REVERSE LATERAL DISTAL ARM FLAP

This is a fasciocutaneous flap on the distal lateral aspect of the arm that has been partially and previously described as the extension of the proximal Lateral arm flap; specifically for elbow coverage[13,18]. A great advantage of the reverse Lateral Arm flap is that the skin over and around the elbow is usually thin and, even in overweight patients, is ideal for anterior elbow repair.

Indications

As stated previously, regarding whether the flap can be based proximally or distally will depend on what is needed and where the defect is located. For elbow coverage, the proximally based flap fits all requirements in texture, colour and especially thickness. Even in overweight patients, the combined thickness of both the skin and subcutaneous tissue is usually thin, which makes this flap especially useful to resurface defects over joints, face and neck. This flap can also be used as an adipofascial flap[44] to cover defects around the elbow. As there is not skin elevated with the flap, the adipofascial paddle can be larger with no concerns about the primary closure of the donor area.

Vascularization

As the *Posterior radial collateral artery* (PRCA), courses down, it becomes more superficial and ends in a vascular subcutaneous plexus around the epicondylar and olecranon area, interconnecting with the *Radial recurrent artery* (RRA) and the Interosseous recurrent artery (IRA)[18]. Terminal branches of these two arteries nourish the skin on the lateral aspect of the lower arm and elbow. The reverse flap can be vascularized in either of these two systems (see figs. 6.44 and 6.45). However, the RRA is larger and better positioned than the IRA, for a longer pedicle.

Markings

A template from the defect is used to see the extension and shape of the flap. As this flap is raised over an area vascularized for three main vessels, (the Posterior radial collateral (PRCA), the Radial recurrent (RRA) and the Interosseous recurrent arteries (IRA), two reference lines are traced. Firstly, a line is drawn between the acromion and epicondyle. Approximately 2 cm lateral to this line lays the axis of the Lateral arm flap. A second line is traced between the lateral epicondyle and styloid process. Both lines represent the central axis for this flap. The skin area can measure up to 12-16 cm distal to the lateral epicondyle, over the proximal radial region of the forearm[59]. The flap is outlined over the distal third of the arm, around the central axis that represents the lateral intermuscular septum (through which the Posterior Radial collateral artery courses) and can be extended over the proximal third of the forearm.

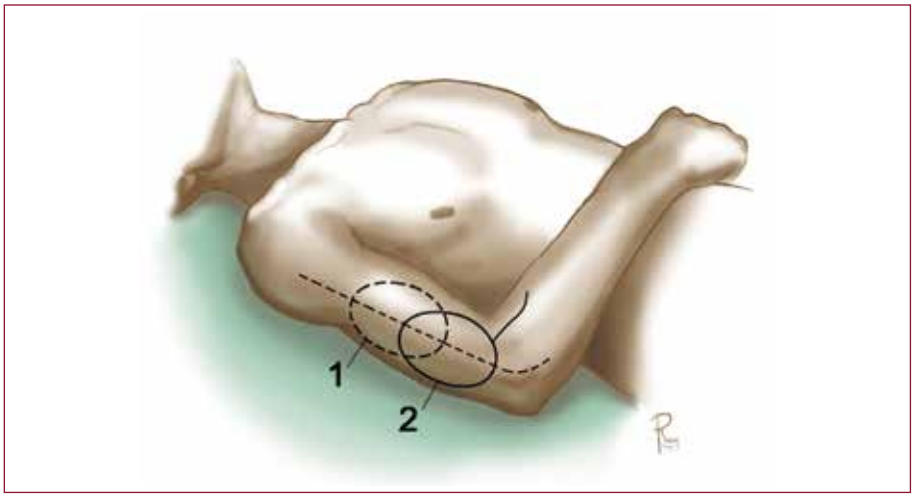


Figure 6.42. Reverse lateral distal arm outlining,

Elevation

The distal arm component has been previously dealt with extensively in the description of the lateral arm flap. Initial steps to reach and isolate the pedicle (PRCA) are exactly the same as for the Distally based lateral arm flap, so it is good to refer back to these sections for further and detailed information.

Surgery is initiated under controlled ischemia with a tourniquet in a high position. Elevation of the flap starts with a full thickness incision along one of its borders, anterior or posterior. (Refer to pictures and accompanying legends.) Anteriorly, the flap is dissected subfascially from the biceps and brachioradialis, until the intermuscular septum (where the PRCA runs) is reached. The vascular pedicle is located at the deepest part of the septum, very close to the humerus bone.

