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Short Communication

The posterior approach to the thoracodorsal vessels for microsurgical free tissue transfer

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ABSTRACT

The latissimus dorsi (LD) muscle is a workhorse flap in reconstructive surgery (e.g., breast reconstruction, chest wall defects, and lower limb trauma). The thoracodorsal artery and its venae comitantes supply this muscle. Recipient vessel options for microsurgical free flap reconstruction of the posterior thorax and lower back are limited. The thoracodorsal vessels are an excellent option due to their reliable anatomy and ease of access. In circumstances when the patient is best positioned prone, the posterior approach to access the thoracodorsal vessels is advantageous. We describe the technique to identify and isolate these vessels via a posterior approach.

Introduction

The thoracodorsal artery and its venae comitantes supply the latissimus dorsi (LD) muscle. This muscle is frequently used as a flap in reconstructive surgery (e.g., breast reconstruction, chest wall defects, and lower limb trauma). Surgeons usually encounter the thoracodorsal vessels when raising the LD either through the mid-axillary approach or through an incision along the line of the muscle free border, with the patient either in lateral decubitus or supine. In these situations, the vessels

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are readily found on the deep surface of the LD when dissection proceeds caudal to cephalad. In addition, thoracodorsal artery perforator (TAP) flaps require dissection of the intramuscular perforator of the thoracodorsal pedicle.[1] During breast reconstruction, the thoracodorsal vessels may be used as recipient vessels for microsurgical free tissue transfer, again exposing them through the anterior approach.[2] However, there are circumstances when the patient is best positioned prone, for instance for microsurgical reconstruction of the lumbar-sacral region or posterior lower limb and here a posterior approach to access the thoracodorsal vessels is valuable but less well known. We describe the technique to identify and isolate these vessels via a posterior approach.

Anatomy

The subscapular artery arises from the third part of the axillary artery; it is the largest branch. It gives rise to the circumflex scapular artery which forms anastomotic connections with the dorsal scapular artery. It also branches into the thoracodorsal artery. The thoracodorsal artery supplies the serratus anterior muscle via a large constant branch. It then continues caudally and reaches the deep surface of the LD. The artery then divides into two primary muscular branches; the transverse and vertical branches. Each primary branch further subdivides into many intra-muscular vessels.[3] Anatomic variations have been described where the thoracodorsal artery arises directly from the second part of the axillary artery,[4] or from the lateral thoracic artery, or from a common trunk which also branches into the lateral thoracic and circumflex scapular arteries. The lateral thoracic artery can also be a branch off the thoracodorsal artery. An accessory thoracodorsal artery has also been described.[5]

The LD originates from the spinous processes of the lower six thoracic, lumbar, and upper sacral vertebrae, as well as the thoracolumbar fascia, posterior third of the iliac crest, the angle of the scapula (variable), and ribs nine to twelve.[6] It inserts onto the medial crest of the bicipital groove of the anterior humerus. The latissimus dorsi muscle is therefore an adductor, extender, and internal rotator of the arm. The teres major muscle (TM) arises from the posterior surface at the inferior angle of the scapula and travels cephalad and obliquely to insert also onto the medial crest of the bicipital groove of the humerus anteriorly, often via a tendon that is conjoint with that of LD. The TM, therefore, has a similar functional vector to the LD, but adducts the humerus solely to the scapula and has no chest wall attachment.

Figure 1. View of the right posterior shoulder and scapula with a line marked from the inferior angle of the scapula towards the axilla, denoting the course of the teres major muscle. The skin incision line is placed just below this to coincide with the interval between teres major and latissimus dorsi.

Figure 2. The superior (medial) border of the latissimus dorsi has been released from the teres major muscle.

Figure 3. Gentle retraction of the teres major medially and latissimus dorsi laterally opens up the plane. Beneath can be seen the loose areolar tissue and fat protecting the thoracodorsal vessels.

Technique

The patient is positioned prone with the arm abducted. The inferior angle of the scapula is palpated and marked. A line is drawn from the inferior scapula angle towards the axilla. A parallel line is marked just caudal to this and this will be the skin incision line (Figure 1). The skin incision is made and dissection is performed straight down to the fascia with monopolar diathermy. This fascia is highly mobile and Adson's forceps can be used to elevate it and retract it caudally in order to facilitate the identification of the intermuscular plane between TM and LD. A layer of areolar tissue and intermuscular fat will help to identify the superior (medial) border of the LD. Dissection is continued in this plane to enter the space between the LD and TM (Figure 2). This plane is not perpendicular to the body surface but is oblique (superficial and lateral to medial and deep) as TM's lateral border overlies the medial border of LD. Gentle retraction of TM medial and LD laterally opens the plane and reveals the loose areolar tissue and fat covering the thoracodorsal artery and veins (Figure 3). The loose areolar tissue is released to expose the thoracodorsal vessels. The vessels are then ready to be prepared under the microscope in the usual manner for receiving a free flap or, when isolated, as the pedicle for an LD flap (Figure 4).

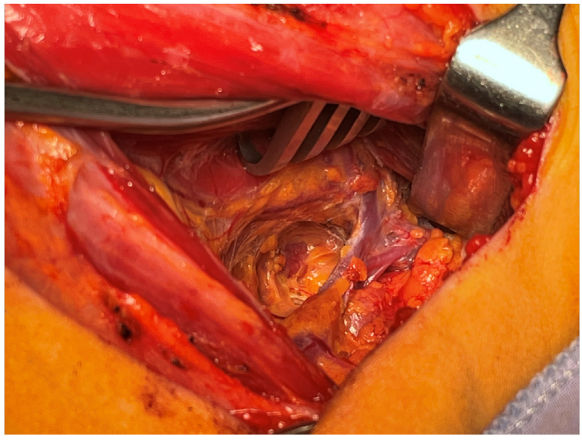

Figure 4. After releasing the areolar tissue and fat around the vessels, the thoracodorsal artery and its venae comitantes can be seen entering the posterior surface of the latissimus dorsi muscle.

Summary

Recipient vessel options for microsurgical free flap reconstruction of the posterior thorax and lower back are limited. The thoracodorsal vessels are an excellent option due to their reliable anatomy and ease of access. The posterior approach is less well known but nonetheless an important component of the repertoire of the reconstructive microsurgeon.

Author contribution statement

Ibrahim Natalwala wrote the manuscript. Chung Yan Vernon Lee obtained the clinical images and edited the manuscript. Simon Kay supervised the project and edited the manuscript.

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Ethical approval

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Declaration of Competing Interest

All authors do not have any conflict of interest

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