SUPRACLAVICULAR ARTERY PERFORATOR FLAP

This flap described by Lamberty in 1979[65] is an axial cutaneous perforator flap extending from the base of the neck to the skin over the Deltoid muscle. In fact, the skin over the proximal third of the arm could be simultaneously elevated with the flap, though it is not recommended without delay, because this area is not nourished by direct cutaneous branches from the main vessels, and so, there is the risk of distal necrosis. Because of its wide arc of rotation, which ensures a 180-degree mobilization anteriorly and posteriorly, the flap can reach distant sites when harvested, especially as a pure island flap[39,78]. It is advisable and less risky to extend the flap length up to the middle zone of the shoulder (see figs. 5.5 and 5.6). If a longer flap is needed, a delay procedure is advisable as is the case for the delayed Cervicohumeral flap. As an axial flap it can be long and narrow and can easily reach the opposite part of the neck as well as the axillary area.

Ideally, this flap has to be designed in such way that its donor area can be primarily closed avoiding skin grafts over this rather visible area. What makes this flap the first option for neck repair is its versatility. It can be outlined in various different ways that is able to provide relatively large skin paddles, while donor areas are repaired by primary closing. It can be tailored as a single pedicled flap, island tunnelled flap[82], anterior bilobed flap and posterior

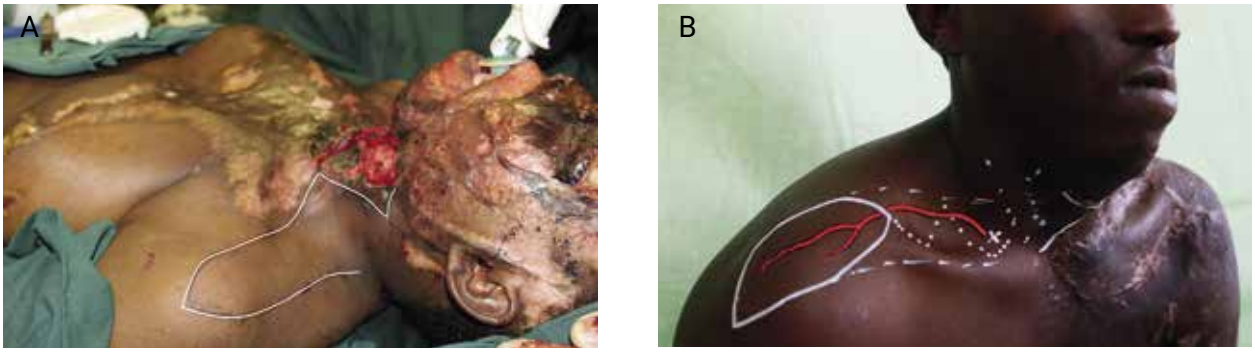

Figure 5.5. Variations for the supraclavicular pedicled flap: A) Single Cutaneous pedicled flap. B) Island flap outlined over the right deltoid area.

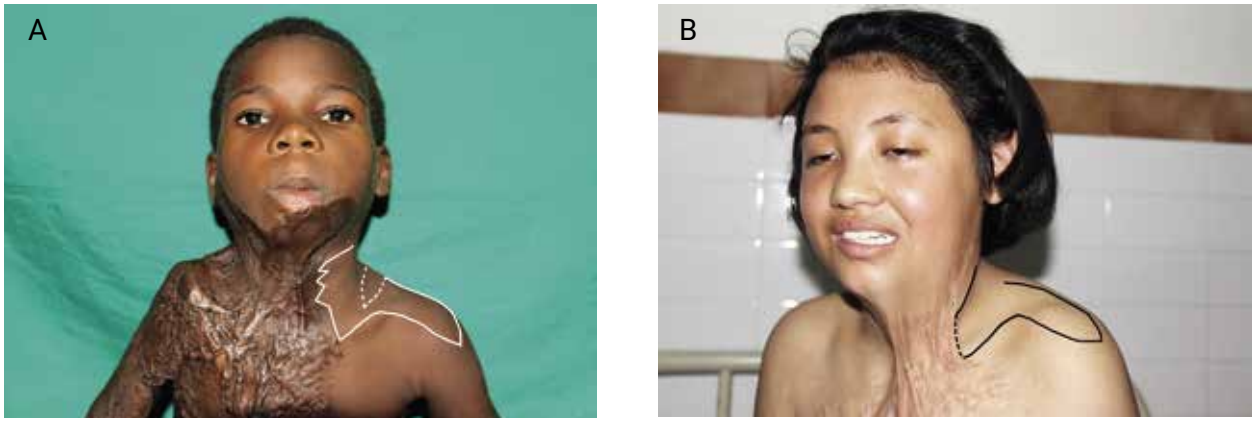

Figure 5.6. Variations for the supraclavicular flap: A) Bi-lobed supraclavicular flap, the anterior skin at the base of the neck is included in the flap. B) Tri-lobed supraclavicular flap, in this case the anterior skin at the base and the lateral aspect of the neck together with a small portion of skin over the upper trapezius area.

