How I Do It

Novel method of closing a tracheo-oesophageal fistula using a de-epithelialized deltopectoral flap


Abstract
The authors describe a novel use of a de-epithelialized deltopectoral flap for the closure of tracheo-oesophageal fistulae, which have been resistant to other methods of closure.

Introduction
Speaking valves following laryngectomy require the creation of a tracheo-oesophageal fistula (TOF). If the valve is removed due to poor patient compliance, recurrent infections or leakage, for example, the fistula may be closed using conservative treatment in the majority of cases. This involves keeping the patient nil by mouth along with the use of a nasogastric feeding tube for approximately 10–14 days.

If this conservative method fails, a variety of surgical techniques for closing the TOF have been described. These include purse string sutures, dermal fat grafts, local flaps, and regional flaps.

The authors describe the first clinical case of a novel way of closing a TOF using a modification of the deltopectoral flap.

Fig. 1
Pre-operative markings of flap with X marking second intercostal perforator. TOF visible above endotracheal tube.

Fig. 2
Flap raised.

Fig. 3
Subcutaneous tunnel created over the clavicle.

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Accepted for publication: 27 August 2004.
Technique

The trachea is separated from the oesophagus exposing the TOF and stripping the trachea of tissues for approximately 2 cm above and below the fistula. A narrow deltopectoral flap is designed based on the second intercostal perforator vessels (Figure 1). A flap measuring 13 cm (3 cm in width allowed sufficient length not only to reach the trachea without tension but also to be wrapped around it. The flap is raised from distal to proximal (Figure 2). Care is taken at the base of the flap to identify and preserve the axial vessels. The flap is then de-epithelialized so that it can be tunneled underneath the intervening skin bridge between the base of the flap and the trachea. A subcutaneous tunnel is fashioned to run over the clavicle using blunt dissection (Figure 3). After passing the flap under this tissue bridge it is angled to run in the depth of the wound between the trachea and oesophagus and is inset, using absorbable sutures in such a way as to cover approximately half the circumference of the trachea at the level of the fistula (Figure 4). The skin flap donor site is closed directly (Figure 5). The patient is fed via a nasogastric tube and kept nil by mouth for 10 days. There is commencement of oral fluids on day 10 if no leak is noted. The patient then starts on a build-up regimen from liquids to a normal diet. Review of the patient three months later showed a healed donor site and epithelialization of the TOF (Figures 6 and 7).

Discussion

Operating in an already scarred field complicates the surgical closure of tracheo-oesophageal fistulae. Vascularization of dermal fat grafts may be further compromised by radiation-induced changes. Local flaps, such as the sternocleidomastoid flap, were excluded in the present case. The authors felt that to design a local flap of sufficient length could result in failure due to its questionable vascularity because of the patient's previous surgery and post-operative radiotherapy. Regional flaps such as pectoralis major flaps provide well-vascularized tissue. However, the bulky nature of the flap may compromise breathing or swallowing. The cutaneous portion of the flap when inserted into the TOF may herniate significantly into the trachea. By de-epithelialization of the flap, Shindo et al., have shown that the risk of prolapse is reduced and that the raw surface of the muscle, inset into the TOF, will re-epithelialize within two weeks. The donor site from these myocutaneous flaps may not close primarily and would therefore require a skin graft. The authors have modified the original description of the deltopectoral flap by basing the flap on a single perforator. In this way it is possible to provide a well-vascularized, thin mobile flap with a large arc of rotation. It provides soft tissue interposition between the trachea and oesophagus without excessive bulk. The direct closure of the donor site is also an advantage when compared to other myocutaneous flaps.
References


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Mr A. McMurtrie takes responsibility for the integrity of the content of the paper.
Competing interests: None declared