

Novel Approach to Decreasing Tension When Approximating Wound Edges in Advancement Flaps: The ImPli Stitch

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Subcutaneous stitches are placed in an effort to close dead space and aid in tissue edge approximation when repairing a surgical defect,¹ but overcoming tension to approximate wound edges in surgical defects may be particularly difficult to accomplish in situations such as extreme defect width, location of the defect over a convex surface, inelasticity or rigidity of tissue, and excessive recoil of tissue being approximated.

To ease tension, increase tissue movement, and decrease the risk of necrosis when advancing a flap, it is imperative to undermine the surrounding tissue adequately. Additional movement can also be achieved by excising standing cones at the proximal aspect of the flap near its initiation point, but when undermining and excising standing cones do not sufficiently free the tissue and reduce tension, a subcutaneous ImPli stitch can be placed. The ImPli stitch decreases the width of the surgical defect, redistributes tension along the length of the flap, and reduces tension where the distal free edge of the flap meets the opposing edge of the wound defect. In the author's experience, placement of the ImPli stitch, by reducing tension as described, diminishes the possibility of tissue necrosis, dehiscence, poor wound healing, and scarring when a flap is used to close a surgical defect.

Technique

One side of the ImPli stitch has features of the imbrication stitch and the set-back buried dermal stitch, and the other half resembles the fascial plication stitch. It derives its name from the combination of the imbrication and plication stitching techniques. The ImPli stitch is designed to take advantage of the relative immobility of the fascial tissue at the distal base of the surgical defect and use that tissue's stability to gently, but effectively, pull the pedicle of an advancement flap toward the opposing edge of the defect such that the flap drapes loosely over the defect in preparation for placement of the traditional buried stitch, buried vertical mattress stitch, or subcutaneous inverted cross mattress stitch that brings the edges of the defect together in direct opposition.

The ImPli stitch is like the imbrication stitch and the set-back buried dermal stitch in that it facilitates wound edge approximation, allows wound edges to drape together without tension, minimizes tension across the epidermal component of the opposing edges, and incorporates as part of its technique an infradermal entry and exit site.^{2,3} However, the infradermal entry and exit portion of the ImPli stitch is incorporated into the stitch on only one side of the closure, at the flap's initiation point, to allow for relief of tension and

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resultant relaxation of the flap distal to the stitch.

The ImPli stitch is similar to the fascial plication stitch in that the ImPli stitch uses the stability of the fascial layer to assume the burden of tension when decreasing the distance between the opposing sides of the defect.⁴ However, the ImPli stitch enters and exits the fascial layer on only one side of the defect, at the distal base of the defect opposite the side of the flap's leading edge.

After the surgeon excises the lesion, determines the appropriate type of advancement flap to use, and appropriately undermines the tissue surrounding the defect while carefully noting the vascular and nerve structures beneath the defect, the first step (Step 1) in placement of the ImPli stitch is to insert the needle into the base of the defect 1 to 2 mm proximal to the defect edge distal-most to the flap. With the needle pointed in the direction of the flap, the needle is advanced downward to grab hold of approximately 6 to 8 mm of relatively fixed fascial tissue before turning the needle upward again and exiting the base of the defect approximately 8 to 10 mm from the entry point and parallel to the direction of the flap.

In Step 2, the needle is inserted into the flap using an infradermal approach 1 to 2 mm from the flap's initiation point. With the needle pointed toward the distal edge of the flap, the needle is advanced toward the upper reticular dermis to grab hold of 6 to 8 mm of dense dermal tissue before exiting the flap infradermally approximately 8 to 10 mm distal to the entry point and parallel to the direction of the flap.

In Step 3, the surgeon repeats Steps 1 and 2 by placing an identical stitch approximately 1 mm lateral to the initial stitch to create side-by-side suture placement for a pulley effect similar to that used in the buried pulley stitch⁵ and the subcutaneous inverted cross mattress stitch.⁶ The pulley effect decreases the amount of work required to

advance the flap over the surgical defect (Figure 1).

In the final step (Step 4), the two ends of the suture are gently pulled together, and a knot is tied, resulting in the forward movement of the flap and subsequent draping of the flap over the surgical defect (Figure 2). In the event that the defect is being closed using a bilateral advancement flap, such as an H-plasty, two ImPli stitches can be placed in mirror image of each other so that the opposing flaps can meet in the middle of the defect.

When correctly using the ImPli stitch, the surgeon will notice that the flap loosely drapes over the surgical defect and that a slight dimpling of the tissue can be noted from the skin's surface over the portion of the flap's initiation point where the infradermal aspect of the ImPli stitch was placed. The dimpling resolves as the absorbable suture naturally resorbs (Figures 3A–C).

