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METHODS ARTICLE

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The Kuwait Stitch: A novel surgical technique for surgical wound closures

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Abstract

There are several stitch techniques used for surgical wound closing. Each stitch has its own benefits and drawbacks that a surgeon must balance before use. In this paper, we highlight some of the more common techniques utilized in operative wound closure and briefly discuss benefits and caveats one must be aware of before using. The rest of our paper will focus on a new technique, the Kuwait Stitch, with instructions on how to perform the technique followed by a discussion on the benefits and indications for use of this stitch.

KEYWORDS

surgery, surgical stitch, wound closure

1 | BACKGROUND

Surgical wound closure is a vital process for incisional healing and surgical outcomes. Wound healing can be divided into four key stages: hemostasis, inflammation, proliferation, and maturation.[1] Surgical management with the use of suture material is indicated when there is a significant tissue depletion (i.e., laceration repair or closure of surgical incisions). A surgeon's goal is to approximate the skin edges to allow for primary wound healing. When the wound heals with suture material, there is a natural tendency for the skin to contract and depress.[2] As a result, suture stitching techniques were developed to purposely evert the skin to minimize the unnecessary tension and to improve the cosmetic appearance of the scar after healing.[2,3] The ideal technique is one that achieves skin eversion but is also simple and fast enough for a surgeon to implement.

The most commonly implemented suture technique is the simple interrupted stich.[4] The simple interrupted stitch allows a surgeon to fine tune and adjust the wound edge approximation throughout closure.[5] If applied with too much tension though, the simple interrupted technique can create a "railroad track" scar appearance.[6] Although both the simple interrupted and continuous, or running, stitches use the same number of passes through the dermis, the running stitch is typically used for longer incisions, and more evenly distributes tension along the wound.[5] Unfortunately, one must be careful with this technique since there is an associated risk of wound dehiscence.[7]

Two techniques that provide the most skin eversion are the vertical and horizontal mattress stitches. Both mattress stitches are generally used when the wound edges do not well approximate, invert with suture, or if the wound is deep. The vertical mattress is effective for closing wounds on the neck and groin, where the skin tends to invert. Some disadvantages for the vertical mattress include its time-consuming property, the requirement of additional passes, and risk of cutting into the skin and creating "railroad track" scars.[8] In areas of the palm and soles, the horizontal mattress stitch is the preferred method over the vertical mattress to maintain tension and skin eversion.[8] The caveat with this technique is the strength of the stitch, so much that it could cut off blood supply and cause skin necrosis. Both mattress stitches can be modified with a buried knot

that can help to reduce the tension, dead space, and the risk of marks after healing.[5]

In the remainder of the paper, we describe a novel technique, which we named the Kuwait Stitch (Simple Eversion), that dependably achieves desirable approximation of the incised skin edges. We outline the technical steps involved in performing the Kuwait Stitch (Simple Eversion) to illustrate its ease of use.

2 | TECHNIQUE

This technique is best described as follows: The first pass of suture involves passing the needle through the epidermis entering it where one could normally enter for a simple interrupted suture case. The needle is acutely angled away from the skin incision so that when it passes through the dermis at the dermis-subcutaneous fat level, the needle point is farther from the skin incision than it was when passed through the epidermis. The needle is then passed parallel to the skin surface as it travels through the tissue in the plane of the dermis-subcutaneous tissue plane until it exits at the skin incision. The needle is then passed through the other flap of the incised skin again in the dermis-subcutaneous tissue plane until it reaches a distance that is farther from the desired needle exit point from the epidermis. The needle is then directed toward the desired epidermis exit site and is passed through the epidermis (Figure 1). Now, it is time to tie the knot. When the suture is tied with just a bit of tension, the dermis underlying the epidermis is with enough volume to push the epidermal edges upward and outward (Figure 2). This causes enough eversion to exactly approximate the cut epidermal and dermal edges. Once the knot has been tied, cut the needle from the suture, and repeat the process along the rest of the wound (Figure 3).

Realistically, it can be difficult to suture only the dermis and not include any of the subcutaneous tissue. The inclusion of some of the subcutaneous tissue may occur, but the important concept of the technique is that an inverted triangle of tissue, most of which is dermis, causes desirable eversion or near perfect approximation of the dermis at the skin incision line. This technique reliably works, and it is our standard technique for cosmetic closures. One caveat is in cases with moderately thin skin, where it would be more advantageous to include more of the subcutaneous tissue.

The completed wound closure has the following appearance. The skin is anatomically approximated. There is no inversion of the skin at this incision line and no dermis is visible. There may be a slight upward bulge of the skin beneath the suture. The span of the suture crossing the incision line is 5 mm or less and the interrupted stitches are placed approximately 4 mm apart from each other.

