

PARASCAPULAR PERFORATOR FLAP

Manchot described the arterial anatomy of this area in 1889⁽⁷⁰⁾, mentioning that vessels arising from a triangular space of the dorsal trunk vascularize the skin territory over the scapula; being the main artery, the Circumflex Scapular artery (CSA). This vessel gives off some cutaneous branches that can vascularize four different flaps: ascending (ascending scapular branch), horizontal (scapular branch), descending (parascapular branch) and anterior (posterior circumflex humeral artery)^(40,42,89) (see fig. 5.92). A single cutaneous nerve does not innervate this skin territory and so it cannot be raised as a sensitive flap.

Indications

As a cutaneous pedicled flap or as an island flap, it can entirely cover the axilla and reach the deltoid area if necessary. Any of its variations can be used as a free flap. Its anatomical consistency, donor site morbidity, variety of shape and well as its design and the possibility to include bone with the flap^(36,93,97,100), makes this flap a highly versatile and reliable choice. However, depending on the

type, shape and size of the flap, the donor area can be repaired by primary closing.

Vascularization

The subscapular artery branches off from the distal third of the axillary artery. It quickly divides into the Thoracodorsal and the Circumflex scapular arteries. After passing beside and around the lateral border of the scapula, the Circumflex scapular artery emerges at the triangular space bordered by the Teres major inferiorly, the Teres minor superiorly and the upper triceps laterally. (Although sometimes it can be found that this perforator exits below the Teres Major) (fig. 5.92)^(27,80). The cutaneous branches that are mentioned above, vascularize a variety of 4 different flaps all subsidiary from the subscapular system⁽⁵³⁾.

Markings

As previously stated, there are 4 possible flaps to be designed based on the CSA (fig. 5.94A), though the most

