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APPENDICES

APPENDIX A

The operative procedure of the thoracodorsal artery perforator flap

The major indications for this flap were: 1) primary coverage of a large trauma wound with exposed bone, joint, and tendons, and 2) coverage of large defects following released of contracture caused by previous crush injury. This would facilitate further reconstructions.

General principles and steps for elevation of a perforator flap with musculocutaneous perforators included:

- 1) Doppler mapping of the perforators and design of the flap before operation;
- 2) Identification of the perforator and main pedicle;
- 3) Intramuscular dissection of the perforators, with preservation of nerves;
- 4) Elevation of the flap;
- 5) Primary thinning for the flap; and
- 6) Transfer of the perforator flap to cover the defect [14].

Surgical Technique

The patient was placed in the lateral decubitus position on a beanbag (Fig. 1). The ipsilateral arm was left free and included in the operative scrub. A stockinette around the arm and Mayo stand with a well-padded pillow helps to rest and optimally position the arm during surgery.

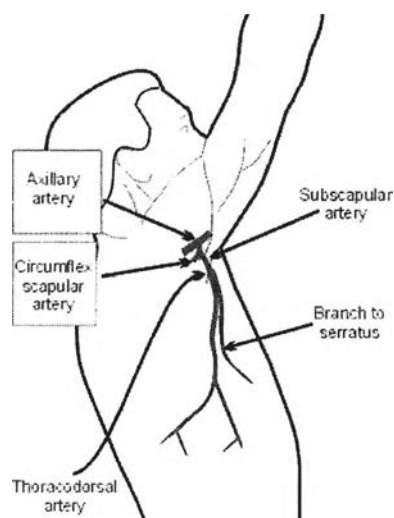


Figure 1. The patient was placed in the lateral decubitus position.

The lateral border of the latissimus was palpably identified and outlined with a marking pen. With the arm placed at the patient's side, a sterile pencil doppler is used to identify and map out the perforators starting about 6 – 8 cm below the posterior axillary fold and 2 – 4 cm inside the lateral border of the latissimus (Fig. 2). Additional perforators were identified at 1.5 – 4.0 cm intervals inferior to the first.

A flap of dimensions approximating 8 X 15 cm, centered over the perforators was outlined. This results in an ellipsoid with its anterior longitudinal arc skirting the lateral border of the latissimus. The width was determined by the pinch test to determine what can be closed primarily. The maximum reliable length of a TAP flap that can be elevated on a single perforator has not been clearly established. Flaps up to 25 cm in length have been reported.

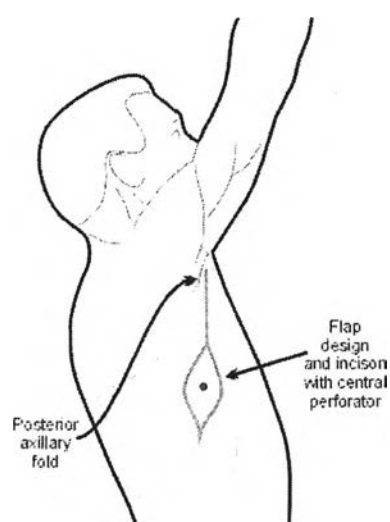


Figure 2. The center of the TAP flap.



The anterior incision was made first (Fig. 3). The anterior margin of the latissimus was identified. Scissor dissection then proceeded in an anterior to posterior direction gently separating the dorsal thoracic fascia from the underlying muscle using vertical spreads. All perforators were identified and protected. A cutaneous nerve may be seen accompanying the largest perforator. The dominant perforator was selected and the others can be ligated. Alternatively, if a second perforator appears to be in the same longitudinal plane as the first, it was likely that it was a more distal branch of the same intramuscular vessel and can be included with only a small additional time investment. Also, if all perforators were small, it seems prudent to include more than one.