3 | DISCUSSION

The technique described in this article has not been associated with any significant adverse effects, such as wound dehiscence or long-term scarring. It can be applied throughout most areas of the body; however, this stitch has not been tested or used on the face, groin, genital, or perianal regions. This Kuwait stitch has limited indications for use in areas of the body with thin skin such as that can be found

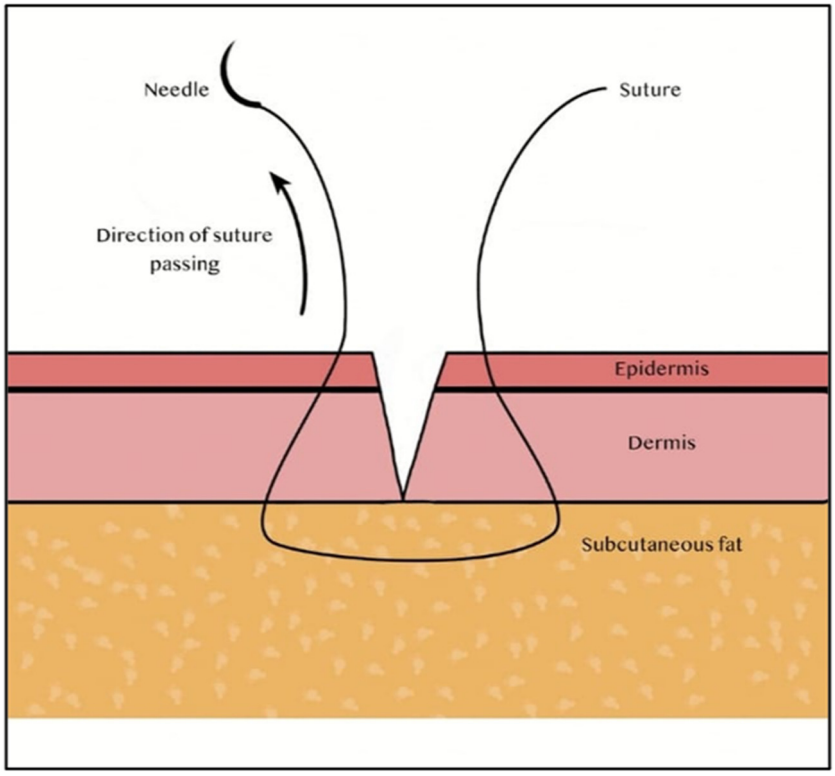

FIGURE 1 Illustration showing the Kuwait Stitch through the skin layers

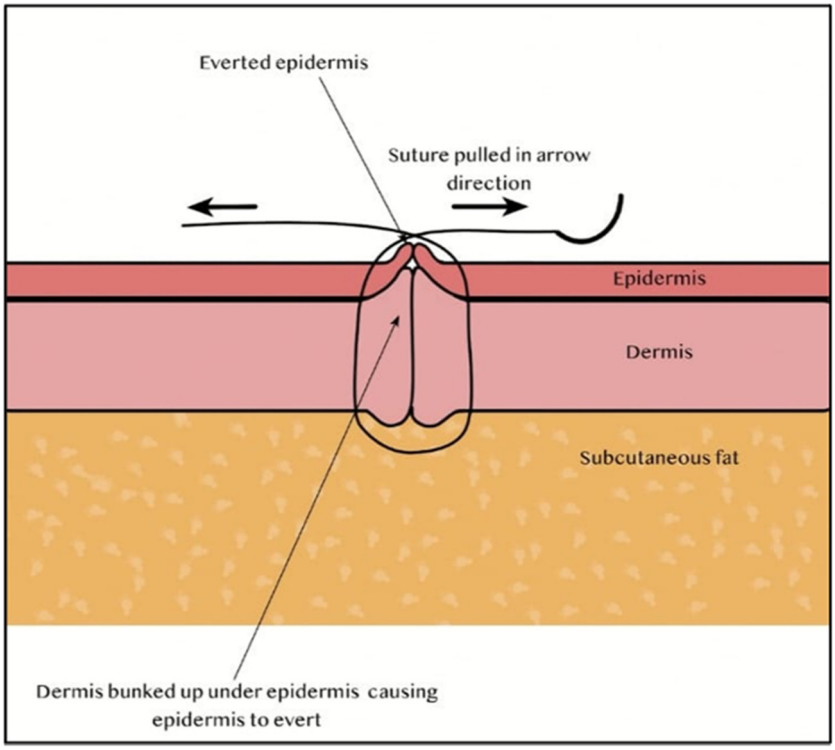

FIGURE 2 Depiction of the wound edge eversion created with the Kuwait Stitch

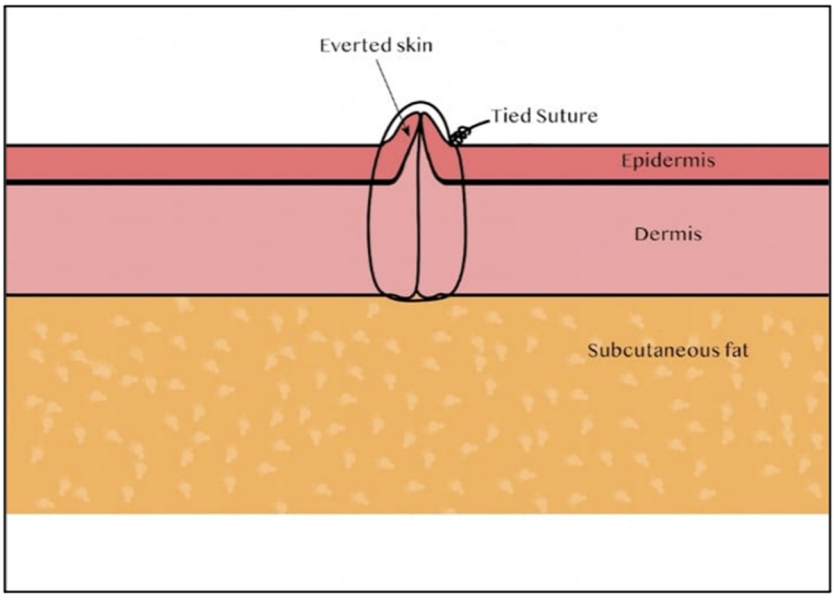

FIGURE 3 Final illustration of the Kuwait Stitch

on the dorsum of the hand in elderly patients. Furthermore, the Kuwait Stitch requires a degree of needle strength or bending resistance; tiny needles that bend easily such as those found with smaller suture diameters would not be appropriate to use due to the likelihood of needle malleability. It is our recommendation to utilize the Kuwait Stitch in regions of the body with modest to thick dermal layers and to use suture with sturdy needles that resist bending while passing the suture.

In our experience, the Kuwait Stitch technique results in a superior cosmetic scar when compared to the vertical and horizontal mattress techniques. Compared to both mattress techniques, the Kuwait Stitch requires fewer total passes through the skin, contributing towards shorter operating times and less risk to patients from being under sedation. Additionally, the technique we present here does not have associated risk of skin necrosis, a rare but possible concern seen with the horizontal mattress technique.

The Kuwait Stitch described in this paper is easy to learn and learning curve is very small for surgeons with minimal experience. This technique is very reproducible. The needle size for this suture technique is not as important as the gauge of metal for the suture

needle because needles which bend easily will not work well using this technique. Nylon suture is what we have mostly used when performing this technique, but other monofilament sutures could also be used.

In this paper, we only focused on detailed instructions with schematic diagrams on how to perform the Kuwait Stitch technique without any outcome measurements. In the future, we plan to conduct a randomized study comparing the outcomes between this technique and vertical/horizontal mattress stitch techniques.

4 | CONCLUSION