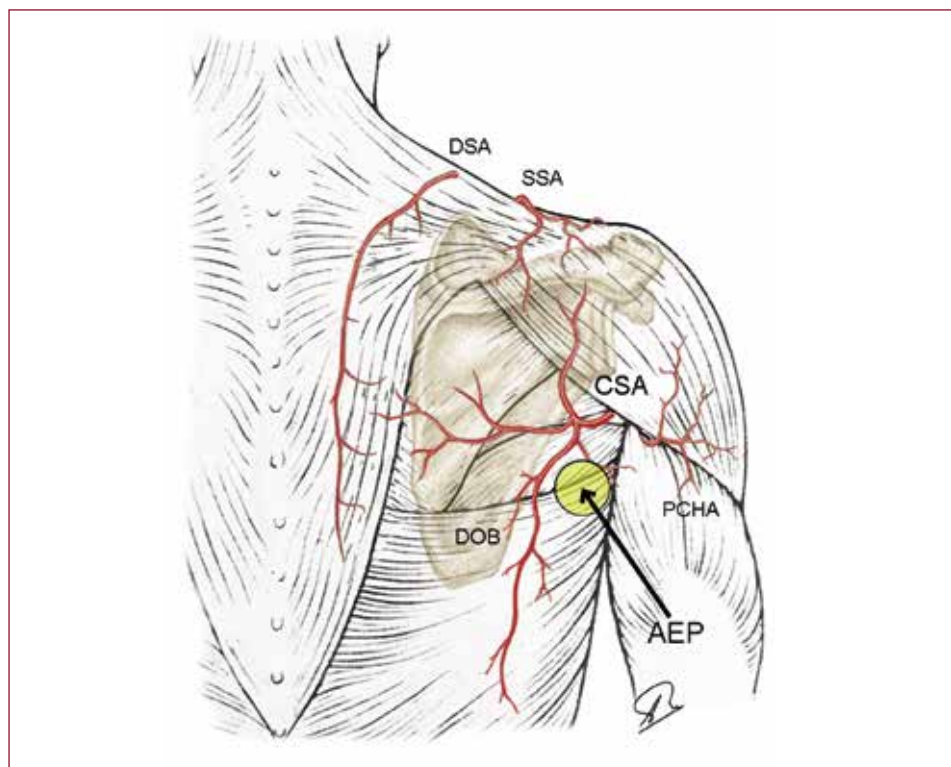


Figure 5.92. Vascularization of the scapular region: DSA: Dorsal Scapular artery, SSA: Supra Scapular artery, CSA: Circumflex Scapular artery, PCHA: Posterior Circumflex Humeral artery. Occasionally the CSA may exit at a lower alternative emergence point (AEP) between Latissimus Dorsi and Teres Major. The descending osseous branch (DOB) is seen branching off from the Descending branch of the SCA.

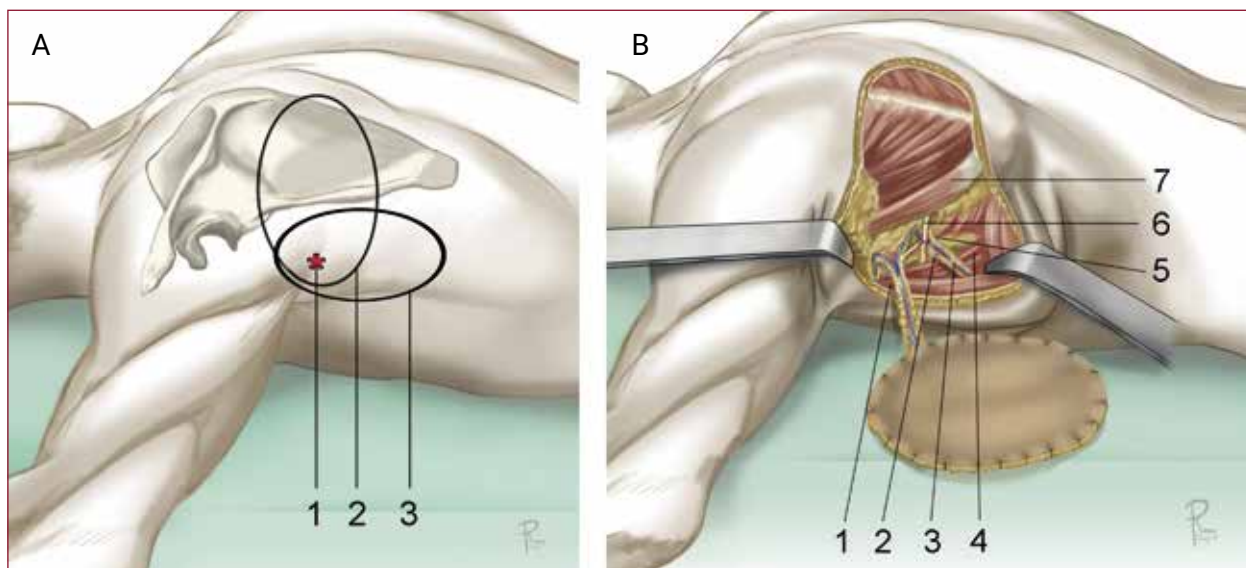


Figure 5.93. A) Scapular and parascapular flap designs; 1: point of the CSA emergence, 2: Scapular island flap and 3: Parascapular pedicled flap. B) Pedicle and references for the scapular perforator flap; 1: Teres Major, 2: Latissimus Dorsi's neurovascular pedicle, 3: Teres Major Vascular pedicle, 4: Latissimus Dorsi, 5: Thoracodorsal vessels, 6: Circumflex scapular vessels and 7: Teres minor.