As previously mentioned, the distally based flap is vascularized by three main arteries that anastomose in a wide arterial system. The flap can thus be elevated, based on one, or several of these arteries and vascular systems or networks[18,40]. However, the system or network that best ensures full vascularization is the one that includes both the Radial recurrent (RRA) and the Interosseous recurrent arteries (IRA), plus the distal section of the PRCA.

a) RRA-IRA-PRCA. The *Radial recurrent, Interosseous recurrent and Posterior collateral radial arteries* system. For a flap based in this plexus, the PRCA has to be divided and ligated proximally to the point where the Radial recurrent artery branches off and the flap is raised, including the distal portion of the three arteries: the PRCA, the RRA and the IRA (see fig 6.44). The pedicle containing the RRA and IRA (and the distal portion of the PRCA) is dissected subfascially down to within 2 cm proximal of the lateral epicondyle. It is almost impossible to individualize these recurrent arteries - the Radial and the Interosseous. Thus, if the flap is to be based on this system, it should be raised on a short fasciosubcutaneous pedicle, where these two arteries are included[59]. Including the RRA and the IRA, together with the distal part of the PRCA, enhances the flap vascularization; through the arc of rotation is limited exclusively to the elbow region.

b) IRA-PCRA. The flap can also be based on the anastomoses between the interosseous recurrent and posterior interosseous arteries and the PRCA (18). According to Katsaros[40], skin islands of about 8 cm by 10 cm can be elevated on the lateral aspect of the elbow, based on this arterial network. These arteries (and veins) are too small to be individualized and elevated. The pedicle includes the subcutaneous tissue and fascia around the elbow and is dissected to within 2 cm proximal of the lateral epicondyle[68].

c) RRA-PRCA. Another option is to raise the flap exclusively based on the anastomosing network between the Radial recurrent artery and the Posterior radial collateral artery[13] (see fig. 6.45). It permits a longer and narrower pedicle, though vascularization of the flap is limited to the RRA.

Figure 6.43. Anteriorly, the flap is dissected subfascially from the biceps and brachioradialis, until the intermuscular septum is reached (where the PRCA runs). The vascular pedicle is located at the deepest part of the septum, very close to the humerus bone.

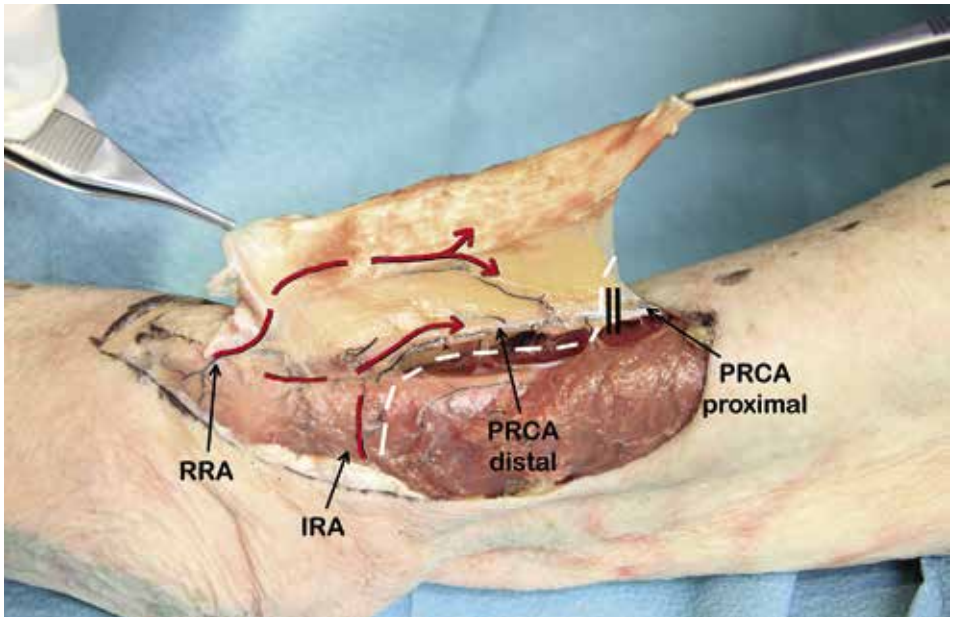


Figure 6.44. RRA-IRA-PRCA vascularization. Laterally, the incision is made deep into the fascia of the Triceps muscle. Elevation continues subfascially until the lateral septum is reached. The septum and the PRCA are elevated from the humeral shaft and the artery is divided and ligated proximally to the branching of the radial recurrent artery. The white dotted lines indicate the incision lines, to include the radial recurrent and the interosseous recurrent arteries.