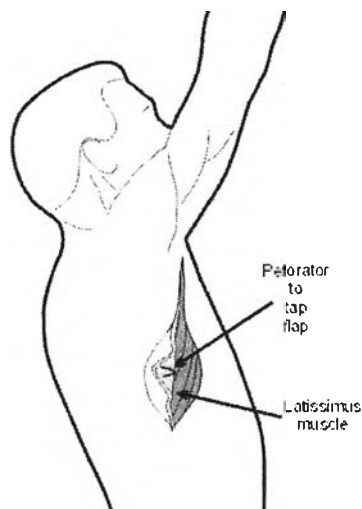


Figure 3. The anterior incision was made first.

The perforator or perforators were chased through the substance of the muscle toward their origin from the distal thoracodorsal or its lateral branch, which may be intramuscular at this point. Bipolar cautery was used to ligate the multiple small muscular branches that were present during all stages of the dissection. Cautious use of mini self-retaining retractors within extended longitudinal muscle splits on each side of the perforator(s) greatly facilitates the dissection. When the perforator has been dissected 2 – 3 cm within the muscle the posterior skin incision was completed thus isolating the fasciocutaneous ellipse on its pedicle (Fig. 4). This not only allows the skin flap to be manipulated in order to facilitate completion of the dissection but also allows flap perfusion to be confirmed before the blood supply to the potential fall back latissimus muscle flap has been compromised.

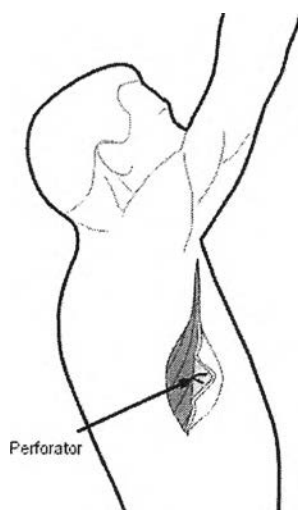


Figure 4. The posterior skin incision.

With flap perfusion deemed adequate, dissection continues through the latissimus. If the source of the perforator was the distal main thoracodorsal trunk, this vessel was easily identified proximally on the deep surface of the muscle (Fig. 5).

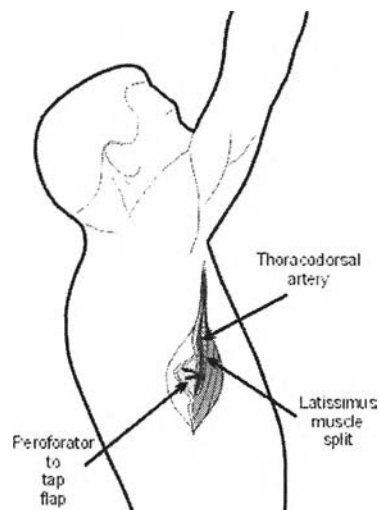


Figure 5. The perforator and the pedicle of the TAP flap.

The vessels distal to the perforator were clipped after care was taken to separate the accompanying thoracodorsal nerve. The proximal vessels were also separated from the nerve and the desired length of thoracodorsal pedicle liberated. The vessels were ligated, and with gentle traction on the flap were simply pulled through the split in the muscle (Fig. 6).