bilobed flap[68]. This flap can also be pre-expanded (when tissue expanders are available) to enlarge the skin paddle and facilitate donor area closing with a free tension suture.

Indications

This flap is long and highly mobile and so it can reach distant defects in the face, axilla and opposite anterior and lateral aspects of the neck. Because its size (4 to 10 cm in width and 20 to 30 cm in length) and its wide arch of rotation, it can be mobilized as an island patch for limited distant defects (axilla or throat) or as a large bilobed flap (anterior-lateral neck defects). It represents an ideal option for neck or mentosternal post-burn skin contractures[81].

Vascularization

The flap is based on the *supraclavicular artery,* a cutaneous perforator arising from the *transverse cervical artery.* It enters the skin fat pad at the base of the posterior triangle of the neck and runs directly towards the acromioclavicular joint[29]. Over the shoulder this artery anastomoses with cutaneous terminal vessels of the *posterior circumflex humeral artery.* This distal network of cutaneous branches allows for the possible extent of the flap to the upper third of the arm, though it is uncertain and not advisable.

Markings

Markings starts by outlining the posterior border of the Sternocleidomastoideus muscle, the course of the jugular vein and the clavicle axis. These three lines will delimitate a triangle where the cutaneous branch to the flap will emerge branching off the *transverse cervical artery* (see fig. 5.7). Reference points to design the flap are marked out approximately at the centre of this triangle as well as the tip of the acromion. A straight line joining the two points is drawn, which will be the axis of the flap (white line). The *supraclavicular artery* and its cutaneous branches are found along this line. The skin paddle is designed according to how far the flap has to reach, the way it should rotate and the defect's size. It can be designed as a single pedicle flap, island flap, anterior or posterior bilobed flap. The size can be between 16 cm long and 8 cm wide. The width of the pedicle should be the width of the skin island. The length of the flap can be extended up to the upper third of the arm (though it is not advisable). It is much safer if the skin paddle doesn't extend beyond the deltoid muscle, 5 cm further from the acromion is a reasonable length for the flap.

The high versatility of this flap is shown in the following, different cases:

Elevation

It can be performed in two fashions: As a skin ped-

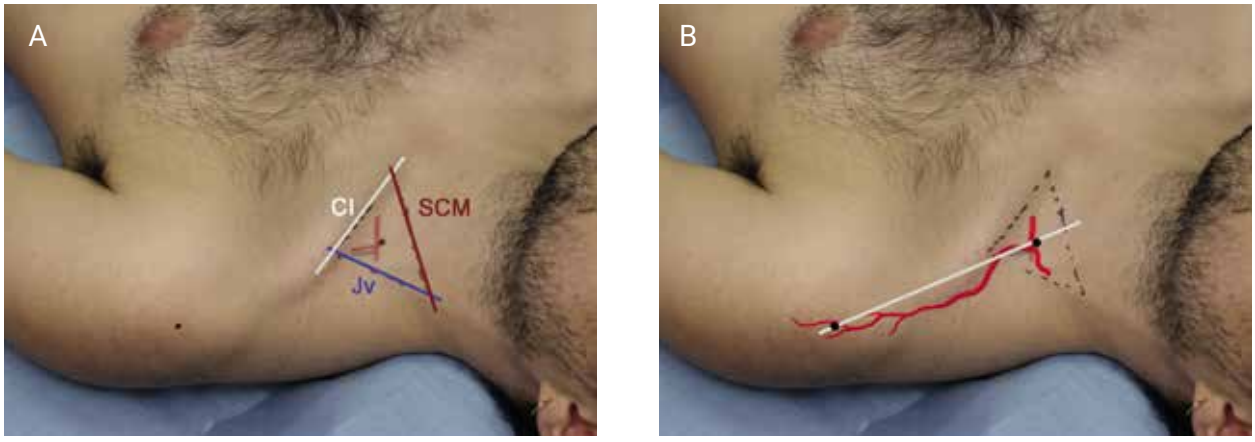

Figure 5.7. A) Reference lines that delimitate the posterior triangle: "Cl" for clavicle, "SCM" for the posterior edge of the Sternocleidomastoideus muscle and "Jv" for jugular vein. B) The central point of the triangle is marked as well as a point over the acromion. The line joining both points represents the axis of the pedicle.

