European Annals of Otorhinolaryngology, Head and Neck diseases xxx (2017) xxx–xxx

Available online at
ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com/en

Technical note

Modification of fasciocutaneous radial forearm free flap to achieve two-layer closure during reconstruction of circumferential hypopharyngeal defects

M. Abu-Serriah [a,*], S. Loughran [b]

[a] Department of Oral & Maxillofacial Surgery, Oral Health, Auckland District Health Board, 1051 Auckland, New Zealand
[b] Department of Ear Nose and Throat, Manchester Head and Neck Cancer Centre, Manchester Royal Infirmary, Central Manchester University Hospitals NHS Foundation Trust, Manchester, United Kingdom

ARTICLE INFO

Keywords:
ALT
RFFF
Anastomosis
Pharyngectomy
Tubed
Radial
Forearm

ABSTRACT

Circumferential defects of the hypopharynx are a reconstructive challenge. Various local, regional and free flaps have been described with each having advantages and disadvantages in terms of functional outcomes. The fasciocutaneous radial forearm free flap (RFFF) is one of the most common free flaps used for reconstructing circumferential hypopharyngeal defects. The skin paddle is pliable and reasonably matches the native hypopharyngeal wall. It is easy to raise, has predictable vascular anatomy and a long pedicle. Unlike the anterior lateral thigh (ALT) flap, the RFFF is associated with higher rates of pharyngocutaneous fistula. This was thought to be due to the difficulty in achieving two-layer closure. However, in a post treatment neck or in patient with large body habitus, the use of ALT or other free flaps may not be possible leaving the RFFF as the only viable option. To aim to reduce the risk of fistula and wound dehiscence, we describe a novel design of RFFF, which provides two-layer closure. We believe that our design gives the reconstructive surgeon another reconstructive option, which should be considered in challenging circumferential hypopharyngeal defects.

1. Introduction

The use of free tissue transfer for reconstructing circumferential hypopharyngeal defects is common practice [1]. Tubed anterior lateral thigh (ALT) free flap is perhaps the most common free flap used for circumferential hypopharyngeal reconstruction in the United Kingdom (UK). However, in patients with large habitus, or those with post treatment necks due to previous bilateral neck dissection, radical or adjuvant radiotherapy the use of ALT may not be possible.

Fasciocutaneous radial forearm free flap (RFFF) is an alternative option but it is associated with relatively high fistulation rate requiring prolonged hospital stay and the potential complications of the fistula.

We describe in this report a modification of the traditional tubed fasciocutaneous radial forearm free flap (T-RFFF), which we believe may reduce the risk of wound dehiscence hence fistula formation.

2. Surgical technique

A 64 year old right hand dominant Caucasian man who had T3N0 squamous cell carcinoma (SCC) of the supraglottis had been treated with total laryngectomy, bilateral neck dissection, followed by adjuvant radiotherapy in 2010. In March 2016, he presented with a new primary SCC of the neopharynx. This was subsequently treated with circumferential resection of hypopharynx and reconstruction with a new design of T-RFFF.

Tumour resection was carried out through the old Gluck-Sorenson skin incision scar.

Due to previous neck dissection and adjuvant radiotherapy, harvesting T-RFFF was delayed until suitable blood vessels for microvascular anastomoses were identified. The length of the hypopharyngeal defect was first measured using a ruler and its width was determined using size 12 Montgomery salivary bypass tube (MSBT). We recommend the use of MSBT circumference multiplied by 1.5 or 2 times at the oesophageal end to account for any future scarring and to minimise the risk of stricture.

This information was used to assist the design of a trapezoid skin paddle at the distal forearm (Fig. 1) as described previously [2].

* Corresponding author.
E-mail address: m.abuserriah@gmail.com (M. Abu-Serriah).

http://dx.doi.org/10.1016/j.anorl.2016.11.014
1879-7296/

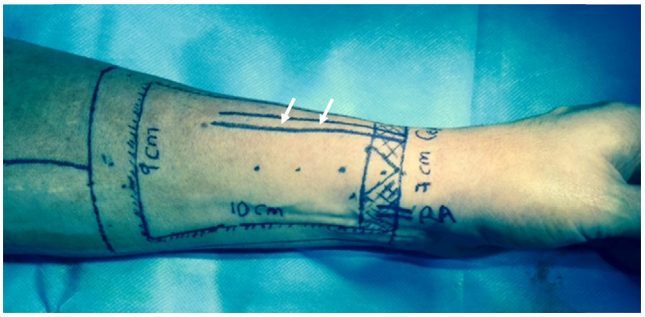

Fig. 1. Trapezoid skin paddle was marked at the distal forearm, incorporating the cephalic vein (white arrow). In this instance, the dimension of the distal (oesophageal) end was 70 mm, while the proximal end (base of tongue) was 90 mm and a length of 100 mm. A small triangle (20–25 mm at base) was incorporated distally; this was designed to fit within a slit incision into anterior cervical oesophageal wall to reduce risk of stricture. A margin of extra skin of 15 mm distally and 20 mm proximally, and on ulnar and radial aspects of the skin paddle.

