

THE PECTORALIS MAJOR ISLAND FLAP: AN IMPORTANT NEW FLAP FOR HEAD AND NECK RECONSTRUCTION

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It is the author's belief that the recently introduced island type of pectoralis major myocutaneous flap (Ariyan, 1979) will eventually replace the delto-pectoral flap as the preferred flap for the majority of head and neck reconstructions.

CASE REPORT

A 52-year-old man presented with a rapidly growing tumour 5 × 6 cm in size, arising deep in the left side of the neck involving the skin which showed signs of impending necrosis (Fig. 1). It extended from just below the angle of the mandible



FIG. 1. Pre-operative view to show a metastatic melanoma in the left side of the neck, with impending skin breakdown.

across the sternomastoid into the posterior triangle of the neck. One year previously a "melanoma" in the neck had been excised, and six months later a single node in the left side of the neck had been removed by surgeons elsewhere. There was no evidence of systemic spread of the melanoma at the time of his admission to hospital.

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OPERATION

The involved skin was left attached to the underlying tissues and excised as part of a radical left sided block dissection of the neck. Approximation of the remaining skin flaps left a residual defect 8×8 cm extending from the mandibular border above, with the carotid vessels exposed in the base of the wound.

Just above the costal margin of the left chest wall, an island of skin 8×8 cm was designed: the skin was incised down to the fascia and a few temporary tacking sutures were inserted to prevent inadvertent separation of the skin from the fascia. A skin incision was then made obliquely from this skin island towards the outer third of the clavicle, at the medial border of the deltopectoral groove and medial to the nipple.

The adjacent skin flaps were undermined for several centimeters. The fibres of the pectoralis major were then split 2 cm from its lateral free border to provide access to the subpectoral tissue plane. This allowed identification of the axial vessels on the under surface of the muscle where they were protected by the posterior layer of pectoral fascia. The muscle splitting and subpectoral dissection continued distally to the level of the skin island. The distal third of the island skin flap was situated distal to the lowest muscular fibres of insertion of the pectoralis on the sixth rib. Here, the fascia continuing over serratus anterior and rectus abdominus was taken with the flap. Multiple perforating branches of the internal mammary artery required ligation.

A 3 cm wide strip of the pectoralis major muscle including the anterior and posterior layers of pectoral fascia, was then dissected proximally to the lower border of the clavicle. This was done under direct vision to ensure that the pectoral branch of the thoraco-acromial artery was included in the centre of the muscle strip. Several sizeable branches of this vessel required transection as they proceeded beyond the lateral margin of the strip. The muscle strip was deliberately made narrower close to the clavicle where the thoraco-acromial artery was larger and more clearly defined (Fig. 2).

The compound island flap was then rotated medially, almost 180 degrees and tunnelled subcutaneously over the clavicle to reach the excisional defect in the neck. The deep fascia and the pectoral muscle (where present) in the compound island flap, were sutured to the platysma at the margins of the neck defect, prior to skin closure.

The donor defect on the chest wall was closed by suturing the gap in the pectoralis major from where the pedicle strip had been removed. The skin wound was closed by a combination of skin suture and application of a split skin graft to the residual raw area the next day (Fig. 3).

The patient was discharged from hospital six days later (Fig. 4) with the flap viable and intact.

DISCUSSION

The construction of a compound pectoralis major island flap would appear to be based on a sound principle, that of a muscle flap nourished by a dominant axial vessel supporting an overlying skin island. This anatomical principle has been vindicated in the clinical applications of the latissimus dorsi island myocutaneous flaps (Schneider *et al.*, 1977; Bostwick, *et al.*,



FIG. 2. Artist's impression of the pectoralis major myocutaneous island flap.

1979) the gracilis myocutaneous flap and the medial gastrocnemius island myocutaneous flap, to mention only a few. In addition the pectoralis major muscle raised as a flap based on the pectoral branch of the thoraco-acromial artery has been used successfully in chest wall reconstruction (Arnold and Pairolero, 1979).

Following its introduction by BAKAMJIAN (1965), the delto-pectoral (D.P.) flap was rapidly accepted as a versatile, safe and standard procedure in head and neck reconstructions. It was the archetypal axial pattern flap and provoked the fundamental rethinking of flap circulation by McGregor and Morgan (1973), that culminated in the rational development of the modern axial pattern myocutaneous island flaps.

