The Island Pedicle Flap: A Valuable Tool for the Repair of Small- to Medium-Sized Surgical Defects on the Extremities

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The repair options for surgical defects of the extremities have been largely limited to second-intention healing, primary closure, rotation flaps, and skin grafts. A novel use of the island pedicle flap is presented as a closure option for small- to medium-sized defects on the extremities.

The repair of surgical defects following extirpation of melanoma and nonmelanoma skin cancer may be challenging. The relative simplicity of the island pedicle flap (V-Y advancement flap), its predictable results, and the minimal operative risk have made this random-patterned flap a valuable tool for the repair of facial defects. Traditionally, this flap has been used for the repair of small- and medium-sized full-thickness defects of the cutaneous lip, eyebrow, forehead, and lower nose.1-7 More recently, other uses have been reported, including the repair of surgical defects of the earlobe,8 cheeks,5,9 and postauricular neck.10 The unilateral and bilateral island pedicle flaps can be valuable tools for the repair of small- to medium-sized surgical defects on the lower extremities.

THE ISLAND PEDICLE FLAP

The island pedicle flap is a triangulate flap that is completely separated from its surrounding skin and contains an underlying vascular pedicle that retains its attachment to the subcutis. In the classic design, the flap is created immediately adjacent to the defect by making 2 incisions of equal length that lead tangentially from the edges of the defect to a point some distance away from the defect (Figure 1). The incisions are made to the level of the subcutis. Thus, an island of skin is created that maintains an uninterrupted vascular supply from its pedicle beneath. The island is then advanced into the surgical defect, thus leaving a secondary defect at the apex of the flap. The secondary defect is then repaired via a primary closure, and the island is sutured in place.

The island pedicle flap has several advantages over other flaps and grafts. The island pedicle flap has a more reliable vascular supply than does the classic advancement flap, in which the blood supply originates at the base of the flap and must span the entire length of the flap to the leading edge. Therefore, the island pedicle flap is not restricted to the 3:1 length-to-width ratio as is the classic advancement flap. The richly vascular pedicle may be advantageous in those at risk for poor healing (eg, smokers and those with a prior history of radiation). Additionally, there is rarely a need for undermining when compared with other flaps, which is particularly advantageous in patients receiving anticoagulants or those with a bleeding diathesis.

Although the island pedicle flap is highly reliable with regard to survivability and low morbidity, a few disadvantages are known. The flap may be prone to...
trapdooring, especially when closing facial defects. In most cases in which elevation does occur, the use of simple massage or intralesional corticosteroids results in significant improvement, and, therefore, surgical revision is rarely necessary. To reduce the risk of trapdooring, some advocate slightly undersizing the flap by 1 to 2 mm on either side, when possible. By doing so, some secondary movement will be necessary to suture the flap in place and must be predicted in advance. When planned properly, this secondary movement will not result in tissue distortion. After hemostasis is achieved, the flap should be advanced carefully into place by using a skin hook or fine forceps. Not infrequently, the flap may require additional movement. This can be accomplished by slightly undermining the tail of the flap. If additional movement is needed, one should first palpate the flap and push it into place. If necessary, undermining of the pedicle can be performed to allow additional movement, but doing so should be kept to a minimum.

The key suture is placed at the mid portion of the leading edge of the flap, although when there is moderate tension, it may be best to close the secondary defect first, thus pushing the flap into place.

THE ISLAND PEDICLE FLAP ON THE EXTREMITIES

Primary (side-to-side) closure can be used to close many small- and medium-sized defects on the extremities. Similar to other sites, it is best to align the suture line along relaxed skin tension lines. With slightly larger defects, the island pedicle flap can be used when a primary closure would produce considerable tension or come a few millimeters short of closing the defect.

Depending on the size of the defect, 1 or 2 island pedicle flaps can be used. The flap(s) is generally designed to slide along relaxed skin tension lines. When 2 flaps are used, a line drawn through both apices of the flaps should be along or parallel to the relaxed skin tension lines when possible (Figure 2). Although the flaps can be successfully designed in different orientations with respect to the relaxed skin tension lines, the closure of the secondary defect will ultimately put more tension on the wound edges, which could lead to wound dehiscence and more tension around the extremity, which, in turn, could lead to compartment syndrome if not planned appropriately. Proper planning of the flap(s) to ensure its adequate mobility to facilitate closure of both the defect and the secondary defect(s) is paramount.

Closure is often performed using both buried and superficial sutures in a manner similar to that of other primary or flap closures on the extremities. It is the author’s preference to use 4-0 polyglactin for buried sutures and either 5-0 polypropylene for some defects on the upper extremities or 4-0 polypropylene for defects on either the upper or the lower extremities as a superficial suture.

SUMMARY

The closure of both partial- and full-thickness medium-sized defects on the extremities can be challenging. The use of skin grafts is still widely practiced today and often has acceptable cosmetic results for superficial defects. Although grafts are commonly used for deeper defects,
the cosmetic outcome is often disappointing. The rotation and O-to-Z flaps are commonly used for the repair of medium- to large-sized defects on the extremities. Large flaps, extensive undermining, or both are often required, thus increasing morbidity.

The island pedicle flap can be an excellent tool for the repair of defects on the extremities and has many advantages over other closure options. Similar to any local flap, the island pedicle flap has a perfect skin color and texture match, which is an advantage over skin grafts. The island pedicle flap is, by nature, a bulky flap and can provide sufficient bulk to repair nearly all full-thickness defects on the extremities. Furthermore, there is rarely a need for undermining, unlike with most other flaps, which is extremely advantageous in patients receiving anticoagulants or those with a bleeding diathesis. This flap has been proven to be reliable and is a valuable tool that, with proper planning, can provide superior cosmetic results with minimal morbidity.

REFERENCES