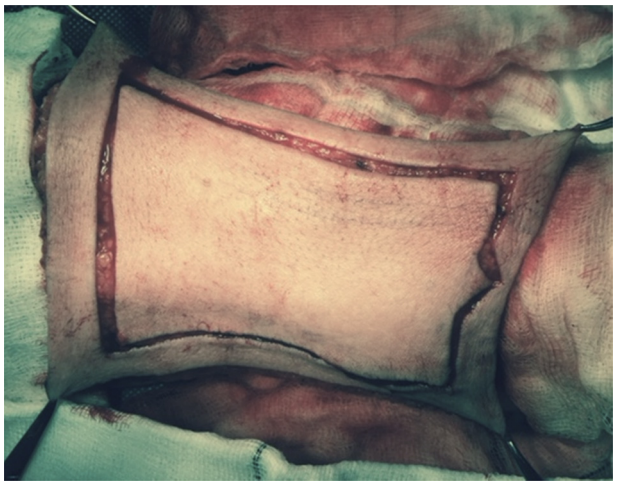

Fig. 2. A margin of vascularised fasciocutaneous tissue was included all around skin paddle. This was cut down to subcutaneous fat to assist fashioning skin paddle into a tube.

A skin paddle of 10 cm long and 7 cm wide at the distal end and 9 cm wide at the proximal end was marked (Fig. 1). The paddle was designed in such a way that it included the radial pedicle and the cephalic vein. A small triangle was incorporated in the flap design at the distal end (2 cm–2.5 cm at the base and 1.5 cm–2 cm long). An additional 1.5 cm strip of fasciocutaneous tissue was harvested on the ulnar and radial sides of the skin paddle and distal end (Fig. 2). At the proximal end, a 2 cm fasciocutaneous tissue margin was also included (Fig. 2).

Additional margins were cut to subcutaneous fat only leaving skin strips connected to skin paddle via vascularised subcutaneous fat and fascia (Fig. 2). At the distal and proximal ends, additional margins of fasciocutaneous tissue were freed from the underlying pedicle and cephalic vein. These steps are essential to facilitate the fashioning of the skin paddle into a tube and assist flap inset.

The T-RFFF was raised in a subfascial plane in a conventional manner.

De-epithelialisation of additional skin margins was then carried out leaving bleeding deep epidermal/dermal layer behind (Fig. 3). A Montgomery salivary bypass tube size 12 was then used to fashion skin paddle into a tube using 3/0 Vicryl horizontal or vertical mattress sutures approximately 5 mm apart (Fig. 4).

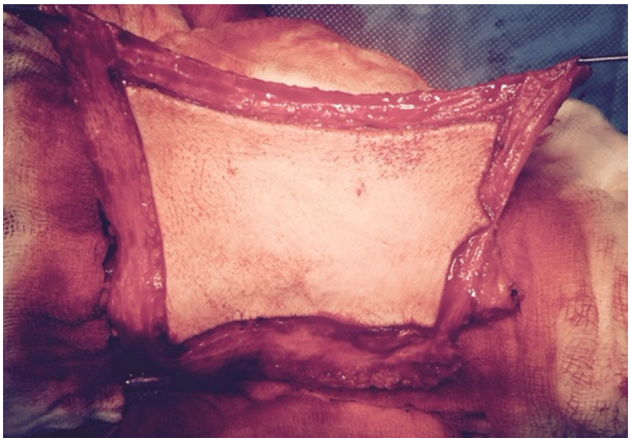

Fig. 3. De-epithelialisation of the additional skin margins. Note skin paddle design and bleeding de-epthilialised margins.

During flap inset, the suture line of T-RFFF was positioned posteriorly and left resting on the prevertebral fascia. The inferior (oesophageal) and the posterior part of the superior (base of tongue) ends of the T-RFFF were inset using a parachuting suturing technique. The anterior part of the tube at base of tongue was sutured under direct vision after passing a nasogastric feeding tube through the MSBT.

Water-tight second layer closure was carried out by suturing the de-epithelialised skin margins on ulnar and radial side to the prevertebral fascia (Fig. 4). The superior de-epithelialised skin margin was laid over the anastomotic line and was sutured to the base of tongue, while the inferior margin was allowed to drape over the oesophageal end anastomosis without suturing.

Microvascular anastomosis was then carried out uneventfully with end to side radial artery to external carotid artery proximal stump, and end to side vena commitants common stump and cephalic vein to internal jugular vein using 9/0 nylon.

A Swartz–Cook Doppler was used to monitor arterial flow. A full thickness skin graft was harvested from the lower abdomen and used to reconstruct the left forearm donor site defect. The patient made uneventful recovery and was discharged from hospital within two weeks. Barium swallow at day 10 postoperatively showed no salivary leak and the patient recommenced oral intake. Six months postoperatively, the patient is managing liquid diet orally and left forearm donor site healed well.

3. Discussion

Reconstruction of circumferential hypopharyngeal defects following pharyngolaryngectomy is a surgical challenge. Reconstruction can be achieved with either locoregional (e.g. pectoralis major myocutaneous flap, deltopectoral flap, latissimus dorsi, and gastric pull-up) or free flaps (e.g. radial forearm free flap [RFFF], and anterolateral thigh [ALT] free flap and free jejunal flap [FJF]) [1].

Donor site selection depends on multiple factors such as patient habitus and comorbidity, neck status, size of defect, vascular status of the neck, the surgeon's technical skills and available facilities.

The disadvantages of the pectoralis major and latissimus dorsi flaps include excessive bulk, gravitational pull potentially leading to post-operative complications such as wound dehiscence and pharyngo-cutaneous fistula, particularly in a previously irradiated field [3]. Functional outcome is poorer following pedicled flap compared to free flap reconstruction. In a large series of the patients who underwent reconstruction with a pedicled flap, only 9% resumed normal feeding after 6 months compared to 62% of patient who had free flap reconstruction [3].

Please cite this article in press as: Abu-Serriah M, Loughran S. Modification of fasciocutaneous radial forearm free flap to achieve two-layer closure during reconstruction of circumferential hypopharyngeal defects. European Annals of Otorhinolaryngology, Head and Neck diseases (2017), http://dx.doi.org/10.1016/j.anorl.2016.11.014