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EXTERNAL ABDOMINAL OBLIQUE MYOCUTANEOUS ISLAND FLAP FOR ABDOMINAL WALL RECONSTRUCTION

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ABSTRACT

Myocutaneous flaps are used to repair complex defects of different etiologic agents, such as after resection of malignant neoplasms. The present report case aimed to describe the clinical wound aspects of a 12-year-old, weighing 8 kg, female mongrel dog, submitted to abdominal wall reconstruction after en bloc resection of an invasive squamous cell carcinoma using successfully the external abdominal oblique myocutaneous island flap. Some surgical complications were observed, as seroma and partial dehiscence of the suture. Nevertheless, the animal remained well for three months postoperatively when were verified recurrence of the neoplasm. We conclude that external abdominal oblique myocutaneous island flap, besides being useful for severe abdominal defects correction like described in literature, may be a readily available option for the surgical treatment of epithelial tumors, as squamous cell carcinoma involving the abdominal wall.

Keywords: Surgical flaps; autologous transplantation; abdomen; abdominal muscles; dog.

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INTRODUÇÃO

The external abdominal oblique muscle is the most superficial muscle of the abdomen, characterized by the caudoventrally arrangement of the fibers. It consists of costal and lumbar components. The costal component extends from the fourth or fifth rib through the thirteenth rib. The lumbar component originates in the thoracolumbar fascia along the iliocostalis muscle (ALEXANDER et al., 1991; PAVLETIC, 2010; HERMANSON, 2013).

The abdomen is frequently affected by malignant neoplasms, especially the mast cell tumor, squamous cell carcinoma and hemangiosarcoma (LIPTAK e FORREST, 2013; HAUCK, 2013). According to studies, the higher incidence of neoplasms in this location is probably due to chronic exposure to solar radiation on the little pigmented skin (LIPTAK e FORREST, 2013). In many cases the tumors are infiltrative and abdominal wall full thickness resection is necessary (SWAIN e HENDERSON JR., 1997).

Myocutaneous flaps are used to repair complex defects from previously placed suture failure, trauma, infection, radiation necrosis, hernia and resection of malignant and infiltrative neoplasms (MATHES et al., 2000; SMEAK, 2003; HALFACREE et al., 2007; BREUING et al., 2010; PAVLETIC, 2010; GHAZI et al., 2011; ZHANG et al., 2014).

Among the various myocutaneous flaps, the external abdominal oblique myocutaneous island flap has been reported to repair pelvic, abdominal and caudal thoracic defects (ALEXANDER et al., 1991; DEGNER et al., 1996; PAVLETIC, 2010) of approximately 10 cm2 in medium sized dogs (PAVLETIC, 2010). However, despite the ample indications, the use of myocutaneous flap is rarely described in veterinary medicine.

Due to this, the present report case aimed to describe the clinical wound aspects of a dog submitted to abdominal wall reconstruction after en block resection of a malignant neoplastic mass, using successfully the external abdominal oblique myocutaneous island flap.

Case Report

A 12-year-old, 8 kg body weight, female mongrel dog was presented for evaluation due to an abdominal mass with rapid and progressive growing. During a physical examination it was verified the presence of a mass of about 5cm2, ulcerated, attached and located between the right caudal abdominal and right inguinal mammary glands. All clinical parameters were normal. Cytopathologic examination was performed from increased volume and consistent with squamous cell carcinoma.

The complete blood cell count (CBC) and serum biochemistry profile revealed lymphopenia (0.91 X 103/µl; reference range 1.5 to 5 X 103/µl), eosinophilia (2.2 X 103/µl; reference range 0.1 to 1.2 X 103/µl) and increased total serum protein (7.6 g/dl; reference range 5.4 to 7.7 g/dl). No metastases were detected by thoracic radiographies and abdominal ultrasound.

The tumor excision was indicated due to the cytopathologic diagnosis. Therefore, the animal was positioned in dorsal recumbency and the abdominal area was shaved and submitted to surgical antisepsis using 0.5% chlorhexidine. The skin incision was performed with a safety margin of 3cm around the grossly compromised area. During the tumoral excision were verified color and consistency abnormalities of the external abdominal oblique muscle aponeurose. Then, the ventral aspect of the lumbar component of the apparent compromised muscle was excised in order to obtain ample surgical margin and prevent tumor recurrence. The internal fascia, rectus abdominis muscle and internal oblique abdominal muscle were not macroscopically compromised and maintained intact.

Subsequently, operative site was irrigated with 0.9% heated saline and the subcutaneous tissue approximated with 2-0 nylon "walking" suture. The skin was sutured with 3-0 nylon simple interrupted pattern, and a Penrose drain was placed into the subcutaneous and fixed to the skin with 3-0 nylon simple interrupted pattern.

