

Split Latissimus Dorsi Muscle Flap Repair of Acquired, Nonmalignant, Intrathoracic Tracheoesophageal and Bronchoesophageal Fistulas



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The development of a fistula between the tracheobronchial tree and oesophagus due to nonmalignant causes is uncommon. Division of the fistula with muscle flap interposition eliminates contact between the tracheobronchial segment and the oesophagus, theoretically decreasing the chance of recurrence as well as providing a robust blood supply to aid in healing. The split latissimus dorsi muscle flap is a well-suited flap for such repairs because of the ability to simultaneously cover two separate apertures (tracheobronchial and oesophageal). The authors describe the split latissimus dorsi muscle flap with step-by-step technique for repair of intrathoracic aerodigestive fistulas.

Keywords

Fistula • Trachea • Bronchus • Esophagus • Reconstruction

Anatomically, and in terms of clinical manifestations, there is minimal distinction between tracheoesophageal and bronchoesophageal fistulas, so they are often collectively referred to as aerodigestive fistulas. Aerodigestive fistulas are a relatively common complication of thoracic malignancies, and stenting is used as a temporising measure for malignant fistulas because of the poor prognosis. Definitive surgical repair is preferred for nonmalignant fistulas because of the otherwise normal life expectancy. Arnold and Pairolero have published extensively on the benefits of muscle flaps for numerous intrathoracic pathologies [1]. However, there is a lack of large studies comparing techniques for nonmalignant aerodigestive fistulas because of the infrequency of this condition.

The latissimus dorsi muscle is considered a workhorse flap by many reconstructive surgeons because of its versatility and reliability. The ability to surgically split the latissimus

muscle was originally described by Tobin in 1981 [2,3]. Anatomic studies have demonstrated a consistent proximal branching pattern of the thoracodorsal vessels into transverse (medial) and descending (lateral) branches, allowing the latissimus muscle to be split into two separate hemiflaps [2,4]. This flap modification is presented for repair of intrathoracic aerodigestive fistulas.

Patient Selection

Patients with aerodigestive fistulas typically suffer recurrent aspirations as oral intake passes into the oesophagus, through the fistula, and into the lungs. As a result, these patients are often critically ill with pneumonia and severely malnourished. Surgical repair should be deferred in the critically ill patient until the pneumonia has resolved and until adequate nutrition laboratory values are met, as a

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higher rate of complications or mortality would be expected. We recommend insertion of a tube gastrostomy or jejunostomy in the acute setting. The patient should then remain nothing per os with enteric tube feeds for weeks to months until his or her weight increases and nutrition parameters are met. Endoscopic stent placement across the fistula may be attempted, but stents frequently slide out of position over time without the patient immediately realising; as a result, patients develop recurrence of aspiration events, which further set-back time for a safe definitive repair.

Technique

The oesophagus and tracheobronchial tree are best approached from the patient's right side, so the patient should be placed in the left lateral decubitus position. For fistulas involving the left mainstem bronchus, a right-sided approach is also preferred because of the obstruction posed by the aorta when entering the left chest. A left bronchoesophageal fistula is illustrated in the figures as an example; the photographs presented are of a 52 year-old male with an idiopathic bronchoesophageal fistula.

