were measured, and a subdermal pattern rotation flap was crafted based on these measurements (Figure 2C).

Following initial preparations, a semicircular incision was made to create the flap extending to the base of the ear. A 4-0 Absorbable polydioxanone[5] [Bioline ®] was used for a walking suture pattern to accommodate the flap, while interrupted simple sutures with 3-0 non-absorbable nylon [4] [Shalon Nylon®] were applied to the skin.

After closing the defect (Figure 2D), ice was applied to the flap for 10 to 20 min. Subsequently, a bandage consisting of sterile petroleum jelly, gauze, cotton, and an additional layer of bandaging was applied (Figure 2E).

Postoperatively, the following medications are prescribed: amoxicillin and clavulanic acid[6] [Agemoxi® - 22 mg/kg, BID for 14 days], tramadol hydrochloride[6] [Cronidor® - 4 mg/kg, TID for 5 days],

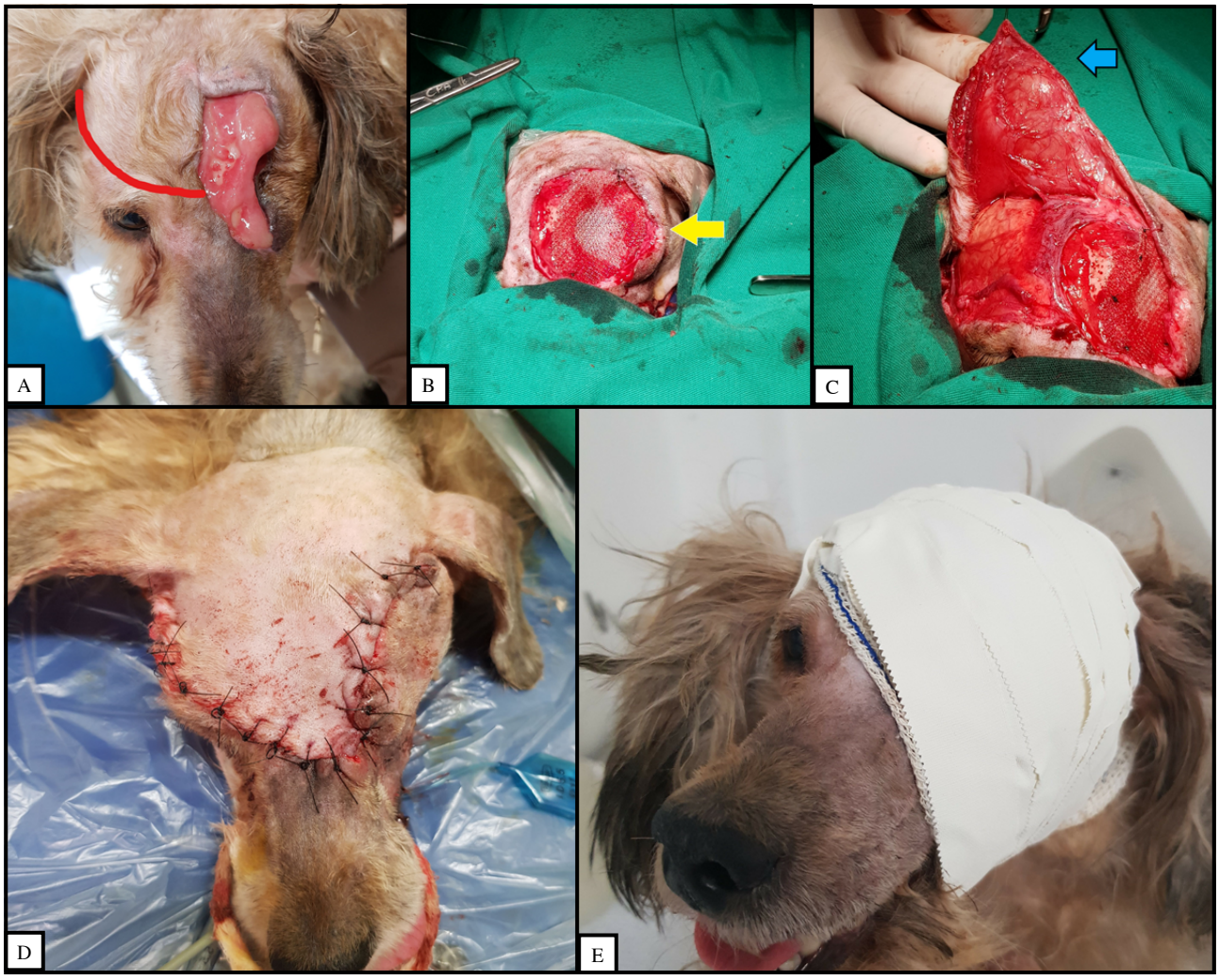

Figure 2. A- Delimitation of the area to be incised for flap creation (marked in red). B- Placement of polypropylene mesh (yellow arrow). C- Demonstration of flap creation. D- Immediate postoperative period. E- Bandaging performed after the surgical procedure.

