



CASE REPORT

# Preservation of lateral thoracic artery to improve vascular supply of distal skin without compromising pedicle length in harvesting pectoralis major myocutaneous flap

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## KEYWORDS

Pectoralis major myocutaneous flap (PM flap);  
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**Summary** The pectoralis major myocutaneous (PM) flap is supplied by three arterial systems. The lower chest skin of the PM flap is mainly supplied by the branches of lateral thoracic artery and internal mammary artery. The conventional harvesting technique for head and neck reconstruction utilizes single arterial supply from the pectoral branch of thoracoacromial artery. The distal skin island of PM flap is therefore compromised and requires indirect blood supply by communicating vessels. In harvesting the PM flap, the pectoralis minor muscle is divided to preserve the lateral thoracic artery and its blood supply to the lateral distal skin island of PM flap without compromising the pedicle length for head and neck reconstruction. Six PM flaps were harvested for reconstruction of head and neck defects with preservation of both the pectoral artery and lateral thoracic artery. The focal point of swing of all six flaps was at the same point just below the mid-point of clavicle for both pectoral artery and lateral thoracic artery. The flaps can reach the oral cavity, tonsil or hypopharynx without limitation and there is no flap necrosis. In conclusion, the lateral thoracic artery can be preserved without compromising the pedicle length of PM flap. It is a recommended technique to improve the blood supply to the distal skin of PM flap.

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Although free tissue transfer is the preferred reconstruction option in most major head and neck reconstruction, pectoralis major myocutaneous flap (PM flap) is still a commonly performed pedicle flap. It may be the flap of choice in centres without microvascular surgery support. PM flap, however, has a high incidence of distal skin necrosis due to vascular insufficiency resulting in 15–32% partial to total flap loss and 8–29% fistula formation.<sup>1</sup>

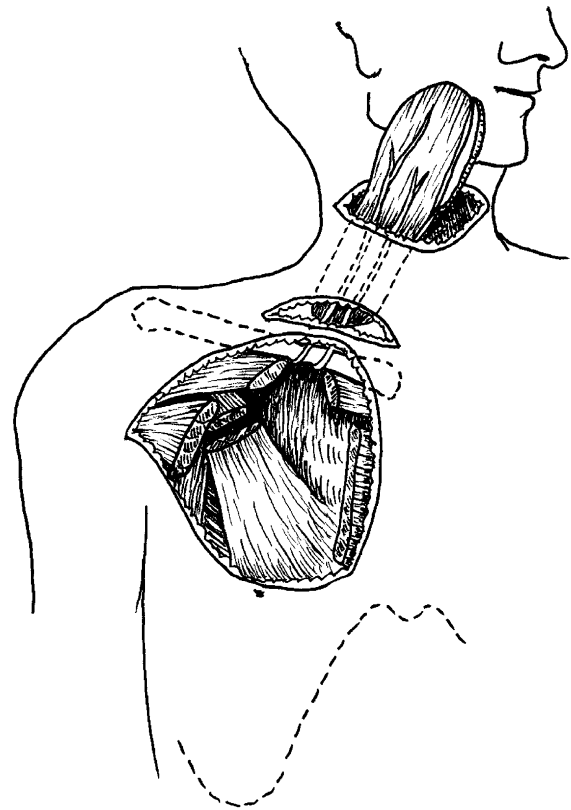
Yang et al. has shown that the pectoral branch of thoracoacromial artery is the main ( $51 \pm 22\%$ ) blood supply to the skin island overlying upper part of PM muscle.<sup>2</sup> The anterior intercostal branches of the internal mammary artery supply  $43 \pm 20\%$  skin territory overlying medial and lower part of PM muscle. The lateral thoracic artery is the main blood supply to the lateral and lower part of the PM muscle and overlying skin ( $6.6 \pm 4.7\%$ ).

The conventional harvesting method of PM flap for head and neck reconstruction divides all intercostal branches from the internal mammary vessel. The lateral thoracic artery is also divided routinely by most surgeons in order to avoid the limitation of pedicle length of PM flap to reach the upper head and neck defect. As a result of the division of these two sources of blood supply, which in fact are the dominant blood supplies to the skin island overlying the lower PM flap skin, there is high risk of distal flap necrosis. This is particularly important when the skin island must be designed in the lower chest in order to gain enough pedicle length for upper head and neck reconstruction. The author has seen a case of PM flap with a small pectoral branch and a large dominant lateral thoracic artery. Unfortunately, the surgeon divided the lateral thoracic artery as a routine harvesting technique resulting in total loss of the PM flap.

A simple technique to preserve the lateral thoracic artery without compromising the pedicle length of the PM flap is described. In harvesting the PM flap, the muscle is lifted off from the chest wall from below upwards. The lateral thoracic artery is identified underneath the lateral border of pectoralis muscle in the region of the axilla. The pectoral part of PM muscle is divided lateral to the lateral thoracic artery and medial to the pectoral branch of thoracoacromial artery up to the clavicular part of PM muscle. A shallow groove can be identified in the PM muscle separating the clavicular and pectoral part of PM muscle. The pectoral branch of the thoracoacromial artery is identified in this groove. The clavicular part of PM muscle overlying the pectoral branch of thoracoacromial artery is then divided up to the clavicle using the technique of true island PM flap described by Wei et al. in

1984.<sup>3</sup> At this stage, the lateral thoracic artery, which can be seen coming out underneath the lateral border of the pectoralis minor muscle, is compromising the pedicle length of the PM flap. This is the reason to sacrifice it in the conventional harvesting technique by many surgeons. However, the pectoralis minor muscle overlying the lateral thoracic artery can be divided completely to release the lateral thoracic artery up to the clavicle as shown in Fig. 1. Both the lateral thoracic artery and the pectoral branch of the thoracoacromial artery will have the same centre of rotation on the clavicle. There is no compromise of the pedicle length with this technique. The PM flap is then delivered to the neck via a subcutaneous tunnel.

The author has been using this technique since 2003. In a consecutive series of six head and neck cancer reconstructions including two total glossectomy with total laryngectomy, one radical tonsillectomy and three total laryngectomy with partial pharyngectomy. There was no flap loss. Two patients had minor subclinical radiologic leakage without any sign of fistula or inflammation in the neck, which healed with observation.



**Figure 1** The pectoralis minor muscle overlying the lateral thoracic artery is completely divided. The whole PM flap can be swung to reach upper neck, oral cavity and tonsil.

Although we are unable completely to resolve the problem of compromising the distal skin blood supply due to the necessity to divide the branches of internal mammary artery, it is, however, advantageous to preserve the lateral thoracic vessel, which is the major contribution to the lateral and distal PM flap skin. This simple technique would allow the preservation of lateral thoracic artery without compromising the pedicle length of PM flap for head and neck reconstruction.

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