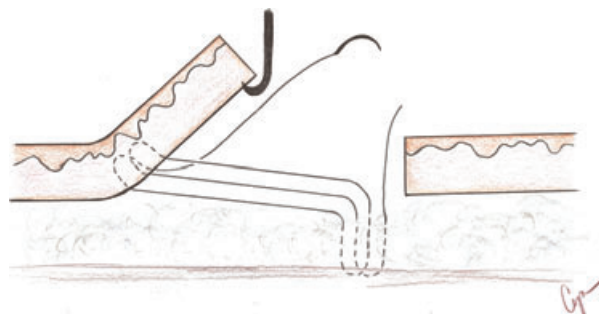


Figure 1. Steps 1 through 3 in placement of side-by-side sutures to create the ImPli stitch.

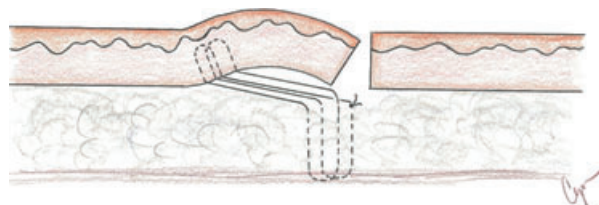


Figure 2. Step 4 and resultant draping of the flap over the surgical defect after the ImPli stitch is secured with a knot.

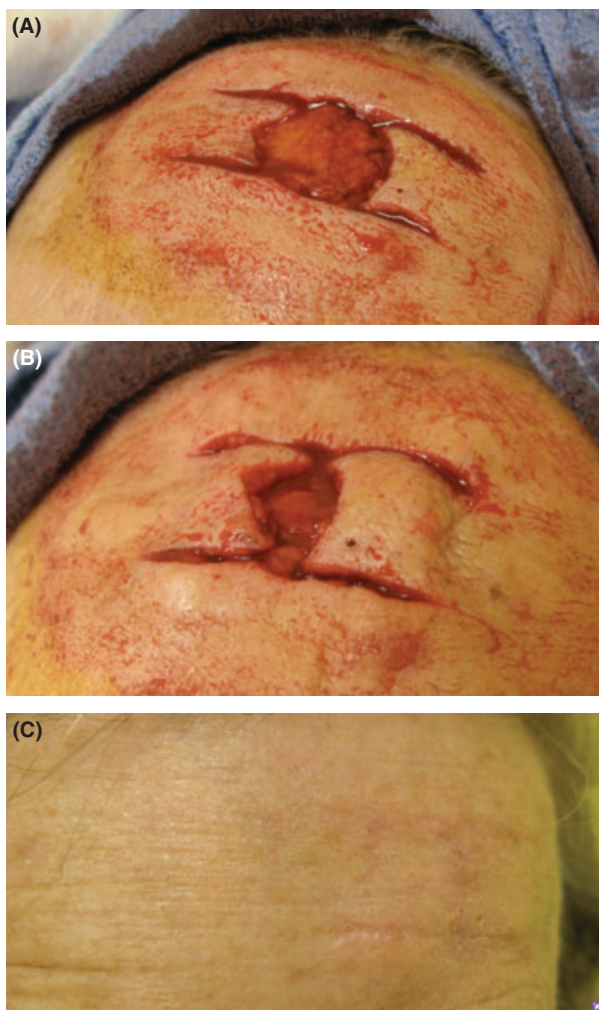


Figure 3. (A) Surgical defect on forehead before placement of ImPli stitches in bilateral advancement flap. (B) Surgical defect on forehead after placement of ImPli stitches in bilateral advancement flap. (C) Forehead in same patient 8 days after surgical procedure. Note minimal evidence of dimpling, which resolves as absorbable suture resorbs.

Discussion

I routinely incorporate the ImPli stitch into my surgical practice to pull the flap gently and effectively toward the opposite side of the defect. This stitch spreads the tension throughout the length of the flap and reduces the tension at the flap's distal edge, where the point of greatest tension would otherwise reside. The ImPli stitch can be incorpo-

rated into any type of advancement flap closure in an effort to decrease the width of the defect and minimize tension at the point where the flap's advancing edge meets the opposite edge of the surgical defect.

For exceptional results, it is critical to place the ImPli stitch parallel to the direction of the flap to ensure adequate perfusion to the entire pedicle. It is also imperative to have a good understanding of anatomy so as to avoid vital vascular and nerve structures, particularly when placing the deep fascial portion of the ImPli stitch. When placed properly, the ImPli stitch aids in tissue approximation and allows the entire length of the pedicle to maintain adequate perfusion, reducing the possibility of poor wound healing and scarring and achieving excellent cosmetic results.

References

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