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Anterior Branch of the Transverse Cervical Artery Pedical Perforator Flap: A Versatility Flap

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Abstract: Introduction: Background: To describe our experience in the use of the anterior perforator of the transverse cervical artery flap (ap-TCAF), to describe the technique for the reconstruction of defects in the head and neck. Methods: From August 2018 to April 2022, two patients were surgically treated for squamous cell carcinoma of the head and neck and underwent reconstruction using the ap-TCAF. The surgical procedure was photographed and described here. Results: The ap-TCAF was used in the first patient to reconstruct a neck defect resulting from an extended laryngopharyngectomy with resection of anterior cervical skin. In the second patient, the same flap was used to reconstruct a defect between the pharynx and the skin, as well as a communication between the trachea and pharynx. Conclusions: These flaps demonstrate exceptional versatility in clinical applications. Their thin profile with axial vascularization facilitates efficient perfusion while maintaining low tissue bulk, enabling rapid elevation during procedures. Notably, their pliability characteristics are comparable to those of radial forearm free flaps, making them suitable for complex reconstructive requirements.

Key words: anterior perforator of the transverse cervical artery flap (ap-TCAF); head and neck reconstruction; squamous cell carcinoma; pharynx defect reconstruction

1 Introduction

The anterior perforator of the transverse cervical artery flap (ap-TCAF) plays a significant role in head and neck oncological reconstruction due to its versatility and reliability. As a thin fasciocutaneous flap in the anterior part of the thorax, it is particularly useful for reconstructing intraoral and cervical defects. The first documented case was reported by Chen in 2016 [1], in which 10 patients with facial and cervical burn trauma were treated. The existing literature contains only a few of reports on this subject. In 2021, Wang presented a paper on his experience of reconstructing 11 patients with oral and oropharyngeal cancer [2]. The ap-TCAF offers several advantages, including a range of flap sizes (from 6 × 4 cm to 15 × 9 cm) and the ability to heal without complications, such as delayed wound healing or donor site dysfunction [2].

2 Materials and methods

2.1 Patients

Between 2018 and 2022, two patients underwent reconstruction at the Gonzalez Rincones General Hospital in Cararas, Bolivarian Republic of Venezuela.

(1) The first patient

In August 2018, a 75-year-old male patient with a history of laryngeal carcinoma, which was treated with radiotherapy 30 years earlier, underwent surgery for transglottic squamous cell carcinoma. He received an extended laryngopharyngectomy with skin resection. Initially, the team planned to use a pectoralis major flap for reconstruction, but decided to switch to an ap-TCAF due to its lower morbidity and versatility. Double skin paddles were used for internal and external coverage.

(2) The second patient

This is a 62-year-old male patient, a smoker with a history of high blood pressure, who was diagnosed with STII glotticlaryngeal squamous cell carcinoma in April 2021. He underwent a hemilaryngectomy and received adjuvant radiotherapy in July 2021. During radiation treatment, he presented with COVID-19 and was admitted to the ICU. Subsequent follow-up examinations revealed a subglottic lesion, the biopsy of which reported squamous cell carcinoma. Therefore, surgery was proposed in November 2021, performing a total laryngectomy. On the 10th day, he began to experience wound discharge, and a physical examination revealed communication between the pharynx and the skin and the pharynx and thetrachea (Figure 5). Surgery was performed on April 20, 2022, with an axial pedicle flap based on the anterior branch of the left transverse cervical artery ap -TCAF. On the 10th postoperative day, the patient began to experience discharge again through the upper edge of the anterior flap, and a fistula was identified from the pharynx to the skin. Therefore, a new surgical intervention was proposed in April 27, 2022, where a right axial fasciocutaneous deltopectoral flap was performed based on the perforating branches of the internal mammary artery.