sodium dipyrone[7] [Dipirona gotas® - 25 mg/kg, TID, for 5 days] and meloxicam[2] [Meloxivet® - 0.1 mg/kg, SID for 3 days].

Bandage changes were performed every 24 h (Figure 3A), followed by intervals of 48 h, 72 h, and 96 h (Figure 3B) after the procedure, utilizing only warm saline solution. Subsequently, bandage changed every 72 h for following 14 days postoperatively. Additionally, an Elizabethan collar was utilized until suture removal.

On the 4th postoperative day (Figure 3B), the flap showed signs of hematoma, slight edema along the cutaneous edge, and a small area of necrosis limited to the epidermis, with the dermis remaining intact. Therefore, was recommended the polysulfated mucopolysaccharide ointment[8] [Hirudoid®, TID for 7 days] was initiated, leading to complete resolution.

Skin suture removal was performed on the 14th postoperative day (Figure 3C), revealing complete wound closure in the orbital region. After 55 days postoperatively (Figure 3D), the dog returned to the HCV-UFRGS, showing complete hair coverage in the flap area.

DISCUSSION

The initial procedure couldn't achieve complete wound closure by directly bringing together the wound edges, as excessive skin loss occurred after the enucleation of the eyeball. Therefore, a reconstructive technique, previously suggested for such cases, was selected [11]

In this case, the wound bed was not in optimal condition to accommodate a cutaneous flap. Therefore, it was advised to initially treat the wound with sterile petroleum jelly and gauze. Additionally, a dressing change every 3 days was recommended until the recipient bed had developed healthy granulation tissue, was free from contamination and infection, and exhibited adequate blood supply as recommended for the placement of a cutaneous flap [8].

Three layers of bandages were applied, and after 2 weeks, visible signs of epithelialization and healthy granulation tissue indicated readiness of the tissue bed for a cutaneous flap. The use of a moist dressing is indicated as prevention of tissue dehydration, reducing the risk of cell death, minimizing trauma during dressing changes, protecting against microorganisms, aiding in the removal of fibrin and necrotic tissue, promoting accelerated angiogenesis, and stimulating the formation of granulation tissue and epithelialization [10].

The decision to use petroleum jelly (petrolatum) as the 1st layer of the dressing, over the flap played a crucial role in hydrating the area and promoting the growth of keratinocytes [1]. In a previous study, petroleum jelly was considered a safer option for wound treatment compared to gentamicin ointment, despite no significant difference in infection rate observed during its postoperative use on wounds [12].

In this case, a rotation subdermal flap was employed, primarily chosen due to the anatomical region (head), the similarity of adjacent structures in flap construction, and the transfer method. Subdermal skin flaps are classified based on their position concerning the skin loss area and the technique used for transfer, including rotation, advancement, transposition, inguinal, and axillary fold flaps [4].

The decision against an axial pattern flap was due to compromised arteries in the facial region caused by the extent of the injury. Additionally, a crucial factor was that local flaps, derived from adjacent tissues, maintain the integrity of the hypodermis and dermis, resulting in similar thickness, texture, color, and hair type [8]. Unlike axial pattern flaps, subdermal flaps lack a specific cutaneous artery and receive blood supply from terminal branches of cutaneous trunks in the subdermal plexus originating from the base of the flap [4,8].

The selected flap for this case, located in the facial region, presented a higher chance of success due to its excellent blood supply [4]. However, given the abundant nerve and vascular structure in this area, extra caution was essential during the procedure to prevent compromising innervation, particularly around the contralateral eye, as branches of the facial nerve is very close proximity during the creation of the flap.

Due to the extent of the cutaneous defect, the selected technique for wound coverage was a rotation flap, which is a semicircle combining advancement and transposition. This was advantageous in this case due to the lack of sufficient skin to cover the wound, without creating a secondary defect [4]

Early seroma formation was observed but was effectively managed with bandaging, resulting in complete resolution. Although a small area of necrosis appeared at the flap's edge, as the dermis remained intact the overall healing process was not impaired.

