

Application of bilateral supraclavicular artery island flaps in the repair of hypopharyngeal and cervical skin defects: a case report

Jing Zhou, Yi-Ming Ding, Meng-Jiao Zhou, Yun-Xun Kuang, Ting-Yao Ma, Xiao-Hong Chen

Department of Otolaryngology Head and Neck Surgery, Beijing Tongren Hospital, Capital Medical University, Beijing 100005, China.

To the Editor: In advanced head and neck malignancies, especially in patients who relapse after comprehensive treatment such as a history of neck surgery or radiotherapy, tumors can simultaneously invade both the mucosa and skin. Reconstruction of penetrating defects formed after tumor resection must achieve the following goals: (1) Reconstruction of the digestive tract to restore swallowing function. (2) Provide soft tissue for repair of important structures in the neck, that is, to re-build the skin of the neck. We used bilateral supraclavicular artery island flaps to repair a large area of skin with mucosal defects in the neck of a patient with advanced laryngeal malignancy after surgery, and with satisfactory post-operative results.

A 66-year-old patient had been diagnosed with laryngeal cancer (T2N0M0) 6 years earlier and underwent vertical partial laryngectomy in another hospital. He received radiation therapy (60 Gy/33F) after surgery and was followed up regularly. However, 3 months ago, the skin on the front of his neck appeared red and swollen, accompanied by difficulty with eating and dyspnea. His symptoms gradually worsened. So a tracheotomy was performed in our emergency department.

Examination revealed swelling in the anterior neck area, skin ulceration, and a ruptured area with dimensions approximately 2 cm × 1 cm [Figure 1A]. Laryngoscopy showed local scar-like changes to the glottis; the left hemilaryngeal swelling was immobile and the mucosa was edematous. The right half of the throat moved slightly. No new blood vessels were seen with narrow-band imaging [Figure 1B]. A neck imaging scan revealed irregular soft-tissue masses in the laryngopharyngeal cavity, approximately 4.9 cm × 3.6 cm in size, unevenly enhanced, and the edges were unclear; lesions affected the skin on the anterior neck, and involved the left cervical sheath, the anterior edge of the sternocleidomastoid muscle, and the medial space of the thyroid cartilage plate on the right. Multiple lymph node shadows could be seen in the bilateral I to III

area of the neck [Figure 1C]. Pathologic examination of the mass in the anterior cervical ulcer suggested squamous cell carcinoma.

The pre-operative repair plan considered local tissue flap repair after radiotherapy. For penetrating defects, repair using a local supraclavicular tissue flap is preferred. The scope of surgical resection included the affected neck skin (with a safe margin of 2 cm), the whole throat, the hypopharyngeal wall and anterior wall (mucosal margin 0.5–1 cm), cervical lymph node dissection and tracheostomy surgery. Rapid pathologic examination during surgery indicated that the surgical margins were negative, and no tumor metastasis was detected during rapid pathologic examination of the IV and V lymph nodes on both sides of the neck, and the supraclavicular blood vessels were well developed. For the mucosal defects, we designed bilateral supraclavicular island flaps for repair and reconstruction. The left supraclavicular island flap (7 cm × 4 cm) was sutured to the posterior wall of the hypopharynx to repair the mucosal defect. The right supraclavicular artery island flap (10 cm × 7 cm) was used to repair the anterior cervical skin defect and the skin in the donor area was sutured directly without skin grafting [Figure 1D–F].

Pathologic diagnosis of specimens indicated squamous cell carcinoma (highly differentiated). No tumors were present in the laryngeal resection margin and skin resection margin. No tumor metastasis was found in the lymph nodes on both sides of the neck in levels II to VI, and laryngeal carcinoma (rT4aN0M0) was diagnosed after surgery.

After surgery, the wound healed well with a smooth appearance and without swelling, infection or pharyngeal fistula. On the 12th day after the operation, the patient resumed oral feeding. A normal diet was restored 1 month after the operation, and esophageal angiography showed no stenosis [Figure 1G–I].

Access this article online

Quick Response Code:



Website:

www.cmj.org

DOI:

10.1097/CM9.0000000000000831

Correspondence to: Xiao-Hong Chen, Department of Otolaryngology Head and Neck Surgery, Beijing Tongren Hospital, Capital Medical University, Beijing 100005, China. E-Mail: trchxh@163.com

Copyright © 2020 The Chinese Medical Association, produced by Wolters Kluwer, Inc. under the CC-BY-NC-ND license. This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

Chinese Medical Journal 2020;133(11)

