

## Sternocleidomastoid Muscle Flap: An Option to Seal off the Esophageal Leakage after Free Jejunal Flap Transfer – A Case Report

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Necessary requirements for the successful management of an esophageal fistula are the following: functional closure of the defect, control of infection, shortened period of hospitalization, and minimal donor-site morbidity. A sternocleidomastoid (SCM) muscle flap meets those requirements. Furthermore, the SCM muscle flap is already a well established treatment for non-oncologic patients, although the procedure has received criticism for head and neck reconstruction in patients with malignant disease of the upper aerodigestive tract. In this report we describe the utility of a SCM muscle flap, as a buttress for repairing a frank clinical leak after esophageal reconstruction with a free jejunal flap, in a selected patient with a clinically N<sub>0</sub> neck. No clinical leakage was found postoperatively. After a two-year of follow-up, the patient could eat solids without the need for additional nutritional supplementation. No tumor recurrence was noted. (*Chang Gung Med J* 2009;32:224-9)

**Key words:** sternocleidomastoid muscle flap, jejunal flap, esophageal fistula

Significant challenges are associated with the management and treatment of an esophageal perforation or fistula. Approaches to both management and treatment thereof remain highly controversial. Recent series favored an aggressive approach.<sup>(1-6)</sup> The utility of the sternocleidomastoid (SCM) muscle flap for primary or reinforced repair of an esophageal perforation is well established on non-oncologic grounds.<sup>(6-8)</sup> The approach, however, has received criticism for head and neck reconstruction in patients with malignant disease of the upper aerodigestive tract. The major criticism of the SCM flap relates to the safety of preserving the muscle when there are regional nodal metastases. Moreover, modified neck dissections may allow for preservation of the SCM muscle, but the dissections may then compromise the blood supply. Therefore, the SCM muscle flap is not as widely used as the pectoralis major muscle flap to

seal off the cervical esophageal anastomotic leakage after cancer related reconstructions. The purpose of this report is to describe the utility of a SCM muscle flap as a buttress for repairing a frank clinical leak after esophageal reconstruction with a free jejunal flap in a selected patient with a clinically N<sub>0</sub> neck.

### CASE REPORT

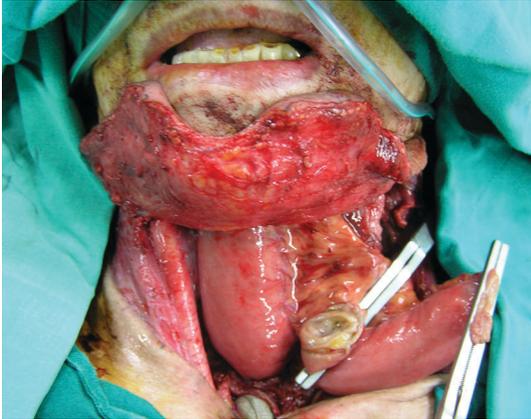
A 79-year-old man received 6600 cGy radiation treatment for a T1N0M0 squamous cell carcinoma of the larynx. After a 3 year period the patient had suffered a recurrence and underwent a total pharyngolaryngectomy, upper esophagectomy and bilateral neck dissection. A free jejunal flap was employed in the pharyngoesophageal reconstruction (Fig. 1). A complication with the neoesophagus was leakage at the right posterior aspect of the upper anastomotic site,

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**Fig. 1** A free jejunal flap was employed in the pharyngoesophageal reconstruction. Both ends of the monitor jejunal loop were clamped with intestinal clamp forceps.

noted clinically 5 days after the operation and confirmed by a barium esophagogram (Fig. 2). Removal of the monitor jejunal loop was scheduled 2 weeks after the free jejunal flap transfer. A frank clinical leak was associated with a neck infection and therefore an attempt was made to repair the fistula at the same time. Due to tissue friability, it proved difficult to achieve direct closure. The right SCM muscle flap was used to buttress the leakage at the upper junction of the jejunal flap.

### Operative procedure

General anesthesia was administered via the tracheostoma, and the patient was positioned supine with the neck in slight extension. The previous incision on the right of the neck was reopened. The upper esophageal anastomosis was identified and the location and extent of the leakage was determined. Intraoperative lavage with diluted methyl blue solution, administered from the mouth, was used to define the fistula and verify the effective repair of the defect. No leakage existed as the operative field remained unstained.