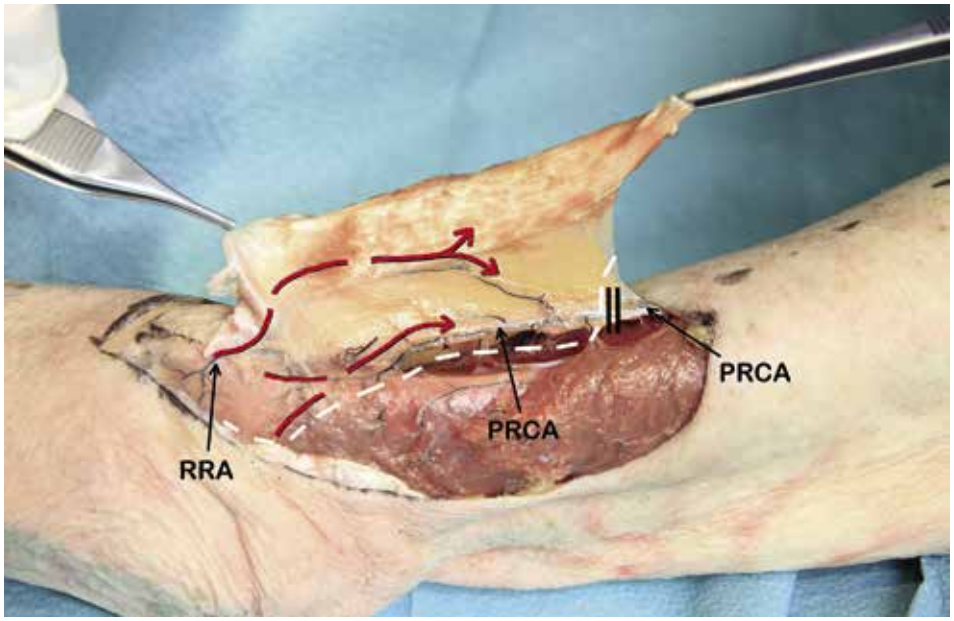
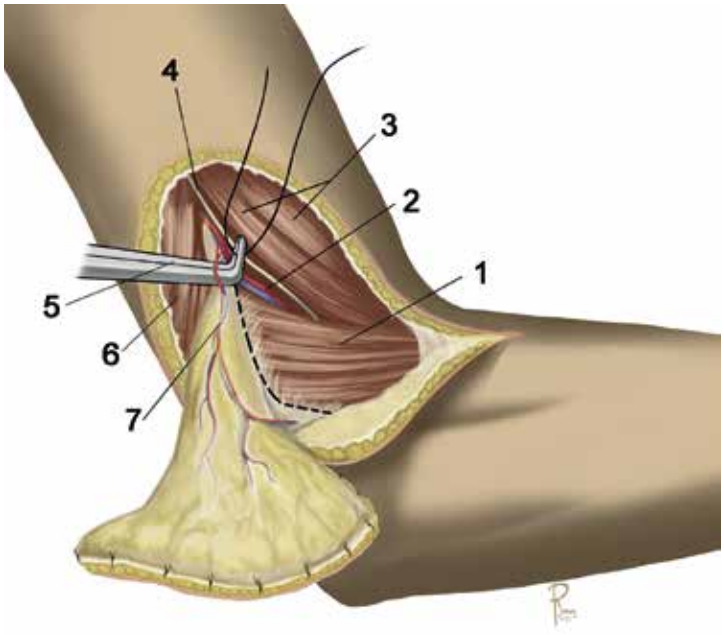


Figure 6.45. RRA-PRCA vascularization. As in the other versions of the flap, the PRCA is divided proximally to the RRA branching. Elevation follows a line that continues distally, preserving the distal part of the PRCA, anastomosed with the RRA, but dividing the network of vessels branching off from the IRA and continuing down, around the epicondyle.



1. Brachioradialis muscle
2. Recurrent radial art.
3. Biceps and brachialis muscles
4. Radial nerve
5. Ligature around the posterior descending artery
6. Triceps muscle
7 Posterior descending branch od the profunda brachii artery

Figure 6.46. Distally based lateral arm perforator flap.