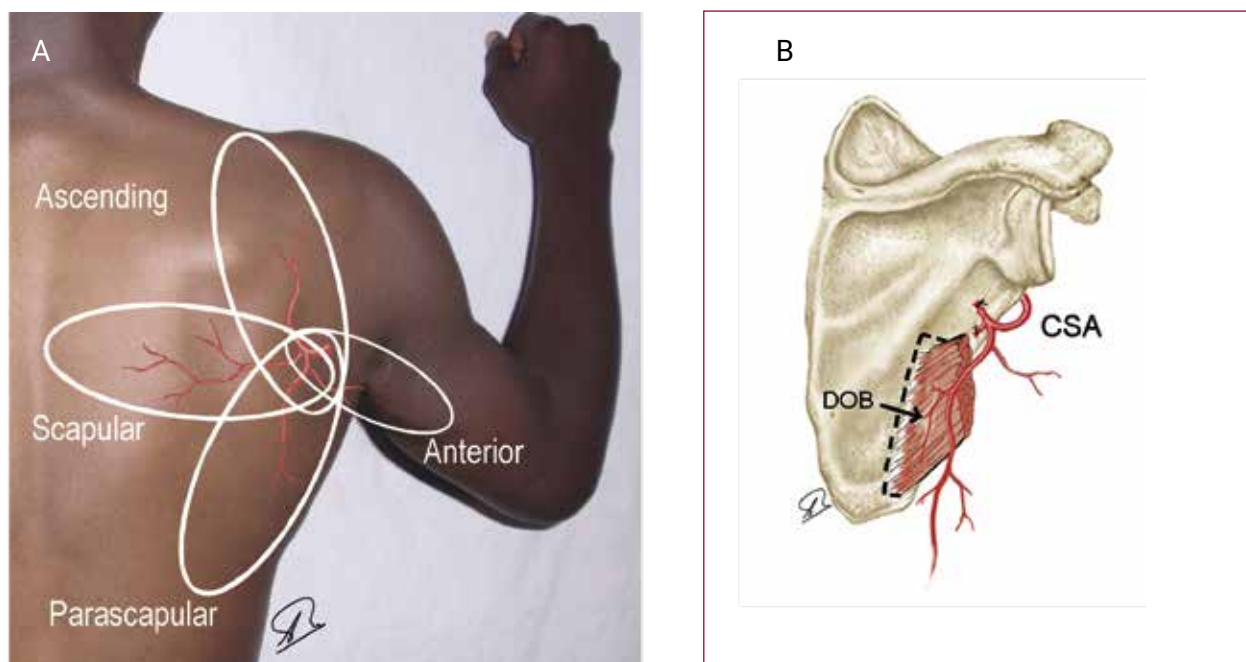


Figure 5.94. A) Scapular flap variations based on different cutaneous vessels branching off the Circumflex scapular artery: Descending Branch: Parascapular flap. Lateral-medial branch: Scapular flap. Ascending branch: Upper scapular flap and for the short Posterior circumflex humeral artery: Anterior flap. B) Vascularized bone graft: The descending osseous branch, included into a cuff of the Teres Major muscle at its insertion on the scapular lateral border, is the pedicle, to raise a vascularized bone graft.

commonly used are the Scapular (fig. 5.93-2) and the Parascapular (fig. 5.93-3).

With the patient standing up, marking starts by localiz-

ing the approximate location of the triangular space. Given that it is a very constant perforator artery, it can be very precisely localized by Doppler examination. With the "emerging