Received: 17-03-2020 Edited by: Xiu-Yuan Hao

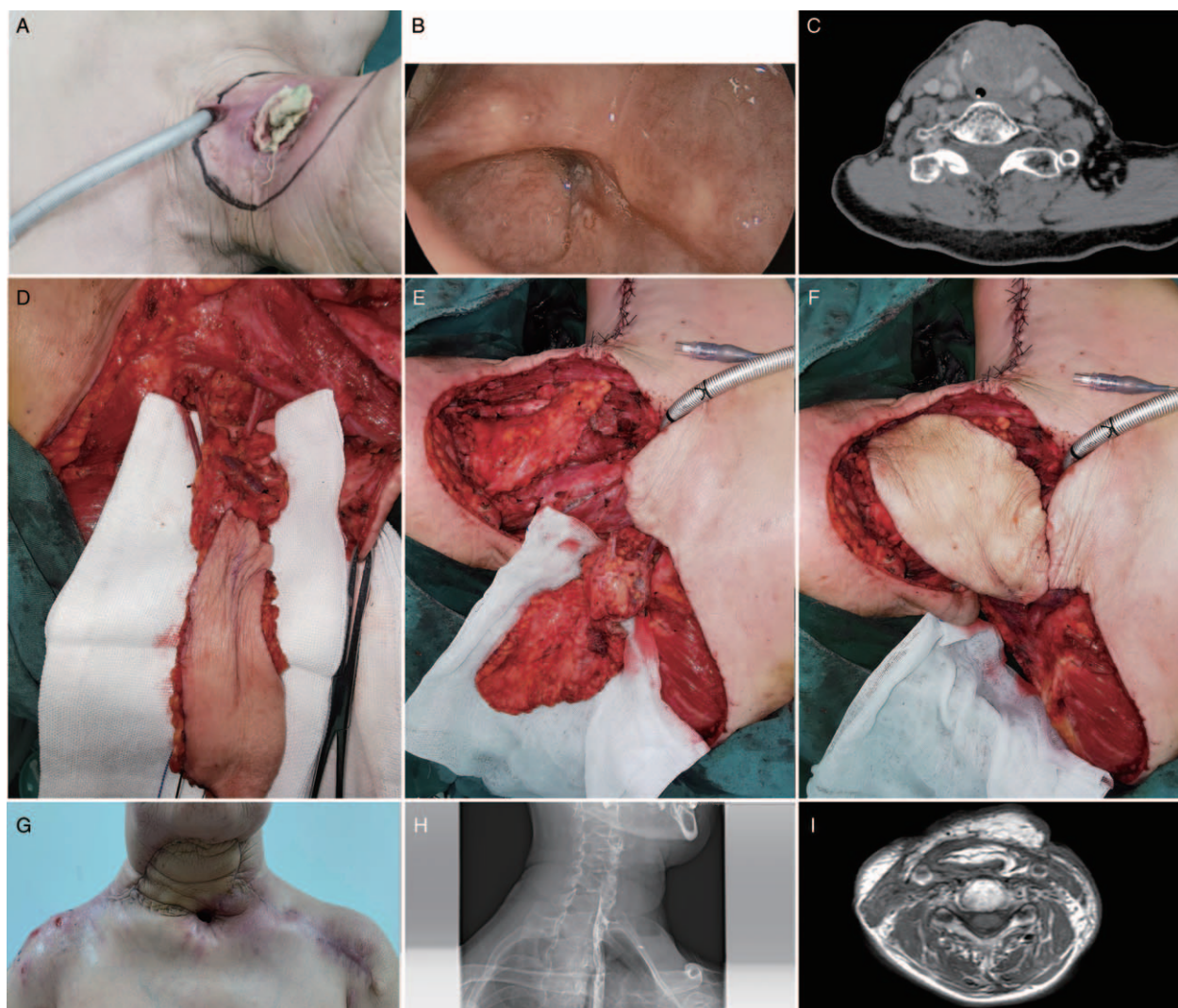


Figure 1: (A) Physical examination: swelling of the front neck, skin ulcers, ruptured area of about 2 cm × 1 cm. (B) Laryngoscopy: local glottic scar-like changes. (C) Neck computed tomography: axial view: Irregular soft-tissue masses can be seen in the laryngo-pharyngeal cavity, about 4.9 cm × 3.6 cm in size. (D) The lesions involved the skin of the neck and the left cervical sheath. Left supraclavicular artery island flap, 7 cm × 4 cm. (E) Right supraclavicular artery island flap, 10 cm × 7 cm. (F) The left skin flap was sutured to the posterior wall of the hypopharynx to repair the mucosal defect. The right skin flap was used to repair the anterior neck skin defect. (G) Appearance after repair. (H) Esophagography showed no stenosis 1 month after the operation. (I) Neck magnetic resonance imaging: axial view showed no significant flap atrophy 6 months after the operation.

Recurrent advanced laryngeal or hypopharyngeal cancer invades the surrounding tissue. Resection of the tumor may cause complex defects in the pharynx, cervical esophagus, and anterior cervical skin. Skin and mucosa should be repaired simultaneously. In particular, penetrating tissue defects, formed after resection of tumors that have recurred after radical radiation therapy, are difficult to treat. With the development of microsurgical techniques and tumor plastic surgery, free skin flaps and jejunum valve transplantation are widely used in head and neck tumor plastic surgery.^[1] Single-pedicled double-leaf anterolateral femoral skin flaps have been used to reconstruct oropharyngeal neck skin composite defects, and with a conventional diet restored after surgery.^[2,3] However, it is difficult to identify a suitable vascular pedicle for anastomosis in the neck receiving area of patients who have undergone neck radiotherapy as this increases the risk of surgery and limits the application of free flap transplantation in such defect repair. In recent years, based

on the experience of using pectoralis major myocutaneous flaps to repair head and neck tissue defects, a folded pectoralis major tissue flap has been designed to repair penetrating holes in the pharynx; however, this type of tissue flap is too bloated after folding. This can easily cause a local deformity and pharyngeal stricture, making it difficult to swallow post-operatively.^[4] Therefore, it is very important to identify local tissue which is thin, and with an abundant blood supply, yet large enough to repair the wound.