The histopathologic examination confirmed an epithelial tumor of squamous epidermal cells localized in superficial and deep dermis and hypodermis, infiltrative, unencapsulated and with marked quantity of fibrous stroma, consistent with squamous cell carcinoma.

Approximately two months postoperatively was observed an increased volume of approximately 15cm long to 10cm wide, adhered and not ulcerated, located around the abdominal scar (Figure 1 A). A new cytophatologic examination was done and suggested recurrence of the previously resected tumor.

Because of this, an external abdominal oblique myocutaneous island flap was performed. The animal was positioned in lateral recumbency and the abdominal area to be resected was shaved and submitted to surgical antisepsis using chlorhexidine. A paracostal skin incision was performed approximately 5cm caudal to the 13th rib. A second incision

was made approximately 10cm caudal to the first, extending from the craniodorsal ileum's edge to the inguinal fold region. After that, two parallel skin incisions were made to unite the previous incisions and form a rectangle (Figure 1 A). The remaining portion of the external abdominal oblique muscle was identified and released ventrally by sharp dissection from the scar, located anatomically in the region of the external fascia of the rectus abdominis muscle. Similarly, the thoracolumbar fascia of the external abdominal oblique muscle was incised to release it dorsally (Figure 1 B). The neurovascular pedicle, consisting of cranial abdominal artery, cranial hypogastric nerve and satellite vein, was identified craniocaudal to the 13th rib and meticulously dissection. The remaining lumbar component of external abdominal oblique muscle was completely released from costal component by a parallel incision to the caudal border of the muscle flap. The abdominal external oblique muscle island flap was then reserved and protected with a moistened pad, while tumor was resected together with the macroscopically compromised oblique muscles and rectus abdominis, thus resulting in full thickness defect of approximately 7cm long to 5cm wide.

After the tumoral excision and exposure of the abdominal cavity, the remaining portions of the abdominal muscles were approximated and sutured with 2-0 nylon sultan pattern. Subsequently and to reduce suture tension, the abdominal external oblique muscle island flap was placed over the abdominal suture and attached to the muscular fascia with 3-0 nylon simple interrupted pattern (Figure 1 C).

Additionally, an advancement flap was performed by a perpendicular incision, cranial to the defect, followed by the blunt dissection of the skin, which was mobilized caudally. The cranial border of the myocutaneous island flap was sutured to the caudal edge of the advancement flap with 3-0 nylon simple interrupted pattern. Similarly, the skin of lumbar, inguinal and ventral abdominal regions was submitted to blunt dissection from subcutaneous tissue and approximated to the skin flaps with 3-0 nylon "walking" suture, and the skin sutured with 3-0 nylon simple interrupted pattern (Figure 1 D). In this moment, Penrose drains were placed into the subcutaneous and fixed to the skin of inguinal and ventral abdominal regions with 3-0 nylon simple interrupted pattern. Relieving incisions were also performed near the caudal edges of the advancement flap and lumbar skin.

The animal received at postoperative tramadol hydrochloride (4 mg/kg, orally, every eight hours, for three days), cephalexin (30 mg/kg, orally, every 12 hours, for seven days), meloxican (0.1 mg/kg, orally, every 24 hours, for three days) and omeprazole (0.5 mg/kg, orally, every 24 hours, for seven days). The surgical wound was protected by an absorbent and compressive bandage, which remained for two days, after that was cleaned daily with saline 0.9%.

At four days postoperatively were observed swelling in the right hind limb and skin darkening around the suture between lumbar region and the dorsal portion of the myocutaneous island flap, which temperature was normal. After 11 days postoperatively, was observed dehiscence of the suture between lumbar region and the caudal-dorsal portion of the flap. Skin temperature remained normal. The drain was maintained due to the large amount of seroma and removed with 15 days postoperatively.

At 18 days postoperatively were not even more observed edema, accumulation secretions and skin discoloration. The open wound was granulated and almost epithelialized. The skin suture was removed.

At 40 days postoperatively, the animal appeared healthy and the wound completely resolved. Chemotherapy was suggested, but the owner declined it.

The animal remained well and without complications three months following the second surgery. According to the owner, after that period was observed tumor recurrence in the right pelvic limb with progressive growth. At ventral abdominal region, however, tumor recurrence was not observed. The animal passed away without other clinical abnormalities, but it was not possible to perform necropsy.