Figure 5.8. The cutaneous patch island is outlined over the flap's axis. From the proximal tip of the skin patch to the origin of the supraclavicular artery a "W" incision is marked out.

icled flap or an island flap. The flap has to be raised as thickly as possible as the artery runs to the acromion into the subcutaneous tissue.

Island flaps always fit better than skin pedicled flaps and don't waste the skin over the pedicle at rotation point, though in certain circumstances (as in many neck contractures release) the skin over the pedicle can also be use to resurface part of the ipsilateral neck. Island flaps are better transfered by tunnelling them under the skin. Subcutaneous undermining should be

Figure 5.9. Following the "W" incision on the supraclavicular fossa, anterior skin is incised only to subdermal layer. The resulting triangular skin flaps are elevated strictly subdermally exposing all subcutaneous tissue along the pedicle. Electrocauthery should be used prudently and at low gradation. Elevation starts around the distal half of the island patch, where the incision is made deep into the Deltoid's fascia.

Figure 5.10. Subdermal dissection is also performed on the posterior cutaneous flaps over the pedicle.

Figure 5.11. Incision is made all around the skin paddle. Distal part of the flap is incised deep into the subfascial plane and the flap elevated preserving the fascia, along with the flap.

Figure 5.12. The flap is elevated from distal to proximal and elevation continues subfascially until the clavicle is reached.

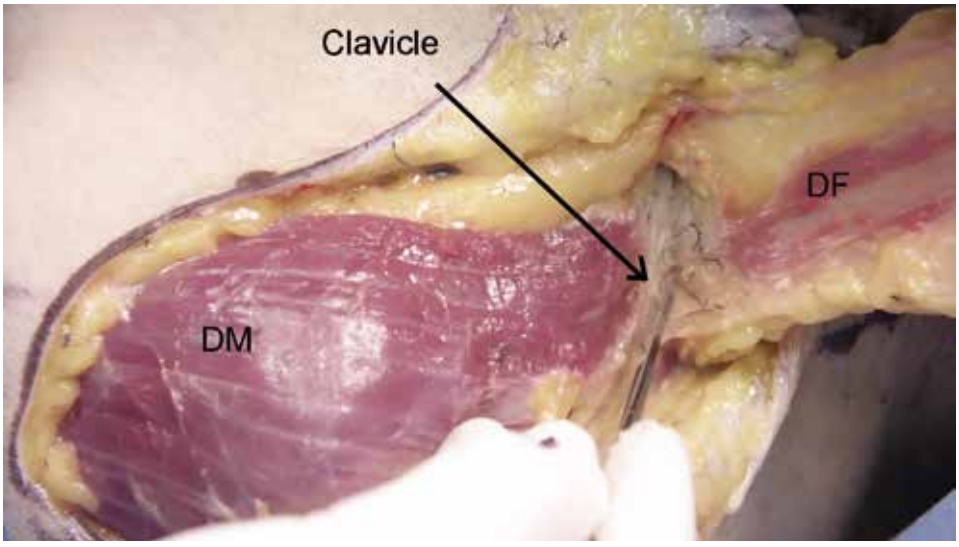

Figure 5.13. Once the insertion of Deltoid muscle to the clavicle is reached, dissection continues over the periostium (in very thin patients dissection can be performed subperiostically), to reach the supraclavicular fossa. Accidental thinning of the flap will definitely damage the artery. This is also true regarding extensive use of electrocauthery. Flap elevation is technically more difficult in thinner patients than in overweight ones.

Figure 5.14. Dissection continues deep on the supraclavicular fossa, taking care not to go too deep or too superficial. The superficial jugular vein is the reference (if required) to know how far internal elevation of the flap should reach. Usually, it is not necessary to go further than the posterior triangle of the neck, as it is not necessary to individualize the vessels.