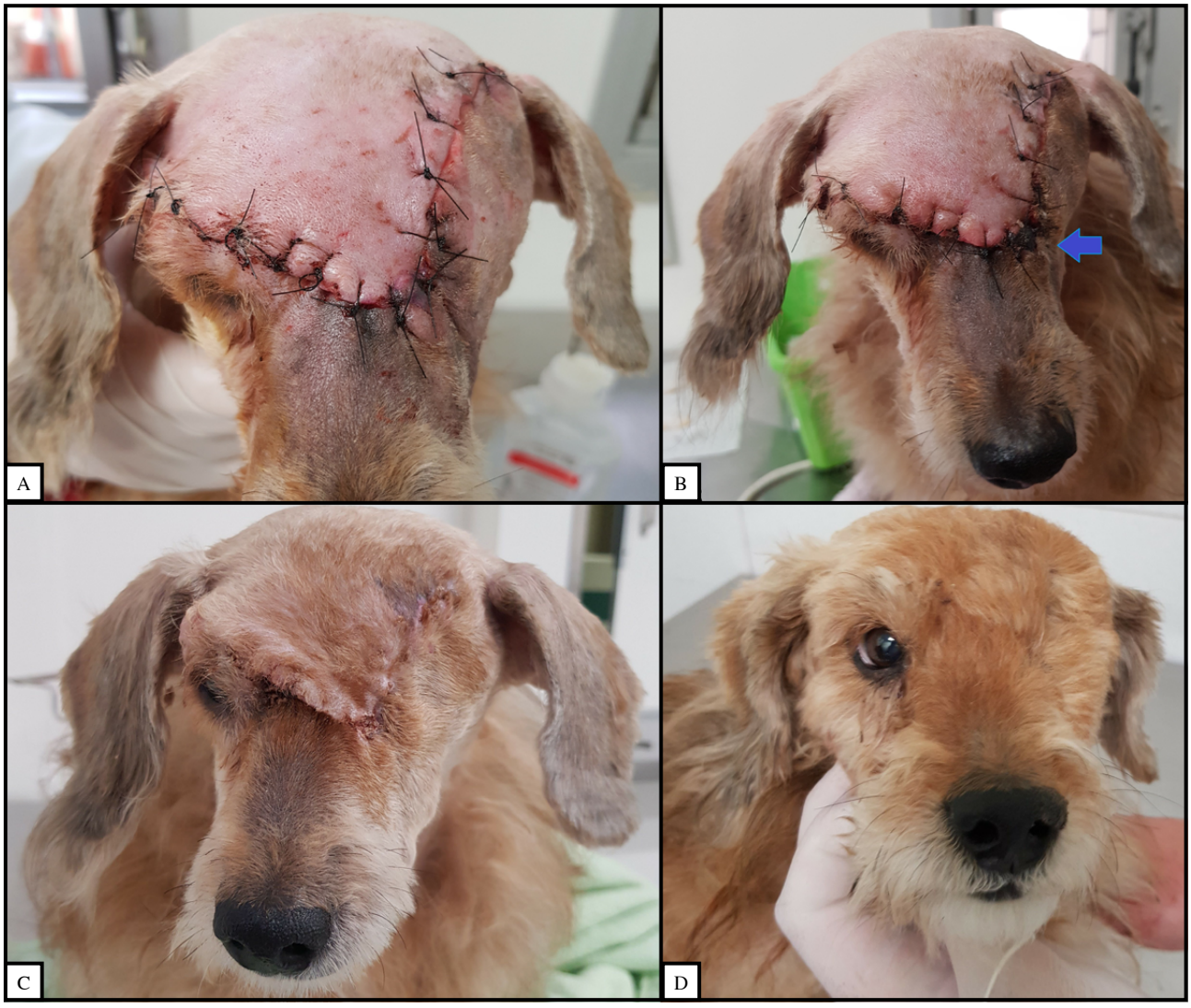

Figure 3. A- Flap after 24 h post-surgery. B- Flap 96 h post-surgery showing a small area of necrosis. C- Flap 14 days after suture removal. D- 55 days after surgery.