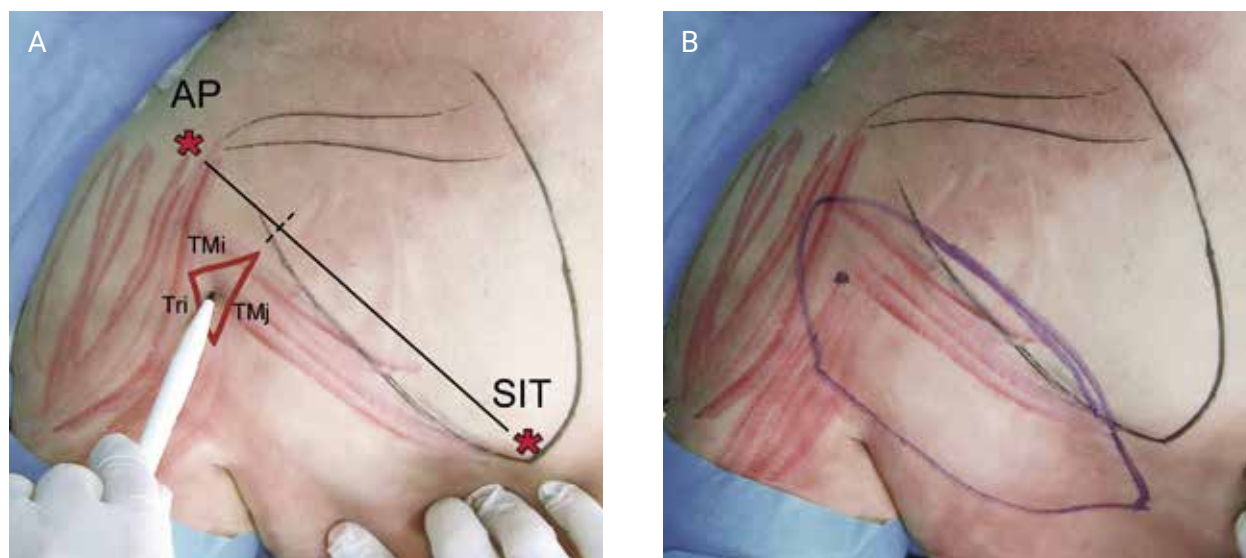


Figure 5.95. A) According to Serafin (95), the location of the triangular space is at the lateral scapular border, two fifths of the distance inferiorly on the line connecting the Acromial process (AP) and Scapular inferior tip (SIT). B) Outlining of the parascapular flap.

point” localized, the type of flap is selected according to the defect location and the required rotation (see fig. 5.93A).

As stated, the parascapular flap usually does not need to exceed 8-9 cm in width, meaning that that primary repair of the donor area is feasible. Regarding the vertical dimensions of the parascapular flap, its upper boundary is localized on the scapular spine. The inferior boundary for island flaps is said to be on the inferior angle of the scapula. Although for cutaneous pedicled flaps, the inferior limit is extended further below this angle. Lateral margins are outlined between the mid-axillary line, laterally, and medial vertebral line. It should be remembered that the anatomic territory (contrast

injected territory) is always less extensive than the surgical territory (final vascularized harvested cutaneous territory⁽⁷¹⁾). The parascapular flap, based on the triangular space, is outlined along the axis of the descending branch of the CSA.

Elevation

The flap is raised from distal to proximal, respecting the fascia covering the underlying muscles. Some authors recommend a retrograde dissection from the triangular space due to the possibility of an anatomic variation about the exit of the descending branch.