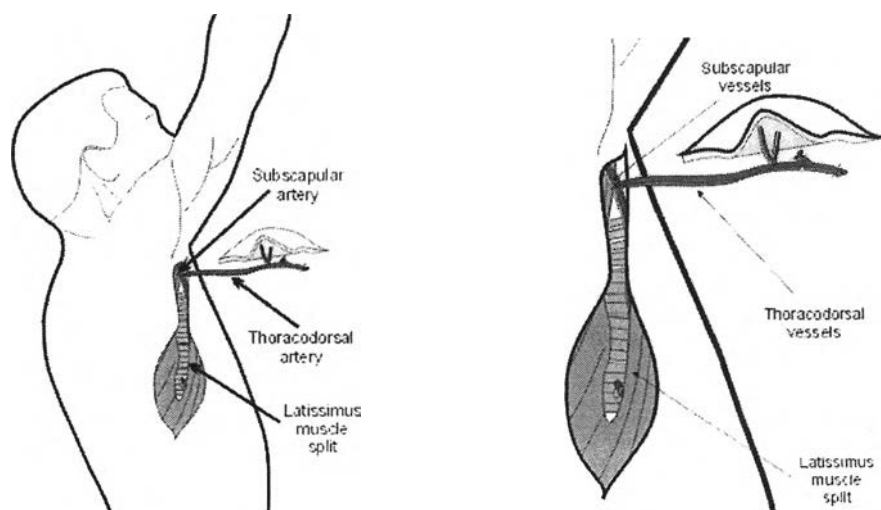


Figure 6. The proximal vessels were also separated from the nerve and the latissimus dorsi muscle.

If the source of the perforator was the lateral branch of the thoracodorsal, its intramuscular path was traced proximally until its course on the deep surface of the muscle was revealed. The lateral branch of the thoracodorsal was then dissected off the deep surface of the muscle and traced proximally to its junction with the main axis and the medial/horizontal branch. If adequate pedicle length and vessel diameter were presented, the pedicle may be divided here. If a longer pedicle with larger diameter vessels was necessary, the medial/horizontal branch was ligated and dissection proceeds up the main thoracodorsal axis as required. Cautions, accompanying the lateral branch of the thoracodorsal vascular axis were branches of the thoracodorsal nerve. More proximal nerve branches to muscle can usually be preserved by separating the nerve from the pedicle. Distally, the perforator becomes so small that separating the nerve at this level could prove disastrous. Therefore, at some point, the distal intramuscular branches of the thoracodorsal nerve accompanying the perforator must be sacrificed and left adherent to the pedicle. This trivial amount of deinnervation was surely inconsequential. If there was a desire to neurotize the flap the previously mentioned cutaneous nerve can be separated off the main nerve branches proximally by intrafascicular dissection.

The edges of the vertical muscle split were approximated with absorbable suture. Closure of the back wound proceeded in the usual fashion [1, 5, 10, 18].

APPENDIX B

Example for Case Record Form (CRF)

Female, 1134, Right

Axillary artery to bifurcation = 7.5 cm

Dome of axilla to bifurcation = 4.0 cm

Bifurcation lower than tip of scapula = 1.0 cm or

Bifurcation higher than tip of scapula =cm

Medial branch run parallel to upper border of muscle = 3.0 cm

Diameter = 1.7 mm

Length = 2.0 cm

Lateral branch run parallel to lateral border of muscle = 1.0 cm

Diameter = 2.2 mm

Length = 7.7 cm

Direct cutaneous perforator found or not found

higher than bifurcation = 0.7 cm or

lower than bifurcation =cm

Thoracodorsal nerve lateral/superficial or medial/superficial

lateral/deep or medial/deep

Diameter = 1.7 mm

The Perforator of the Lateral Branch of the Thoracodorsal Artery

No.	Distance (cm) (from the dome of axilla to its origin)	Diameter (mm) (at its origin)	Length (cm) (origin to piece to muscle)	Piece to muscle (cm) (from dome of axilla)
1 st perforator	7.4	1.3	2.7	11.0
2 nd perforator	-	-	-	-
3 rd perforator	-	-	-	-

The Muscular Branch of the Lateral Branch of the Thoracodorsal Artery

No.	Distance (cm)	Diameter (mm)	Length (cm)
1 st muscular	from dome of axilla 6.2	1.6	3.8
2 nd muscular	from 1 st muscular 1.2	1.4	3.5
3 rd muscular	from 2 nd muscular -	-	-
4 th muscular	from 3 rd muscular -	-	-

BIOGRAPHY

Miss Samang Wanidchaphloi was born on June 2, 1981 in Kanchanaburi, Thailand. She received her Bachelor degree of Science (Radiological Technology) with the first class honours in 2003 from the Department of Radiological Technology, Faculty of Medical Technology, Mahidol University, Bangkok, Thailand. She has enrolled in graduate program for Master degree of medical Science at Chulalongkorn University since 2003.