Two intraluminal nasogastric tubes were inserted for the purpose of stenting and drainage. The defect was repaired with an interrupted 2-0 polypropylene suture. In order to secure the successful sealing off of the leakage, the sternal head of the right sternocleidomastoid muscle was detached and rotated medially as a superiorly based muscle flap to reinforce the esophageal repair (Fig. 3). The SCM



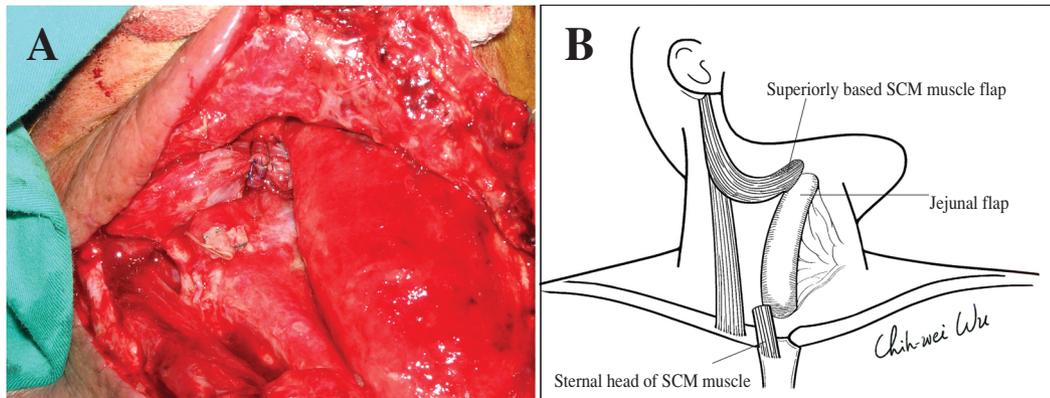
**Fig. 2** A barium esophagogram 13 days after the free jejunal flap transfer revealed leakage at the right posterior aspect of the upper anastomotic site.

muscle flap was inset on top of the repair. The split of the SCM was muscle carried through approximately two thirds of the muscle belly in its longitudinal direction without compromising the circulation.

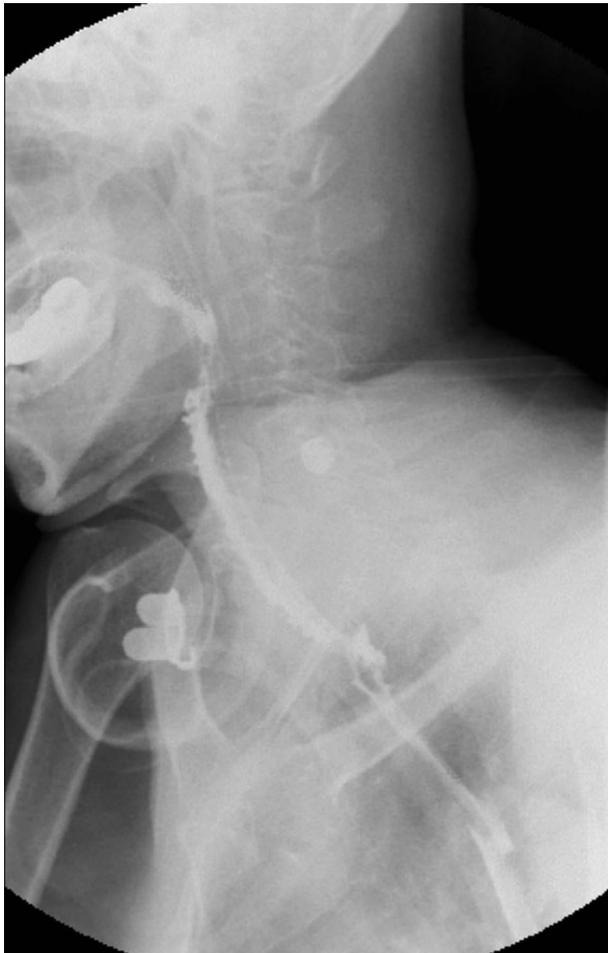
Postoperative feeding was given from jejunostomy. The patient was able to tolerate the full extent of the procedure. The neck infection subsided gradually, and no clinical leakage was found postoperatively. Two weeks postoperatively, a barium esophagogram revealed a patent esophagus without leakage from the upper esophageal anastomosis (Fig. 4). A two-year follow-up consultation revealed that the patient could eat solid food without the need for additional nutritional supplement. No tumor recurrence was noted.

### DISCUSSION

The SCM muscle flap is a well documented sur-



**Fig. 3** The sternal head of the right sternocleidomastoid muscle was detached and rotated medially as a superiorly based muscle flap. (A) intraoperative view; (B) illustration.



**Fig. 4** A barium esophagogram revealed a patent esophagus without leakage two weeks postoperatively.

gical alternative for head and neck reconstruction. The use of the SCM muscle was first reported by Jianu<sup>(9)</sup> in 1908 as a method to reanimate a paralyzed face. Muscle and myocutaneous flaps based on the SCM muscle have been well described by Owens,<sup>(10)</sup> O'Brien,<sup>(11)</sup> and Ariyan.<sup>(12-14)</sup> Classified by Mathes and Nahai as a type II muscle,<sup>(15)</sup> the SCM muscle has tripartite blood supply, and the dominant pedicle comes from the branch of the occipital artery entering on the deep surface of the upper third of the muscle belly. The two heads of the SCM muscle can be split cranially and the use of the sternal head through to the occipital artery allows the minor pedicle and the clavicular head to remain in situ. The procedure provides the safe SCM muscle flap reconstruction without the resulting possibility of a flat neck deformity.<sup>(16)</sup> The use of SCM muscle flaps in non-oncologic patients for repair of esophageal perforations caused by trauma<sup>(6,8)</sup> or iatrogenic injury<sup>(6,7)</sup> is already well documented.