A standard posterolateral thoracotomy incision is made in the skin overlying the right fifth intercostal space. Normally, the latissimus muscle is divided when performing a thoracotomy, so attention must first be directed toward harvesting the latissimus prior to entering the chest. Sufficient access to the entire latissimus muscle can be obtained through the thoracotomy skin incision by elevating superior and inferior skin flaps. With the aid of a lighted retractor for improved visualisation, the dissection should be continued as far caudally as possible to identify the origin of the latissimus at the iliac crest and lower ribs. In a similar fashion, dissection should be extended cranially toward the latissimus insertion at the humerus. The entire latissimus muscle is then detached close to its origin to allow for adequate length to reach deep into the thoracic cavity. As the latissimus is elevated toward its insertion, the thoracodorsal artery is identified by hand-held Doppler. The thoracodorsal neurovascular hilum exits the axilla and runs along the deep surface of the latissimus muscle 2.5 cm from anterior (lateral) edge. The artery bifurcates 4 cm distal to the inferior scapular border. The descending (lateral) branch continues distally parallel to the anterior (lateral) muscle edge. The transverse (medial) branch courses parallel to the superior border of the muscle, 3.5 cm from the edge. An arterial branch to the serratus anterior muscle is identified proximal to the neurovascular bifurcation and divided. The latissimus muscle is then split between its two main vascular branches (Fig. 1). The branching pattern is sufficiently constant to permit splitting the muscle without visualising the vascular anatomy [3]. The muscle should then be covered with a moist sponge and tucked beneath the superior skin flap while the intrathoracic portion of the operation commences.

When the oesophagus and tracheobronchial tree are identified, the space between these structures is carefully

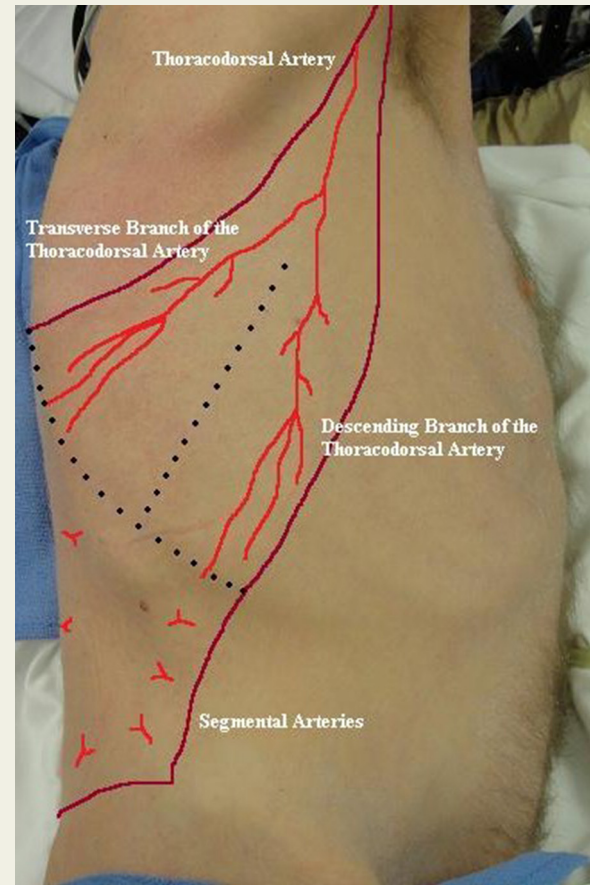


Figure 1 The vascular anatomy of the latissimus dorsi muscle depicted is the basis for splitting the flap. The dotted lines designate the pattern for division of the muscle into two hemiflaps.

developed. Following division of the fistula, an aperture remains in the posterior membranous wall of the tracheobronchial segment and the anterior wall of the oesophagus (Fig. 2). The oesophageal aperture is repaired primarily in two layers, and the tracheobronchial aperture is left open to be plugged with muscle rather than sutured closed.

The flap's route of entry into the thoracic cavity is then created by removing a 5 cm segment of the second or third rib in the midaxillary line. Both hemiflaps are then rotated anteriorly along a common pedicle and passed superior to the superior border of serratus anterior muscle into the chest. The long thoracic nerve to serratus anterior must be identified prior to passing the latissimus muscle so that the nerve is not injured. One hemiflap is parachuted down to plug the open tracheobronchial aperture via "U" stitches placed circumferentially around the defect; the other hemiflap is parachuted down in a similar fashion to buttress the primarily repaired oesophageal aperture (Fig. 3). Either hemiflap may be inset at either location as long as neither is twisted in a way that compromises blood flow. Redundant muscle tissue often protrudes from between the trachea and oesophagus on

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