Figure 1. Surgical procedure of the anterior perforator of the transverse cervical artery flap (ap-TCAF) for head and neck reconstruction

2.2 Surgical techniques

The anterior branch of the transverse cervical artery is typically located 6 cm lateral to the sternoclavicular joint and 2 cm superior to the clavicular midline. It traverses a triangular space bounded medially by the sternocleidomastoid muscle, laterally by the external jugular vein, and inferiorly by the omohyoid muscle. These vessels are identifiable via Doppler ultrasound in the supraclavicular fossa. They course superior to the clavicle and terminate at the dermal layer of the anterior thoracic wall.

In our first case where we had to intraoperatively change a pectoralis major flap to an ap-TCAF, we looked for the anterior branch of the transverse cervical artery in the skin and fascia anterior to the pectoralis major muscle using transillumination and carving the flap to our needs to reconstruct the intra-pharyngeal defect and anterior cervical skin (Figures 2, 3, 4, 5).

Figure 2. Flap 14 × 7 cm

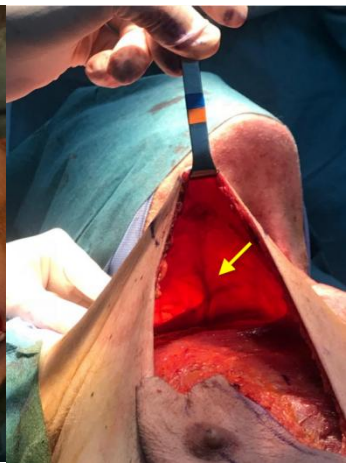

Figure 3. Perforator branch

Figure 4. Flap raised

Figure 5. Postoperative result

In the second case, we performed the initial incision at the inferior border of the flap. The skin and prepectoral fascia were elevated to visualize the anterior branch via transillumination, which had been preoperatively localized with Doppler ultrasound. This axial flap can be safely elevated and rotated to the cervical region (Figures 6-11).

Figure 6

Figure 7

Figure 8

Figure 9. Flap 12 × 6 cm

Figure 10

Figure 11

2.3 Follow-up

These two patients were carefully monitored until May 2025, with no recurrence. In the second patient, radiotherapy caused deterioration of the swallowing function and the need for endoscopic dilation of the stricture. We also performed another flap procedure on this patient to cover an upper laryngeal dehiscence, leaving our ap-TCAF.

3 Results

The ap-TCAF was used to reconstruct the pharynx in the first patient and both the pharynx and the trachea in the second patient. Both flaps rotated through 90 degrees to the defects with no twist in the pedicle. They easily reached the area to be reconstructed.

4 Discussion

The anterior chest and base of the neck have a dense network of vessels that can be used for neck reconstruction, such as the internal mammary perforator flap with perforators from the internal mammary artery [4], the classic deltopectoral flap with perforators from the internal mammary artery [5], and the supraclavicular artery [6]. The cervicopectoral flap, described in 2005 by Chin [7], has perforators that come from the superior thyroid vessels and the transverse cervical artery, as well as from its anterior branch. The AP-TCAF presented in this paper was first described by Chen et al. in 2018 [1, 2], but there are few reports in the literature. [1, 2]. We performed the first procedure in 2018, one year after its description. As far as we know, this flap has not been described in any scientific papers from America or Europe. In 2016, Song presented the pre-expanded transverse cervical artery perforator flap [8]. Expanding the ap-TCAF can raise these thin flaps by up to

13 × 22 cm, extending them 3–4 cm below the nipple [8]. This allows for a large arc of rotation. In 2017, Luca presented the transverse cervical artery perforator flap based on the superficial or ascending branch of these arteries as a supraclavicular flap [9]. This is why this specific ap-TCAF is not commonly found in the literature.

5 Conclusion

These flaps demonstrate exceptional versatility in clinical applications. Their thin profile with axial vascularization facilitates efficient perfusion while maintaining low tissue bulk, enabling rapid elevation during procedures. Notably, their pliability characteristics are comparable to those of radial forearm free flaps, making them suitable for complex reconstructive requirements.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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