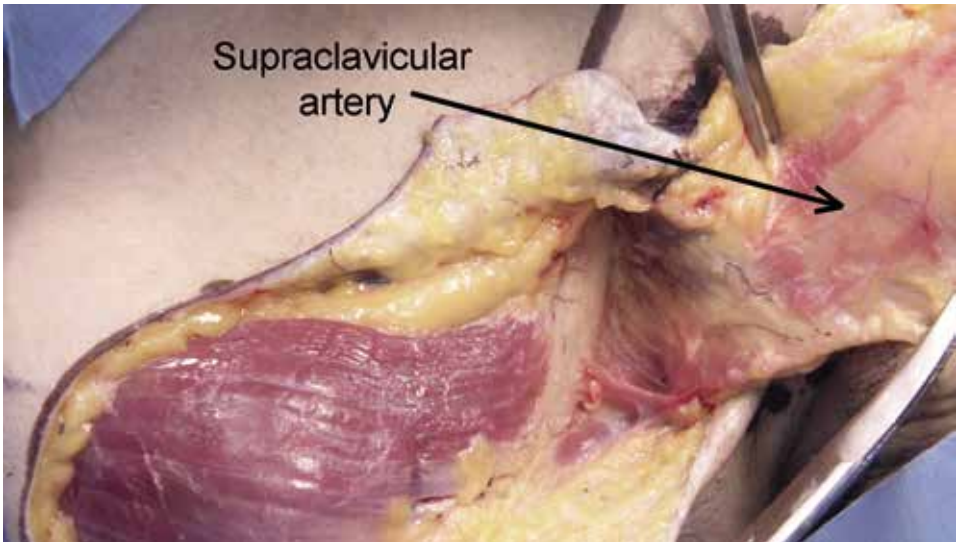

Figure 5.15. Supraclavicular artery Island flap. Once the clavicle is over-passed, dissection continues under the trapezius fascia on the posterior aspect of the pedicle, and deep subcutaneously on the anterior aspect. The jugular vein is the landmark to the pedicle that can be seen in the undersurface of the flap.

Figure 5.16. Once internal dissection has been performed, posterior pedicle limit is divided as much as required for rotation.

Figure 5.17. If more rotation is required, the flap's posterior border can be divided further with scissors, following the upper border of the trapezius.

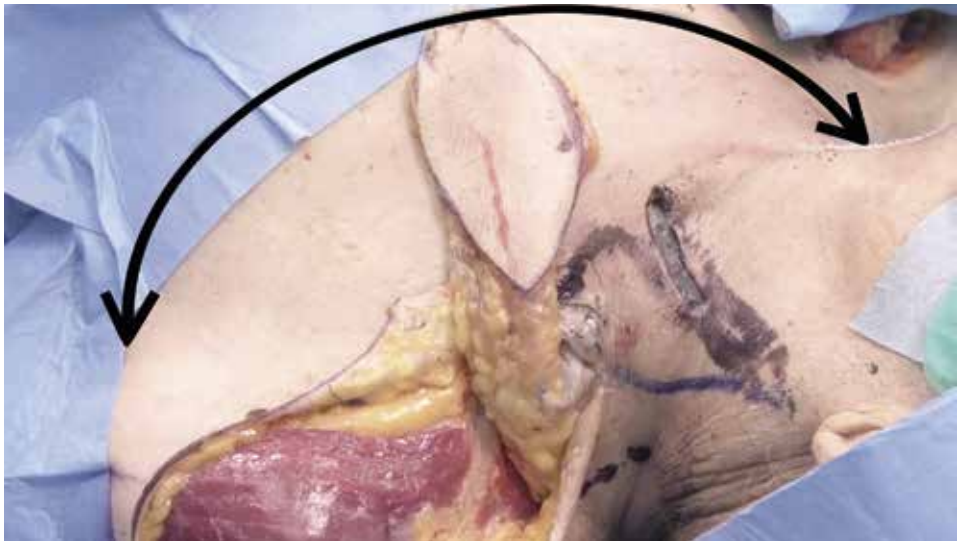

Figure 5.18. Flap's rotation range: from the anterior axillary fold to the opposite side of the neck. To reach the opposite side it is far better to transpose it by tunnelling the pedicle.

ample enough to allow easy passage of the skin paddle island from the donor to the recipient site. The skin paddle has to be secured, (specially at its tip), to the subcutaneous tissue and fascia, using some stitches, to avoid accidental tearing when it is pulled into position through the tunnel. Any minor sign of swelling and venous congestion should be immediately checked and the tunnel widened if necessary. Venous congestion is usually the main cause of flap necrosis. Once the flap is rotated into place, general rules about how to suit the seams and fit the aesthetic-functional units have to be followed.

Adequate pre-operative design will allow the donor area to be repaired primarily. However, if too much tension prevents a safe repair, skin grafts should be used.