The pectoralis major (P.M.) island flap has several important advantages which make it superior to the orthodox delto-pectoral (D.P.) flap:

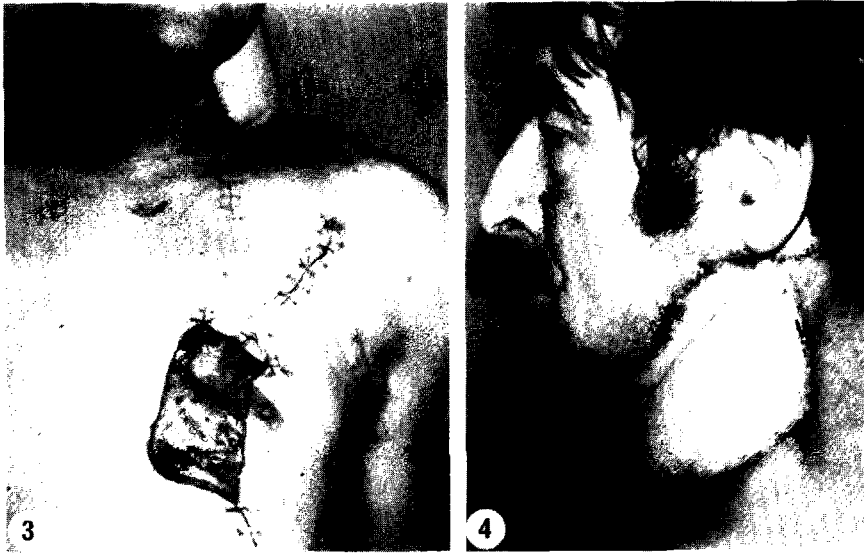


FIG. 3. Six days after operation to show a viable healthy flap inset into the excisional defect over the left side of the neck. The donor defect has been closed partly by direct approximation and a split skin graft. Note the subcutaneous mass over clavicle beneath lateral skin flap showing the position of the muscle pedicle.

FIG. 4. Lateral view of the neck six days after the operation.

1. One operation versus two. The fact that the pedicle of the P.M. island flap can be easily tunnelled over the clavicle beneath the neck flaps of a neck dissection to fill defects of the neck, floor of mouth or pharynx means that reconstruction can be completed in one stage. Although this has been done with the D.P. flap in some situations by de-epithelialisation of the pedicle, the broad base of the flap can make this manoeuvre impracticable, so that a two-stage procedure, with transection of the pedicle 3 weeks later, is often mandatory. The need for a temporary salivary fistula in pharyngo-oesophageal reconstruction is obviated if a suitable one-stage procedure can be used.

A one-stage repair is also the major advantage of a free flap reconstruction of the head and neck. Any plastic surgeon who uses the delto-pectoral flap should be able to raise a pectoralis major island flap without recourse to the specific technical expertise or the time required in free flap transfer.

2. Permanent blood carrying pedicle. This is a fundamental requirement of any flap used in the repair of defects within irradiated tissues (Brown *et al.*, 1951). Transection of the pedicle of a D.P. flap is required by its design. As so much flap surgery of the head and neck is performed in irradiated fields, it is reasonable to expect that use of the P.M. island flap with its permanently vascularised pedicle should be associated with a significantly lower complication rate.

3. Donor site deformity. The scar on the chest, with or without a skin graft of the lower chest, is much more easily concealed than a skin graft over

the shoulder. The buried pedicle of the P.M. flap does, however, leave a noticeable subcutaneous mass over the medial third of the clavicle, which should diminish in time from muscle atrophy.

4. **Reliability.** The D.P. flap has a reported major complication rate of 10% (Bakamjian *et al.*, 1971; Gingrass *et al.*, 1972; Krizek and Robson, 1972; Mendelson *et al.*, 1977). A sizeable series of island P.M. flaps has yet to be reported to compare the complications (Theogaraj, 1979), but as the axial vessel is readily visible, there is less reason for it to be damaged during elevation of the flap. The potential for complications resulting from the later transection of a pedicle are avoided.

Nevertheless a D.P. flap would be preferable should a large amount of skin be required for a facial defect, especially if both ends of the flap are brought up onto the face. The island P.M. flap would be too bulky for this purpose. Similarly the P.M. flap would not be ideal as a one-staged island flap in cutaneous facial defects with their lower border situated higher than the intact mandible, due to the bulk of the buried pedicle leaving a significant prominence over the mandible.

There is, however, no reason why it could not be used for a defect in the parotid area—even if a neck dissection had not been performed. The flap could be tunnelled beneath the neck skin with the aid of a “stair-step” incision if needed.

An important objection to the P.M. island flap is that the incision below the clavicle cuts across the base of the ipsilateral D.P. flap and destroys its potential for future use. This dilemma could be avoided by first elevating a bipedicle skin bridge, as for a D.P. flap, to provide sufficient exposure for the P.M. flap muscle strip to be raised. This manoeuvre would be tantamount to a delay of a D.P. flap.

In the female patient, there is no reason why dissection of the pectoral pedicle strip could not be performed behind the intact breast, the donor area for the skin island being placed below the inframammary fold.

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