It is difficult to mobilize wound edges for a tension-free closure with primary repair alone. The presence of nonviable tissue at the lesion together with poor soft tissue coverage of the repair site may result in the wound failing to heal. At our hospital, 41% of patients who receive treatment for esophageal perforation experience leakage after primary repair.<sup>(1)</sup> For these reasons, the muscle not only serves as a buttress reinforcing the repair, but also provides a well-vascularized tissue to improve the delivery of antibiotics, nutrients and growth factors involved in the healing of the wound.

The necessary requirements for successful management of esophageal fistula are the following: functional closure of the defect, control of infection, shortened period of hospitalization, and minimal donor-site morbidity. A SCM muscle flap meets those requirements in selected patients. Most esophageal fistulas close spontaneously, especially esophageal fistulas occurring proximally. Chang presented that spontaneous closure occurred in 7.4 weeks on average in patients with pharyngocutaneous fistula following free jejunal flap transfer. Furthermore, the rate of spontaneous fistula closure was higher in patients who had not received preoperative radiation therapy.<sup>(17)</sup> Unfortunately, delay in fistula closure causes inflammation and later stricture, in addition, the delay prolongs the period of hospitalization and the institution for adjuvant therapy. In our report, the SCM muscle flap seals off a frank clinical leak effectively in a patient who underwent preoperative radiation therapy. No clinical leakage is found postoperatively and no esophageal stricture occurs. The procedure shortens the period of hospitalization and prevents later complications. As an alternative, the pectoralis major (PM) myocutaneous flap has been used frequently in head and neck reconstruction. Furthermore, the utility of PM myocutaneous flaps, in the management of cervical esophageal anastomotic complications, have been reported.<sup>(18)</sup> Unlike the SCM muscle flap, the PM myocutaneous flap has a bulky appearance with distortion of the chest contour and requires a neighboring donor-site dissection. Several revisions are usually needed to obtain a satisfactory functional and cosmetic outcome.

When the SCM flap is applied in oncologic patients, safety is the major concern. In a clinically normal neck, modified neck dissection preserving the SCM muscle has been proven to be safe.<sup>(19)</sup> The dominant pedicle of the SCM muscle coming from the occipital artery is not manipulated during dissection. Nevertheless, flap-related complications are reported to be more likely if surgery is done after radical irradiation.<sup>(20)</sup> Most complications result from wound infection, dehiscence and superficial skin loss which are all related to the cutaneous portion of the SCM myocutaneous flap. The vascular pedicle of the SCM muscle is not compromised by previous radiation. Sebastian et al. published the largest series of SCM flaps for oral cancer reconstruction in 1994.<sup>(20)</sup>

In the series of 120 cases, total flap loss occurred in 7.3% of patients and nodal recurrence occurred only in 5.7% of ipsilateral necks that were pathologically N0. The SCM muscle flap is considered safe and reliable in a selected patient with a clinically N0 neck. The neighboring SCM muscle can afford a well-vascularized tissue patch for securing anastomotic leakage repair after cervical esophageal reconstruction with a free jejunal flap.

In summary, a SCM muscle flap is able to seal off anastomotic leakage after esophageal reconstruction with a free jejunal flap. This will take an extra 30 minutes. However, early healing is vital for future function. Leakage causes inflammation and later stricture, furthermore, it prolongs hospitalization and delays radiation therapy. Every means should be adopted to facilitate the treatment and healing of esophageal leakage. A SCM muscle flap is a safe procedure for a selected N0 patient.

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## 胸鎖乳突肌肉皮瓣用於治療自由空腸皮瓣轉移後的食道滲漏

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成功的處理食道瘻管必須符合下列要件：功能性關閉管壁缺陷、控制感染、縮短住院天數，以及不會造成皮瓣供給區病態。在非癌症病患中，使用胸鎖乳突肌肉皮瓣處理食道滲漏可滿足以上需求。不過，此皮瓣運用於上呼吸消化道癌症病患的頭頸部重建仍有爭論。在此篇報告中，我們於一位臨床分期 N<sub>0</sub> 的癌症病人，利用胸鎖乳突肌肉皮瓣做為支撐覆蓋於自由空腸皮瓣重建後的食道瘻管，成功地處理大量滲漏的問題。經過二年的追蹤，病人現在可以正常地進食固體食物，不需其他營養補充，沒有癌症復發。(長庚醫誌 2009;32:224-9)

**關鍵詞：**胸鎖乳突肌肉皮瓣，空腸皮瓣，食道瘻管

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