For the above reasons, we have identified the supraclavicular artery island flap to be a better alternative repair tissue compared with the pedicled local tissue flap. This flap is derived from branches of the transverse carotid artery. The concept of a supraclavicular artery island flap was proposed by Pallua *et al* in 1997,^[5] and it was reported that this tissue flap was successfully applied to eight patients with cervical contracture scars. This flap could be

designed with the correct shape and function, and a more detailed anatomical study of the flap was published in 2000.^[6] Subsequently, use of this flap has gradually increased in plastic surgery and in post-operative defect repair after head and neck tumors. In 2018, Trautman *et al* reviewed 33 published clinical studies of the superior clavicular artery island flap, and considered it to be an ideal choice for repairing facial and neck soft-tissue defects.^[7] Based on previous research, we have used bilateral superior clavicular artery island flaps to repair head and neck penetrative defects. Their advantages are: (1) The donor and receptor sites are in the same surgical field, preparation of the skin flaps is simple, and microvascular anastomosis is not required. (2) The skin flap is thin and flexible, and easy to shape and the post-operative function and shape recovery of the neck is good. (3) The donor area can be closed and stitched without affecting shoulder function. (4) Skin flaps are more suitable for patients with advanced age, or with many previous diseases, and for complex repair after tumor recurrence. Our post-operative results showed that bilateral supraclavicular artery island flaps could be used successfully to repair penetrative defects of the head and neck.

Admittedly, supraclavicular artery flaps also have their shortcomings. If the pre-operative radiotherapy field has included the supraclavicular area, the microcirculation in the flap will be affected, so selection should be careful, and the development and distribution of blood vessels in the supraclavicular artery should be clarified during the operation. In addition, intraoperative pathologic examination of cervical lymph nodes at levels IV and V was performed, and after confirming no tumor metastasis, the supraclavicular artery island skin flap was selected.

Primary repair of complex defects of the pharyngeal mucosa and neck skin is difficult, especially for patients with a history of surgery and pre-operative radical

radiation therapy. With strict selection from indications and the use of bilateral supraclavicular island flaps repair, this can be a safe, effective, and easy method with satisfactory post-operative results.

Conflicts of interest

None.

References

1. Yu P, Lewin JS, Reece GP, Robb GL. Comparison of clinical and functional outcomes and hospital costs following pharyngoesophageal reconstruction with the anterolateral thigh free flap versus the jejunal flap. *Plast Reconstr Surg* 2006;117:968–974. doi: 10.1097/01.prs.0000200622.13312.d3.
2. Tan NC, Yeh MC, Shih HS, Nebres RP, Yang JC, Kuo YR. Single free anterolateral thigh flap for simultaneous reconstruction of composite hypopharyngeal and external neck skin defect after head and neck cancer ablation. *Microsurgery* 2011;31:524–528. doi: 10.1002/micr.20906.
3. Selber JC, Xue A, Liu J, Hanasono MM, Skoracki RJ, Chang EI, *et al*. Pharyngoesophageal reconstruction outcomes following 349 cases. *J Reconstr Microsurg* 2014;30:641–654. doi: 10.1055/s-0034-1376887.
4. Burke MS, Kaplan SE, Kaplowitz LJ, Lotempio MM, Hicks WL Jr, Rigual NR, *et al*. Pectoralis major myocutaneous flap for reconstruction of circumferential pharyngeal defects. *Ann Plast Surg* 2013;71:649–651. doi: 10.1097/SAP.0b013e3182583e80.
5. Pallua N, Machens HG, Rennekampff O, Becker M, Berger A. The fasciocutaneous supraclavicular artery island flap for releasing postburn mentosternal contractures. *Plast Reconstr Surg* 1997;99:1878–1884. doi: 10.1097/00006534-199706000-00011.
6. Pallua N, Magnus Noah E. The tunneled supraclavicular island flap: an optimized technique for head and neck reconstruction. *Plast Reconstr Surg* 2000;105:842–851. doi: 10.1097/00006534-200003000-00003.
7. Trautman J, Gore S, Potter M, Clark J, Hyam D, Tan NC, *et al*. Supraclavicular flap repair in the free flap era. *ANZ J Surg* 2018;88:540–546. doi: 10.1111/ans.14263.

How to cite this article: Zhou J, Ding YM, Zhou MJ, Kuang YX, Ma TY, Chen XH. Application of bilateral supraclavicular artery island flaps in the repair of hypopharyngeal and cervical skin defects: a case report. *Chin Med J* 2020;133:1380–1382. doi: 10.1097/CM9.0000000000000831