

Introducing the Bi-Pli Stitch: A New Surgical Technique to Relieve Tension in Large Surgical Defects

Traditional closure of surgical defects after extirpation of tissue involves placement of buried sutures to relieve tension and approximate defect edges before finishing stitches are used to complete the closure. Overcoming tension within uncomplicated surgical defects is accomplished using buried stitches, such as the buried dermal, buried vertical mattress, or subcutaneous inverted cross mattress (SICM) stitches. These stitches work to pull the defect edges together. That amount of work is directly related to the force that is applied to the suture being used to pull the defect edges together.

Very large defects, and defects in areas where the skin exhibits limited mobility, may require deep stitches in addition to buried stitches to relieve tension that is more extreme than in smaller defects. Examples of deep tension-relieving stitches include the plication,¹ corset plication,² imbrication,³ and ImPli⁴ stitches. To this list, the authors propose the addition of a novel suturing technique called the Bi-Pli stitch to easily and effectively relieve tension deep within the wound.

Without alleviating tension deep within large or high-tension defects, surface tension along suture lines of apposition may cause vascular compromise resulting in necrosis or dehiscence. Poor wound healing can negatively affect wound cosmesis and lead to unsightly scarring. Given that patients' evaluations of their surgical experience directly correlates with the appearance of their scar, it is important to adhere to good surgical techniques that portend aesthetically pleasing outcomes.⁵

Technique

The Bi-Pli stitch is a variation of the deep tension-relieving fascial plication stitch described by Dzubow¹ in 1989. The Bi-Pli stitch is created by placing 2 contiguous and parallel plication stitches adjacent to each other at a distance of approximately 5 mm (Figure 1A, B). This side-by-side placement creates a pulley system that facilitates wound closure with ease, even in high-tension defects. In a pulley system, alternating vectors redistribute the force required to do work, thereby providing a mechanical advantage (MA) equal to the number of segments of rope, chain, string, or, in this case, suture doing the work within the system. A traditional plication stitch provides an MA of 2 because 2 segments of suture traverse the defect. However, the Bi-Pli stitch provides an MA of 4, making it easier to close even high-tension defects. An analogous suturing technique is the

SICM stitch,⁶ which also uses a pulley system but is placed in the dermal plane and is used to approximate wound edges.

After extirpation of the tissue, the surgeon engages in careful undermining lateral to the defect edge beneath the dermis and subcutaneous fat down to the plane of fascial or fibrous tissue. The needle is inserted into the fascia or fibrous tissue deep and lateral to the defect edge on 1 side of the wound midway along the length of the defect and exits the fascia or fibrous tissue about 10 mm medial to the insertion point. The needle then inserts and exits the lateral fascia on the opposite side of the defect in the same manner. If the suture ends were tied together at this point, the surgeon would have performed a classic fascial plication stitch. However, to create the Bi-Pli stitch, the suture ends are not tied together and instead, the surgeon passes the needle obliquely across the defect field to insert it approximately 5 mm from the initial insertion point, thus initiating a second plication stitch that is contiguous with the first plication stitch. Once the second plication stitch is placed, the ends of the suture are pulled and tied together with relative ease because of the pulley effect.

Discussion

For large surgical defects, common tension-relieving stitches include plication,¹ corset plication,² imbrication,³ and ImPli⁴ stitches. The plication stitch drags the lateral aspects of wound bed fascia toward each other, thereby decreasing the width of the defect and the surface tension. However, because tension is so high, the stitch can slip when placing

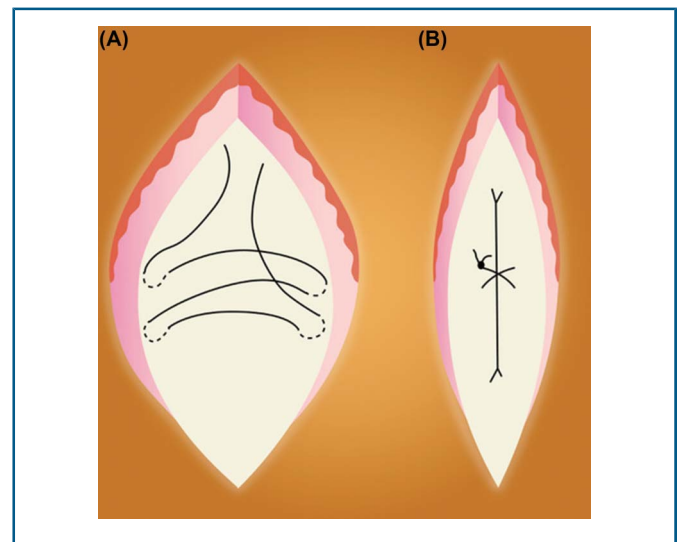


Figure 1.

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the knot, and it requires that an assistant be present to help push the wound together. The corset plication stitch is a running plication stitch that spans the length of the defect. Although it certainly is useful in decreasing tension, it requires more suture material and more bites than may be necessary to close most large defects. The imbrication stitch is an intradermal stitch that creates a shingle-like effect of the surface tissue as it pulls defect edges closer together. Its drawback is that the imbrication stitch does nothing to alleviate tension or space deep within a large defect. The ImPli stitch is used for advancing flaps and thus is not indicated for closure of large linear defects.

The Bi-Pli stitch has been used for several years by the primary author as a means to relieve tension deep within large surgical defects. It uses a lateral pulley effect to easily and securely plicate the fascia in a simple process of placing 2 continuous plication stitches side by side. The redistribution of force across the suture means that the knot can be easily tied without slipping and without the need for an assistant. It has been the authors' experience that the use of the Bi-Pli stitch provides many benefits over common tension-relieving stitches and should be considered whenever presented with the challenge of closing high-tension surgical defects.

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