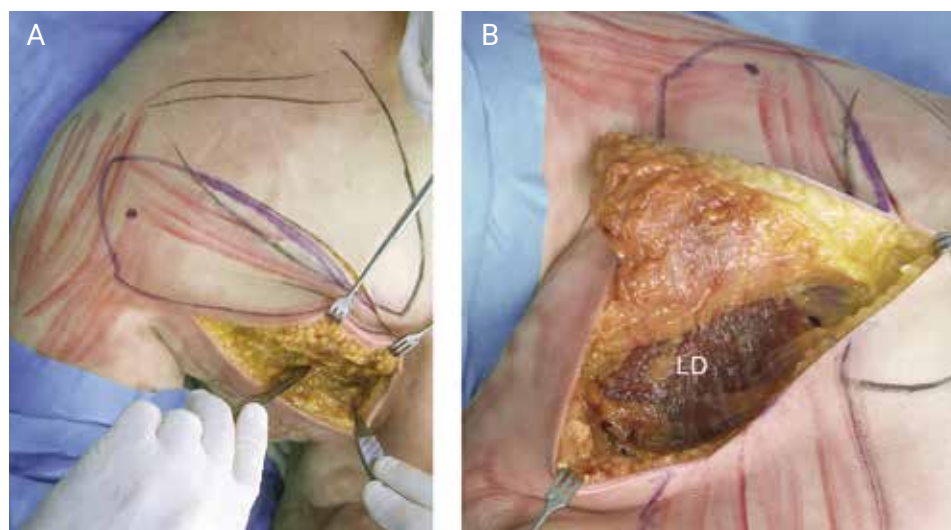


Figure 5.96. Elevation starts by incising the skin over the scapular tip deep into the fascia, which is respected. The skin paddle is progressively elevated over the fascia of the Latissimus Dorsi (LD). Elevation continues until the upper border of the Latissimus Dorsi is reached. If the emerging point of the SCA has not been previously determined by Doppler examination, the boundary between Latissimus Dorsi and Teres Major has to be carefully explored, because of the possibility of the previously mentioned anomalous emergence between these muscles.

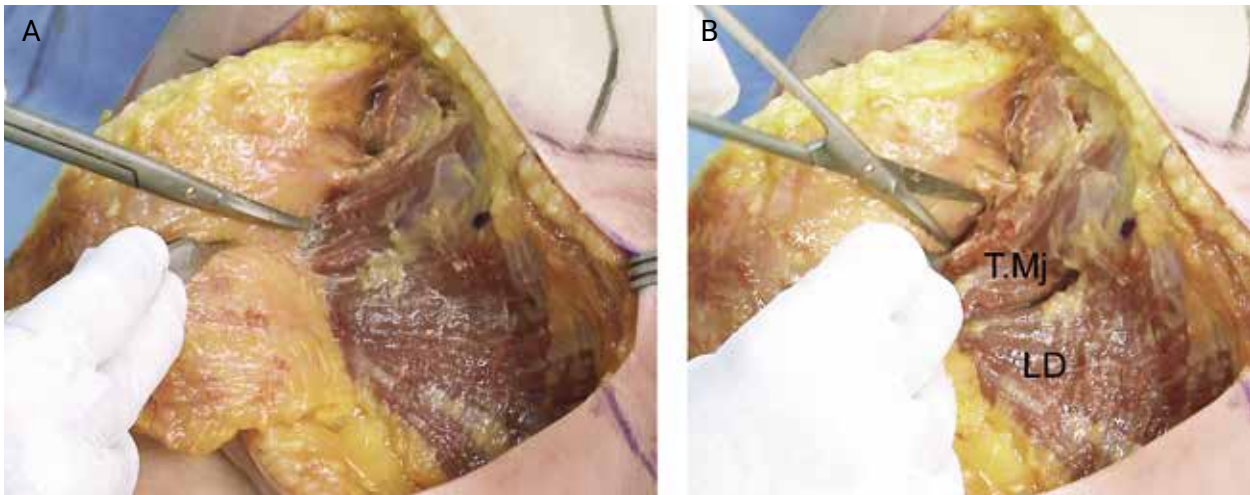


Figure 5.97. Once it is confirmed that the SCA does not emerge over the Latissimus Dorsi (LD), elevation is continued until the upper boundary of Teres Major (TMj) is reached. Blunt and careful dissection is performed to localize the descending inferior branch of the SCA.