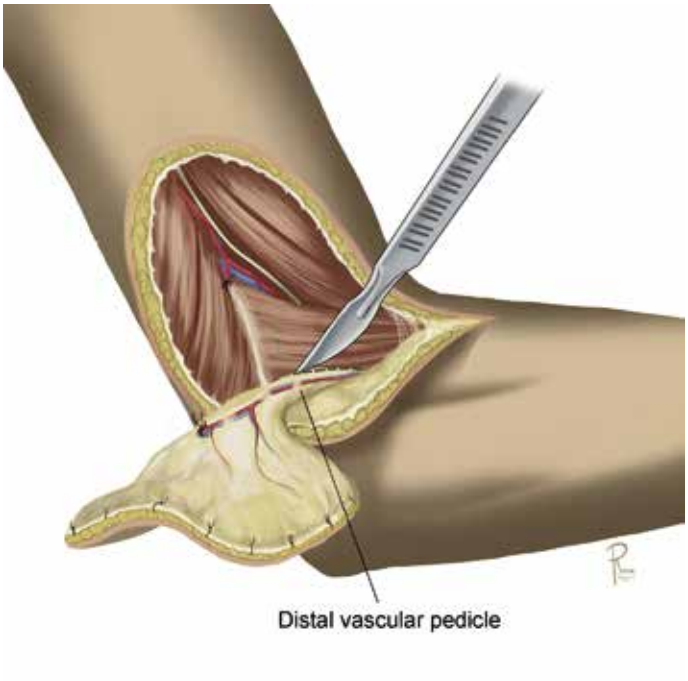


Figure 6.47. The radial posterior descending branch has been already ligated and the loose tissue around the pedicle completely detached from the humerus. The pedicle could still be dissected distally by detaching it from the lateral epicondyle.

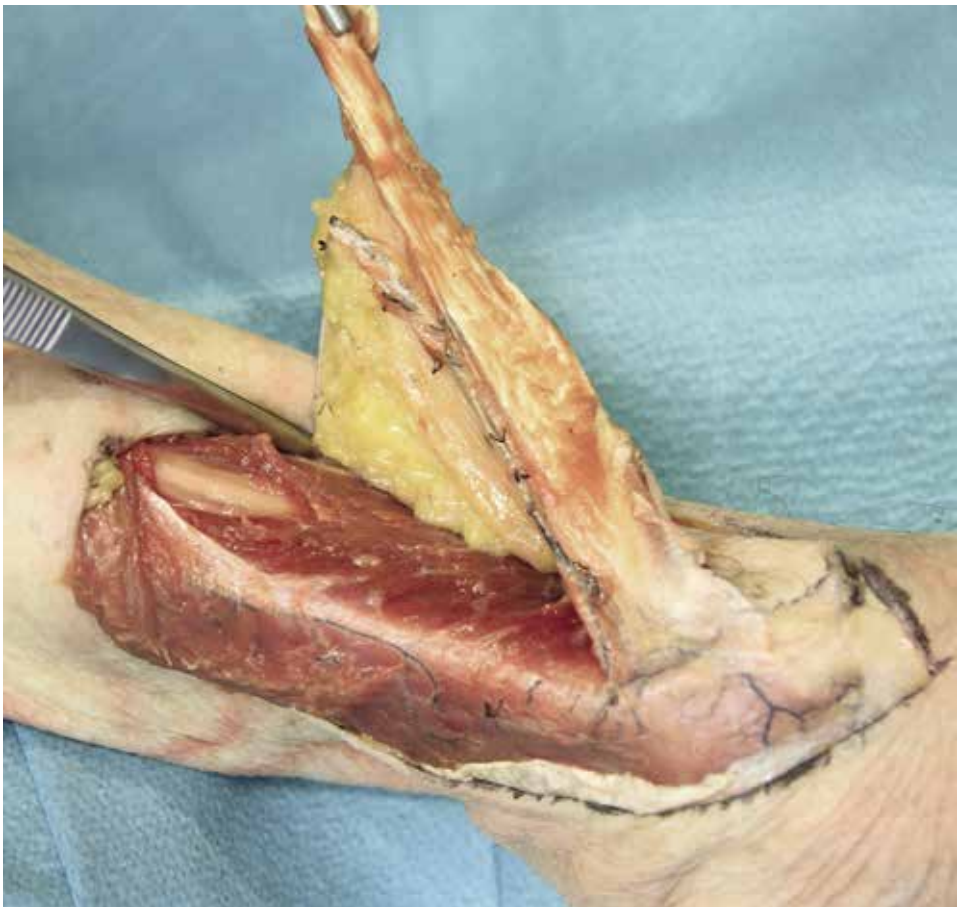


Figure 6.48. Distally based lateral arm flap has already been elevated with the triceps muscle fascia included. The Posterior radial collateral artery has been proximally ligated and the loose tissue around the pedicle completely detached from the humerus. This flap is based on the Radial-Interosseous recurrent arteries system. If a longer pedicle is still needed, it can be dissected inferiorly, by detaching it from the lateral epicondyle.

Figure 6.49. The flap, coming from the lateral aspect of the lower arm, perfectly covers the full extension of the inner surface of the elbow.