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Case Report

Management of radial artery pseudoaneurysm in radial forearm free flap: case report and review of the literature

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ABSTRACT

The formation of a pseudoaneurysm in a revascularized free flap is an extremely rare complication in microsurgery. The most effective treatment modality is still the subject of debate.

We present the management of a case of pseudoaneurysm of the arterial pedicle of a radial free flap used after hemiglossopelvectomy in a patient with squamous cell carcinoma of the tongue.

In our case, a 74-year-old man with the pseudoaneurysm was successfully treated by endovascular stenting. Endovascular stenting can be considered an effective and safe procedure and a relevant alternative to open neck surgical treatment.

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Introduction

Radial forearm free flap (RFFF) is the mainstay of oral cavity and pharyngeal reconstruction. Flap survival rate is about 95% and the complication rate appears to be low [1]. The most common complications are hematoma, infections, thrombosis of arterial, and venous anastomosis [2]. Pseudoaneurysm formation of the pedicle is an extremely rare complication; the first sign is a large pulsatile mass of the neck above the anastomotic site of the donor and recipient artery [3]. We present a case of a radial artery pseudoaneurysm occurring 2 weeks after RFFF reconstruction of the oral cavity following hemiglos-

sopelvectomy, which was successfully treated by endovascular stenting.

Case report

A 74-year-old man was referred to the ENT Department of Guglielmo of Saliceto Hospital of Piacenza for to an ulcerated lesion of the left margin of the tongue. Physical examination revealed a 1.5 cm × 2.5 cm solid mass in the left aspect of the tongue. Neck examination showed enlarged level IB and IIA lymph nodes. Diagnostic work-up included incisional biopsy

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of the lesion, MRI of the head and neck, ultrasonography of the neck, and CT of the chest. Histological evaluation showed a moderately differentiated squamous cell carcinoma. On MRI, the 2.5 cm × 1.5 cm lesion of the left margin of the tongue showed central necrosis and infiltrated hyoglossus and genioglossus muscles. Metastatic lymph nodes were suspected by ultrasonography, which showed involvement of levels I and II and revealed a 4 cm nodal conglomerate at level IIA with compression of internal jugular vein. Chest CT was negative for metastases. A left hemiglossopelvectomy with compartmental resection via a pull-through approach was performed with a left modified radical neck dissection type II (internal jugular vein removal) and right selective neck dissection (I-III levels). Reconstruction of the oral cavity was achieved with a RFFF. The RFFF was chosen to maximize pedicle length and allow anastomoses in the contralateral side. An end-to-side anastomosis between internal jugular and cephalic veins and an end-to-end anastomosis between right superior thyroid and radial artery were performed. There was no tension on the pedicle or on the anastomosis. Intraoperatively, there was no evidence of trauma to the radial artery, and the patient had no recent history of arterial puncture. The procedure was well tolerated and there were no intraoperative complications. Good control of systemic blood pressure was preserved during surgery. The second day after surgery the patient developed a right cervical hematoma, which required drainage under general anesthesia. During surgery, the function of the anastomoses appeared to be normal. On the fifth postoperative day, the patient developed an infection with septic fever. Microbiological culture of the neck drainage revealed an infection of *Staphylococcus* that was treated for 10 days with an antibiotic based on antibiogram. Two weeks after free flap reconstruction, the patient developed a pulsatile neck mass along the right thyroid cartilage (Fig. 1). An ultrasonography of the neck revealed a mass along the right border of the thyroid cartilage. Color Doppler and neck CT angiography showed a 3.5 cm pseudoaneurysm of the arterial anastomotic site (Fig. 2). In angiographic suite, the origin of pseudoaneurysm was confirmed (Fig. 3) and a flow diverter device derived from neuroradiological use [4] was positioned, obtaining an immediate exclusion of the aneurysmatic sac from the blood flow (Fig. 4). After the procedure, the RFFF maintained its vitality and a progressive reduction in the volume of pseudoaneurysm was observed. Adjuvant concomitant chemoradiation, 50 Gy on the left side of the neck and 6 cycles of cisplatin, was initiated 6 weeks after surgery for extracapsular spread of lymph node metastases.

Discussion

Development of microvascular techniques has revolutionized reconstructive surgery. At present, free-flaps represent the first choice for reconstruction of large defects of the head-neck region. Flap survival rate is about 95% in the current literature and complication rates appear to be low [1]. The most common complications are thrombosis of the arterial or venous anastomosis followed by hematoma, infection, and seroma [2].



Fig. 1 – Pulsatile neck mass in a man after hemiglossopelvectomy with compartmental resection via a pull-through and reconstruction of the oral cavity with a radial forearm free flap (RFFF).

Pseudoaneurysm formation after free flap microvascular anastomosis is extremely rare with very few reported cases in the current literature [5]. Pseudoaneurysm formation in an experimental rodent model has been correlated with increased tension in an artery following an end-to-end anastomosis [6]. However, in the clinical setting, cases of pseudoaneurysm due to anastomotic tension are almost never reported. According to the literature, pseudoaneurysm formation is correlated with infection, graft or suture failure, arterial disease, endarterectomy, poorly controlled systemic hypertension, type of anastomosis, and anticoagulation [3]. Its spontaneous rupture has been estimated at 70% usually in the early postoperative stage [3].

A review of English literature retrieved only 3 cases of pseudoaneurysm following RFFF [3,7,8] (Table 1). The first case was described by Ashall in 1989 [7]. The pseudoaneurysm developed nine months after surgery. The pathogenesis was correlated to different factors: end-to-side anastomosis, postoperative infection, and atherosclerotic disease. Excision of the aneurysmatic sac and oversew of the external carotid artery were used to treat the pseudoaneurysm, without postoperative sequelae [7]. In 2007, Baynosa described the second case of iatrogenic pseudoaneurysm following reverse RFFF transfer [3]. The etiology was deemed to be persistence of nylon suture in the recipient vessel that was anastomized with the external carotid artery, which is a high-flow vessel. During surgical exploration, dehiscence between the anastomosis was noted and repaired. In this case, the pseudoaneurysm sac was resected and fibrin glue was used as an adjunct to occupy the dead space from the resection [3]. The last report was by Senchenkov in 2013 [8]. He described a leaking

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