Reconstruction Challenge — Combined Use of Pectoralis Major and Gastric Pull-up Flaps for Massive Naso-oropharyngeal/Oesophageal Defects

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Massive defects of the upper aerodigestive tract present a reconstructive challenge. We report a case in which a large defect of the naso-oropharyngeal and oesophagus was reconstructed with a combination of a gastric pull-up and a pectoralis major muscle flap. Postoperative function was good and survival was in excess of 16 months. The history of such reconstructions and possible alternative techniques are also discussed. (Asian J Surg 2002;25(4):337–40)

INTRODUCTION

Adequate ablation of squamous cell carcinoma of the upper aerodigestive tract is essential both for survival as well as for local control. Following ablative surgery, proper three-dimensional reconstruction is necessary for a good quality of life. Achieving such a functional reconstruction is notoriously difficult in patients who may have a huge tumour extending from the oesophagus to the nasopharynx. We report the combined use of a gastric pull-up and a pectoralis major muscle flap for reconstruction following the resection of synchronous tumours of the oesophagus and oropharynx that extended into the nasopharynx.

CASE REPORT

A 62-year-old man, who was a previous chronic smoker and drinker, presented to our unit with a 2-month history of painless, progressive dysphagia associated with a choking sensation. Physical examination revealed multiple right cervical lymph nodes, ranging from 3 cm to 6 cm and involving nodal levels II to IV.

Oesophago-gastro-duodenoscopy revealed a right piriform fossa tumour (Figure 1 & 2), which involved the epiglottis, and extended along the right posterolateral oropharyngeal wall up into the naso-oropharyngeal. A further synchronous tumour was found in the oesophagus and biopsies of both sites confirmed moderately-differentiated squamous cell carcinoma. Neck ultrasound (US) showed multiple bilateral lymph nodes, but systemic work-up, including thoracic computed tomography and liver US showed neither mediastinal lymph nodes nor liver metastases.

The right piriform fossa tumour was resected en bloc, and the oropharynx and right nasopharynx (including the eustachian tube) were removed. Total laryngectomy and oesophagectomy were performed. The oesophageal tumour was resected using a laparoscopic transthalial technique. In addition, total thyroidectomy, right radical neck dissection and modified left radical neck dissection were performed.

Reconstruction of the massive aerodigestive tract defect was achieved with a gastric pull-up, the stomach being fully mobilized laparoscopically and pulled up...
and inset to the tongue base anteriorly (Figure 3). The oropharyngeal and right nasopharyngeal defects were reconstructed with a right pectoralis major muscle flap. The flap and the pulled-up stomach were finally inset together, at the level of the base of the tongue in the posterior pharynx (Figure 4).

The patient had a smooth postoperative recovery and a methylene blue dye test undertaken 2 weeks later confirmed no leakage, following which an oral diet was resumed. Final histology showed all margins had been cleared but with a close margin of 3 mm at the superior nasopharynx. The nodal yield was 32, of which three were positive (involving both sides of the neck). Accordingly, he was offered adjuvant radiotherapy. The patient remains well and had good function at 16 months of follow-up.

**DISCUSSION**

Surgery, with or without adjuvant therapy, remains the treatment of choice for carcinoma of the oesophagus. Nonetheless, reconstruction after laryngopharyngectomy or pharyngo-laryngo-oesophagectomy has always been a surgical challenge. As with all major

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Figure 1. Right piriform fossa tumour involving the epiglottis, extending along the right posterolateral oropharyngeal wall up to the naso-oropharynx.

Figure 2. Post-contrast T1-weighted coronal magnetic resonance imaging scan showing the extent of the tumour from the piriform fossa to the nasopharynx.

Figure 3. The tumour was excised and the stomach was fully mobilized with laparoscopy; it was pulled up and inset to the tongue base anteriorly.
cancer resections, a one-stage technique with a short hospital stay and low morbidity and mortality should be the goal.

Early described techniques range from the use of a controlled fistula,5 to free tissue grafting6 and local mucosal flaps.7–9 However, all these techniques tended to compromise the resection margins in order to attempt reconstruction. Prosthetic oesophageal replacement was employed in the 1950s without success.10–12 Gastric transposition was first reported in 1949 by Shefts and Fischer13 and gained wide acceptance. The colon and jejunum have also been used for replacement of the thoracic oesophagus, but difficulty is often encountered in mobilizing an adequate vascularized segment for the cervical oesophagus.14 Microvascular intestinal transfer may help overcome this problem, and free jejunal flaps have been commonly used. Nonetheless, there is a significant size discrepancy between the diameter of the nasopharynx and the jejunal segment, and stretching or spatulation of the upper jejunal end is often necessary.15 Furthermore, the technique has a reported complication rate of 17% within the neck and 2.5% in the abdomen, the most common complications being wound dehiscence and peritoneal adhesions.15 Free, radial forearm flaps provide a thin pliable tissue for reconstruction but may only be used for reconstruction of small lengths.

Pedicle flaps offer a reliable method of reconstruction; the deltopectoral flap has been useful for the reconstruction of the pharynx and the cervical oesophagus, although its major limitation is the concern regarding the vascularity of its distal end.14 This often requires a second operation to inset the flap and, as a result, leads to a delay in adjuvant radiotherapy.

The pectoralis major as a tubed flap or an onlay flap for postoesophagectomy reconstruction is widely used in the reconstruction of head and neck defects after cancer resection. Its pedicle allows reconstruction to be achieved to the level of the infratemporal fossa. Its robust blood supply makes it a reliable means of reconstruction in well-selected cases.14 Although it is bulky and, as a result, a tube flap may not always be possible.

The reconstructive challenge becomes even greater with the extension of tumour into the oesophagus and nasopharynx with synchronous lesions, as illustrated in this case. Free jejunal flaps may not be large enough in circumference to reconstruct the nasopharynx, and a gastric pull-up can only allow reconstruction up to the tongue base, as further stretching of the stomach into the nasopharynx may compromise blood supply and lead to anastomotic dehiscence. Therefore, the postresection defect in the oronasal pharynx requires an additional flap for reconstruction. The pectoralis major was considered the flap of choice, being reliable with its excellent blood supply providing further protection for the gastric pull-up flap anastomosis. In this case, gastric mobilization was carried out laparoscopically, further minimizing pulmonary compromise and general morbidity of the patient.

**CONCLUSION**

In extensive carcinoma of the upper aerodigestive tract, uncompromised resection becomes possible with reliable one-stage reconstruction. Such reconstruction is possible with a combination of reliable flaps—in this case, pectoralis major flap combined with a gastric pull-up. Laparoscopic mobilization of the stomach further reduces surgical morbidity and enhances postoperative recovery.

**REFERENCES**

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