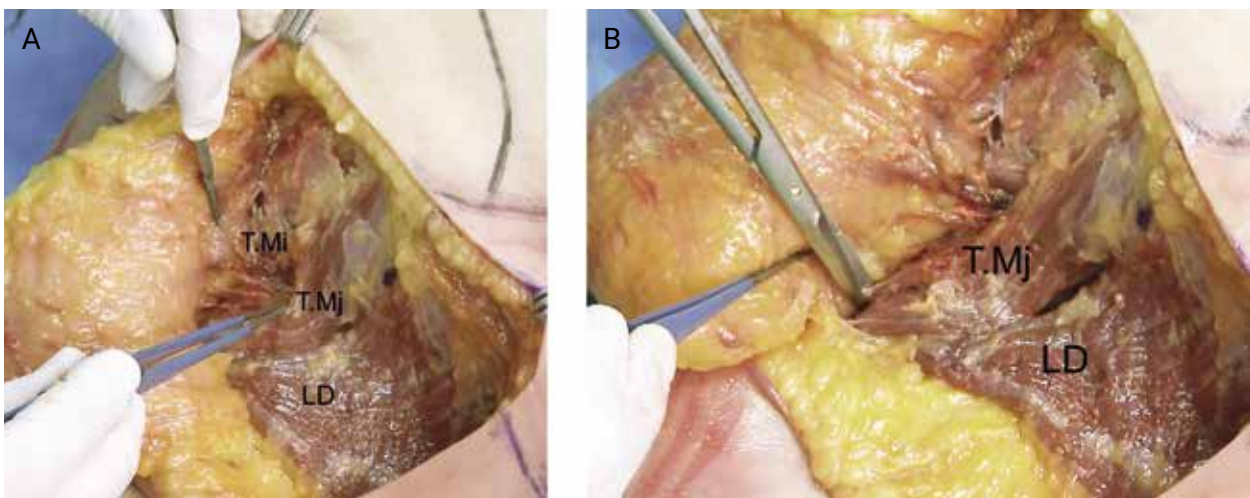


Figure 5.98. Gentle dissection between Teres Major and Teres Minor will reveal the emergence point of the SCA.

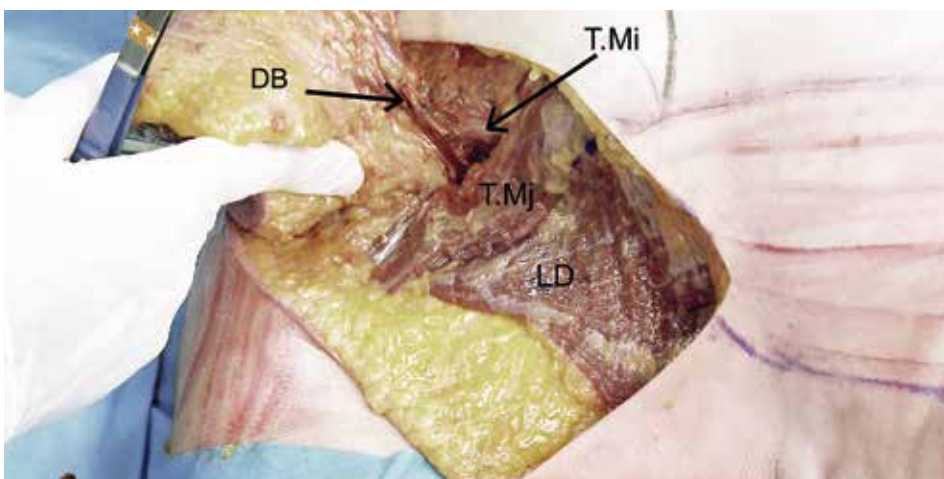


Figure 5.99. The SCA is freed from the surrounding Teres muscles deep into the Scapula. Minor branches are ligated far from the main vessels avoiding the use of diathermy. By freeing the pedicle from its surrounding muscular fibers, the flap will be able to rotate like a propeller flap.



Figure 5.100. Once the SCA and its descending branch have been isolated all around its emergence point, proximal skin incision is completed to fully liberate the skin island.