In summary, the Kuwait Stitch (Simple Eversion) is safe to perform for surgical wound closures. There are no inherently increased risks or complications from this technique compared to conventional stitches used in wound closing. To date, we have not seen any increased adverse effects such as wound dehiscence, surgical-site infections, or long-term scarring problems using the Kuwait Stitch. Operating surgeons should be careful, as with all closing techniques, to not apply too much tension while using the Kuwait Stitch (Simple Eversion). Additionally, preventive steps should be considered to optimize high-risk (comorbidities, increased body mass index, current tobacco use, etc.) patients before surgery to reduce the chances of complications.

AUTHOR CONTRIBUTIONS

Muthana M. Sartawi: Conceptualization; formal analysis; investigation; methodology; project administration; resources; supervision; validation; visualization; writing—original draft; writing—review & editing. **Hafizur Rahman**: Formal analysis; investigation; methodology; project administration; resources; software; supervision; visualization; writing–original draft; writing—review & editing. **Ibraheem Yousef**: Data curation; methodology; resources; visualization; writing—original draft; writing—review & editing. **James M. Kohlmann**: Conceptualization; formal analysis; methodology; project administration; resources; supervision; validation; visualization; writing—original draft; writing—review & editing.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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REFERENCES

1. Janis JE, Harrison B. Wound healing: part I. Basic science. *Plast Reconstr Surg*. 2014;133(2):199e-207e. doi:10.1097/01.prs.0000437224.02985.f9
2. Kappel S, Kleinerman R, King TH, et al. Does wound eversion improve cosmetic outcome?: Results of a randomized, split-scar, comparative trial. *J Am Acad Dermatol*. 2015;72(4):668-673. doi:10.1016/j.jaad.2014.11.032
3. Moody BR, McCarthy JE, Linder J, Hruza GJ. Enhanced cosmetic outcome with running horizontal mattress sutures. *Dermatol Surg*. 2006;31(10):1313-1316. doi:10.1111/j.1524-4725.2005.31209
4. Lammers RL, Trott AT. *Clinical Procedures in Emergency Medicine*. 4th ed. Saunders; 2004.
5. Moy RL, Waldman B, Hein DW. A review of sutures and suturing techniques. *J Dermatol Surg Oncol*. 1992;18(9):785-795. doi:10.1111/j.1524-4725.1992.tb03036.x
6. McLean NR, Fyfe AHB, Flint EF, Irvine BH, Calvert MH. Comparison of skin closure using continuous and interrupted nylon sutures. *Br J Surg*. 1980;67(9):633-635. doi:10.1002/bjs.1800670908
7. Azmat CE, Council M. *Wound Closure Techniques*. StatPearls Publishing; 2021.
8. Zuber TJ. The mattress sutures: vertical, horizontal, and corner stitch. *Am Fam Physician*. 2002;66(12):2231-2236.

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