Post-operation complications such as seroma formation, infection, flap necrosis, and wound edge dehiscence [3] are addressed during this period. Prompt therapeutic intervention during this phase contributes to successful repair, as evident in the swift resolution of the hematoma using polysulfated mucopolysaccharide ointment. The initial flap approach has been previously described, promoting improved capillary circulation by reducing inflammation and intravascular thrombosis [2].

The subdermal rotation flap technique proved effective in correcting the extensive defect created after orbital exenteration, allowing favorable wound healing with no suture dehiscence, presenting a satisfactory aesthetic outcome, and enabling a quick medical discharge.

MANUFACTURERS

[1]Cristália Produtos Químicos Farmacêuticos Ltda. Itapira, SP, Brazil.
[2]Vetnil Indústria e Comércio de Produtos Veterinários Ltda. Louveira, SP, Brazil.
[3]Cirurgica Brasil Ltda. Cambuci, São Paulo, Brazil.
[4]Shalon Fios Cirúrgicos Ltda. São Luís de Montes Belos, GO, Brazil.
[5]Bioline Fios Cirúrgicos Ltda. Anápolis, GO, Brazil.
[6]Agener União. Embu-Guaçu, SP, Brazil.
[7]EMS. Hortolândia, SP, Brazil.
[8]Daiichi Sankyo Brasil Farmacêutica Ltda. Barueri, SP, Brazil.

***Acknowledgments*.** This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001.

***Declaration of interest*.** The authors report no conflicts of interests. The authors alone are responsible for the content and writing of paper.

REFERENCES

1 **Campbell R.M., Perlis C.S., Fisher E. & Gloster H.M. 2005.** Gentamicin Ointment versus Petrolatum for Management of Auricular Wounds. *Dermatologic Surgery.* 31(6): 664-669. DOI: 10.1111/j.1524-4725.2005.31610.

2 **Cuddy L.C. 2017.** Wound closure, tension-relieving techniques, and local flaps. *Veterinary Clinical: Small Animal*. 47(6): 1221-1235.

3 **Fahie M.A. 2012.** Primary wound closure. In: Tobias K.M. (Ed). *Veterinary Surgery: Small Animal*. 2nd edn. St. Louis: Elsevier Saunders, pp.1197-1209.

4 **Franco D. & Gonçalves L.F. 2008.** Feridas cutâneas: a escolha do curativo adequado. *Revista do Colégio Brasileiro de Cirurgiões.* 35(3): DOI: 10.1590/S0100-69912008000300013.

5 **Hunt G.B. 2013.** Local or subdermal plexus flaps. In: Tobias K.M. & Johnston S.A. (Eds). *Veterinary Surgery: Small Animal.* St. Louis: Elsevier Saunders, pp.1243-1255.

6 **Livao lu M., Kerimo lu S., Sönmez B., Livao lu A. & Karaçal N. 2010.** The effect of Hirudoid on random skin--flap survival in rats. *Journal of Plastic, Reconstructive & Aesthetic Surgery*. 63(6): 1047-1051. DOI: 10.1016/j.bjps.2009.03.018.

7 **Pavletic M.M. 2018.** Local flap. In: Pavletic M.M. (Ed). *Atlas of Small Animal Wound Management and Reconstructive Surgery*. 4th edn. Ames: Wiley Blackwell, pp.351-352.

8 **Pope E.R. 2006.** Head and facial wounds in dogs and cats. *Veterinary Clinics of North America - Small Animal Practice*. 36: 793-817. DOI: 10.1016/j.cvsm.2006.03.001.

9 **Siegfried E.C. 1998.** Neonatal skin and skin care. *Dermatologic Clinics.* 16(3): 437-446. DOI:10.1016/s0733-8635(05)70244.

10 **Ter Haar G., Buiks G., Delden M., Reijntjes T., Sanchez R.F & Kirpensteijn J. 2013.** Introduction. In: Kirpensteijn J. & Ter Haar G. (Eds). *Reconstructive Surgery and Wound Management of the Dog and Cat*. London: CRC Press, pp.14-15.

11 **Tschoi M., Hoy E.A., Mark S. & Granick M.S. 2009.** Skin flaps. *Surgical Clinics North America*. 89: 643-658. DOI: 10.1016/j.suc.2009.03.004.

12 **Williams J. 2009.** Decision-making in wound closure. In: Williams J. & Moores A. (Eds). *BSAVA Manual of Canine and Feline Wound Management and Reconstruction*. 2nd edn. Quedgeley: British Small Animal Veterinary Association, pp.25-36.