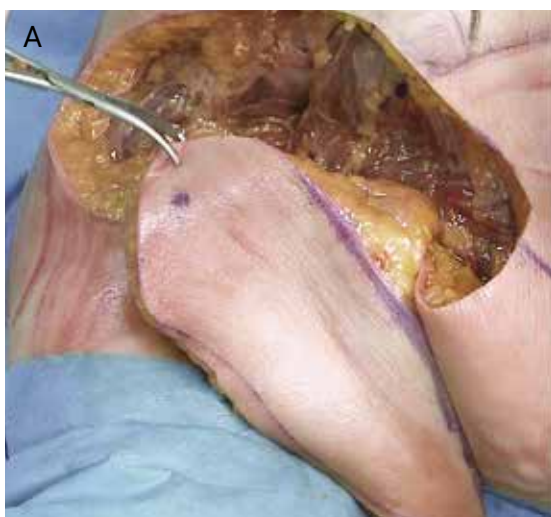


Figure 5.101. Deep dissection of the SCA will allow the flap to be rotated to repair defects affecting the axillary area, as well as defects on the Deltoid zone.



Figure 5.102. When rotation is not enough to displace and cover a defect, intermuscular dissection between Teres Major and Minor has to be performed. If the pedicle is found to emerge below the Teres Major muscle, it can be split to gain length for the pedicle.

Parascapular-scapular flap options

Parascapular-Scapular pedicled flap: In this case, the vessels inside the pedicle do not need to be completely individualised. It is sufficient to reach the upper border of the Teres Major (split or not) and leave all the subcutaneous, loose areolar tissue, which goes into the intermuscular septum, intact. The looser the areolar tissue, which is preserved around the pedicle, the more the pedicle is protected and the risk of tilting or torsion is decreased. Generally, for the flap to reach the axilla, not very much proximal dissection of the pedicle is needed. But as some length of the flap is lost by the torsion over its base, the flap should be designed to be long enough to over-extend its tip further than the inferior angle of the scapula. Occasionally, skin grafts are needed to repair the upper part of the donor area on the rotation point. The way to avoid skin grafting on this area is the use of the Parascapular bilobed flap (which is, in fact the Parascapular-Scapular flap) in which the "horizontal" scapular flap constitutes the minor arm of the bilobed flap. When the main parascapular flap is rotated into the defect, the scapular flap will also rotate into the parascapular donor area, while its own donor area is repaired by primary closing.

Parascapular Island flap: Cutaneous paddle is outlined following a pattern taken from the defect or as an ellipse to facilitate donor area primary repair. The flap is elevated as for pedicled flaps, from distal to proximal. For island flaps, the pedicle has to be precisely individualized and carefully dissected back through the triangular space to gain pedicle length. Donor area for island flap is usually repaired by skin grafting. For obese patients, the flap is usually thick and too bulky for the axilla. Fur-

thermore, a large quantity of skin is needed to repair the donor site. That is why the parascapular flap is generally the last option to be considered in overweight or obese patients.

Expanded flap: For flaps where the emergence point of the main vessel can be precisely determined and its surgical territory can also be predicted, the possibility of previous expansion can provide many benefits: The flap is thinned, its surgical territory enlarged by the delay phenomenon and it usually allows for a primary closure. However, two surgical stages are required. Pre-transfer expansion of the Scapular flap has been reported by Russell⁽⁸⁷⁾, who also emphasised that the inelasticity of the transferred cutaneous paddle is detrimental. However, tissue expanders can be inserted around and beyond the flap's margins, generally on the lateral thoracic wall or medially to the island flap; not to expand the flap itself, but to allow for a primary closure of the donor area.

Vascularized bone flap: The scapula is a good source for vascularized bone grafts. Though the medial scapula can be transferred, the lateral aspect of the scapula is more reliable as it is vascularized by direct branches from the Descending osseous branch of the Circumflex Scapular artery (see fig. 5.94B)⁽⁹⁴⁾. The bone graft can be harvested from 2-3 cm below the glenoid fossa up to the scapular tip (which should always be preserved to prevent winging of the scapula and preserve function). With or without including a cutaneous paddle, to harvest the corticocancellous fragment of the lateral scapula, a cuff of Teres Major muscle, measuring between 10-12 mm has to be left attached to the bone in order to preserve all musculoperiosteal vessels entering the bone⁽¹⁰⁴⁾.