Surgical technique for optimal outcomes

Part II. Repairing tissue: Suturing

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Learning objectives
After completing this learning activity, participants should be able to describe common suturing errors that lead to unaesthetic scars and identify methods to gain hemostasis efficiently and re-approximate skin in a layered fashion with proficiency.

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Sound surgical technique is necessary to achieve excellent surgical outcomes. Despite the fact that dermatologists perform more office-based cutaneous surgery than any other specialty, few dermatologists have opportunities for practical instruction to improve surgical technique after residency and fellowship. This 2-part continuing medical education article will address key principles of surgical technique at each step of cutaneous reconstruction. Part II reviews the placement of deep and superficial sutures. Objective quality control questions are proposed to provide a framework for self-assessment and continuous quality improvement. (J Am Acad Dermatol 2015;72:389-402.)

Key words: excise; excision; incise; skin; surgery; suture; technique; undermine.

INTRODUCTION

Part I of this continuing medical education article reviewed surgical techniques that involve cutting tissue: incising, excising, and undermining. Final inspection of the wound after completing these cutting steps should reveal cleanly incised, vertical wound edges, a wound base with a uniform anatomic depth, and precisely undermined skin flaps. Careful hemostasis should minimize bleeding. Strategies for effective hemostasis have been reviewed elsewhere.[1,2] Precise execution of these cutting steps prepares the wound for accurate placement of buried and superficial sutures.

REPAIRING TISSUE: PLACING BURIED SUTURES

Key points

- **The preferred caliber of the suture and size of the needle depend on the anatomic location, thickness of the skin, and tension of the wound**
- **Suture sequence and surgeon positioning influence the efficiency and execution of subcutaneous sutures**
- **The proper placement of buried vertical mattress sutures and atraumatic handling of skin are critical steps that achieve optimal surgical outcomes**

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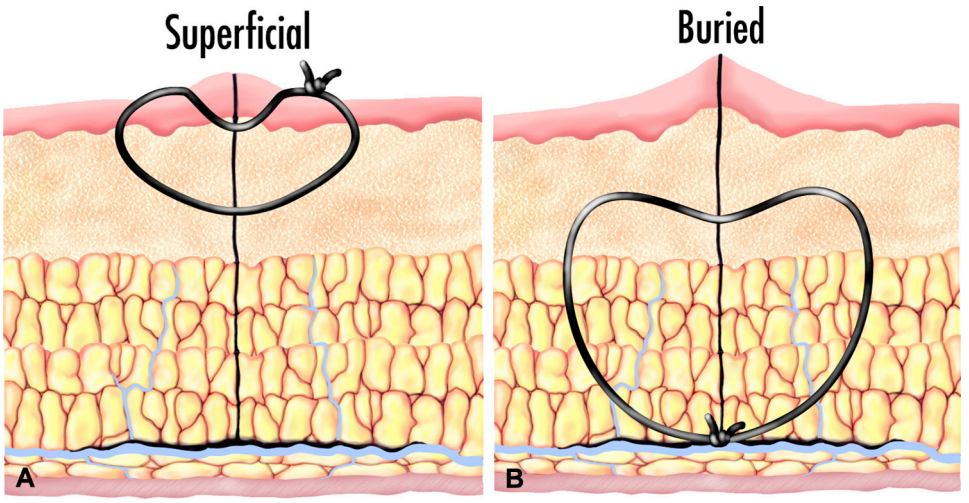

Fig 1. The superficial (**A**) and buried vertical mattress (**B**) sutures each have heart-shaped loops, but the knot is at the bottom of the loop for the buried suture.

- **The buried vertical mattress suture everts the wound edges and allows for tension-free approximation of the papillary dermis and epidermis**
- **After the effective placement of buried vertical mattress sutures, both wound edges should be clearly visible and there should be minimal bleeding from exposed dermis**

The anatomic layers requiring suturing will vary by site, depth, and wound complexity.[3] This article will focus on the most common wounds in cutaneous surgery: wounds that extend through the epidermis, dermis, and subcutaneous fat. Buried or subcutaneous sutures eliminate dead space, approximate the dermis and epidermis, and provide strength to the wound as the scar matures. The buried vertical mattress suture is the workhorse for deep sutures and will be the primary technique discussed herein.[4] It creates the same heart-shaped loop as a superficial vertical mattress suture, except that the knot lies at the bottom of the loop (Fig 1). Numerous other techniques for buried sutures may also accomplish the accurate approximation of wound edges; however, a comprehensive discussion of these lies beyond the scope of this article.[5] Judicious selection of the suture and needle, a thoughtful plan for suture sequence, and positioning relative to the wound are the first steps for effective execution of the buried vertical mattress suture.

The material and caliber of the suture and the type and size of the needle influence execution of the buried vertical mattress suture. Previous articles and educational resources provide a comprehensive review of suture materials.[5,6] In most cases, a dissolving rather than a permanent suture is ideal for buried sutures. Slowly absorbing intradermal sutures, such as polydioxanone, may decrease scar spread in high tension wounds.[7] Wound tension determines the ideal size of the suture. High-tension wounds (eg, those on the torso or proximal extremities) may require a 3-0 or 2-0 suture. In moderate tension wounds, a 4-0 suture may provide sufficient strength. For wounds under minimal tension, a 5-0 suture will usually suffice. In general, using the smallest caliber suture that provides sufficient tensile strength is desirable to minimize the amount of suture material in the wound. The type and size of the suture needle strongly influence execution of deep sutures. Most surgeons prefer to place deep sutures with a reverse cutting needle. The choice of needle size depends primarily on the thickness of the dermis; in anatomic areas with a thin dermis, a smaller needle is required, such as a 3/8 arc P-3 needle. Anatomic areas with a thicker dermis require a larger needle, such as a 3/8 arc PS-2 needle. In locations with thick skin, such as the back, a half-circle reverse-cutting needle may facilitate placement of the buried vertical mattress suture. Using a large needle in anatomic areas with a thin dermis will risk tearing the skin. Using a small needle in anatomic areas with a thick dermis frequently leads to bent needles as the surgeon struggles to rotate the needle far enough to retrieve the tip.

Suture sequence influences operative efficiency and execution. Placing deep sutures is more challenging in areas of high versus low tension.[8] The strategy of placing the first sutures in the area of highest tension then moving to areas of progressively lower tension has its advantages. First, access and visibility to the areas of greatest tension are easiest before most of the wound has been closed. The alternative strategy of placing the