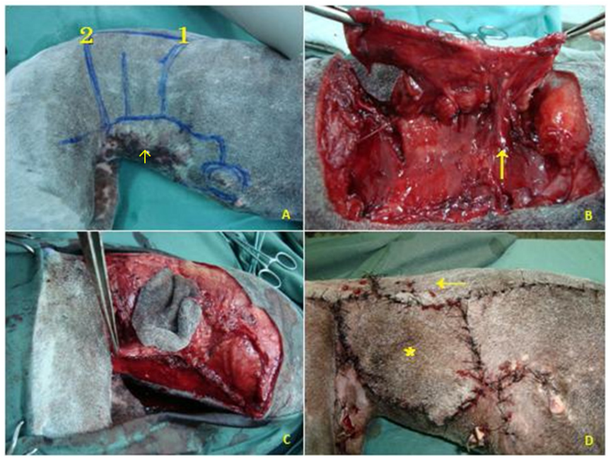

Figure 1: External abdominal oblique myocutaneous island flap for abdominal wall reconstruction in a dog. A) Skin incision 5cm caudal to the 13th rib to provide access to the cranial portions of the muscle (1). Skin incision, parallel and 10cm caudal to the first incision, to provide access to the caudal portion of the muscle (2). Note neoplasm involving the ventral abdominal region (arrow). B) Release of the dorsal aspect of the external abdominal oblique muscle. Note the neurovascular pedicle craniocaudal to the 13th rib (↑). C) Suture of the external abdominal oblique myocutaneous island flap over the abdominal wall suture. D) Immediately postoperative aspect of abdomen. Note the myocutaneous island flap (*) and the advancement flap (←).

DISCUSSION

Considering the extent of the neoplasm at the time of recurrence, we opted initially to perform an en bloc resection followed by a skin flap for reconstruction of the abdominal region. However, since the tumor was adhered and probably involved the deep anatomical planes, a partial resection of abdominal muscles was something expected. Therefore, we decided to perform a myocutaneous flap to simultaneously reconstruct the abdominal wall and occlude the skin defect, and the external abdominal oblique myocutaneous island flap perfectly served for this purpose (ALEXANDER et al., 1991; DEGNER et al., 1996; PAVLETIC, 2010).

Despite the indication of the oblique myocutaneous island flap, it was considered the previous resection of the ventral aspect of the lumbar component of the referred muscle at the time of the first surgery in order to obtain ample surgical margin, and that dorsal component did not have anatomical relationship with the neoplasm. Indeed, the reported animal showed no local tumor recurrence during the evaluation period.

During surgery was verified the possibility of oblique muscle interposition between the remaining portions of the abdominal muscles or also the occlusion of the defect through direct approximation of the muscles edges, however, under tension. Therefore, we opted to place the oblique muscle over the abdominal suture in order to reduce the tension on the previous suture and thus prevent the dehiscence of it and consequently the occurrence of incisional hernia (MATHES et al., 2000; SMEAK, 2003).

Another option for abdominal wall reconstruction in the present case includes the use of biological material or synthetic mesh, as polypropylene or polyethylene plastic mesh (SCHUMPERLICK et al., 1996; SWAIN e HENDERSON JR., 1997). These materials, however, are related to numerous complications such as rejection, adjacent tissue irritation, infection and fistula formation, and are contraindicated in a number of conditions, such as infection (SCHUMPERLICK et al., 1996; SMEAK, 2003), not verified in the reported case.

Additionally, we opted for the oblique myocutaneous island flap because it is a readily available autologous material, which reduces the risk of rejection (SMEAK, 2003; ISKEN et al., 2009), and to avoid potential complications, as infection and mesh extrusion, especially in a scarred environment after oncologic resection (BREUING et al., 2010).

Although complex, the myocutaneous flap performed in the present case showed ideal thickness with an even abdominal contour and effectively provided structural support for the skin flap (GHAZI et al., 2011; ZHANG et al., 2014).

In order for the external oblique myocutaneous flap to be successful is necessary to preserve the neurovascular pedicle consisting of the cranial abdominal artery (PAVLETIC, 2010). In the animal reported here, identification and isolation of the pedicle had no difficulties, allowing the transposition of the muscle segment and ensuring the viability of the flap. However, despite this we have observed postoperatively edema, seroma, skin blackening and partial suture dehiscence. Such complications are described in half of the human patients submitted to ventral abdominal wall reconstruction using the external oblique myocutaneous flap (ZHANG et al., 2014), and can be justified by the reduction of venous flow or pedicle kinking during the transposition into the recipient bed (DEGNER et al., 1996) or extensive dead space on the donor site (OLIVEIRA et al., 2000).

Despite these complications, it was not verified in the present case the occurrence of incisional hernia, one of the major complications described in reconstructive surgery of the abdomen (MATHES et al., 2000) with rates in human patients ranging from 8% to 43% (GISLASON e VISTE, 1999; MATHES et al., 2000). Absence of tension and use of multiple layers of autologous tissue during closure, as in the present case, could reduce the incident of herniation (BANG e BEHBEHANI, 1997). Additionally, preserving the supplying nerves during surgery prevents atrophy and fibrosis of the flap, and consequently the occurrence of hernias (SCHLENZ et al., 1999).

CONCLUSION

We conclude that external abdominal oblique myocutaneous island flap, besides being useful for severe abdominal defects correction like described in literature, may be a readily available option for the surgical treatment of epithelial tumors, as squamous cell carcinoma involving the abdominal wall.

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