Double-Lock Technique: A Simple Method to Secure Abdominal Wall Closure

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ABSTRACT

Secure closure of a laparotomy incision remains an important aspect of any abdominal operation with the aim to avoid the postoperative morbidity and hasten the patient’s recovery. Depending on the operator’s preference and experience, it may be done by the continuous or the interrupted methods either using a non-absorbable or delayed-absorbable suture. We describe a simple, secure and quick technique of abdominal wall closure which involves continuous suture inter-locked doubly after every third bite. This simple and easy to use mass closure technique can be easily mastered by any member of the surgical team and does not need any assistant. It amalgamates the advantages of both, the continuous and the interrupted methods of closures. To our knowledge, such a technique has not been reported in the literature.

Key Words: Abdominal closure. Laparotomy closure. Double lock technique.

INTRODUCTION

Exploratory laparotomy remains one of the common operations across the surgical disciplines. As such, the systematic and safe closure of such a laparotomy wound is the key to reduce the postoperative morbidity like wound pain, wound infection and incisional hernia.1 This, in turn, may lead to early discharge from the hospital, early return to activities and has a potential of eventually saving the overall cost of the procedure. However, despite being such an important step, it is generally assigned to the junior resident of the surgical team who may neither have the requisite expertise nor the assistance.

In this write up, we describe a simple, secure and easy-to-master technique of abdominal wall closure which may be quickly and single-handedly performed by any member of the surgical team. This technique has a potential of establishing as the standard method of laparotomy closure provided that the approximation of the fascial edges remains without tension. To authors’ knowledge, such a technique is yet to be reported.

The Technique: This is a mass-closure (single-layer) technique of a midline laparotomy wound. A 1/0 non-absorbable loop suture is used for its easy handling and tissue-gliding properties, placed in a continuous fashion.

Depending on the length of the laparotomy, the procedure can be started from either/both end/s of the laparotomy wound. The authors usually start at the upper end. Once the angle-stitch of the fascia is secured (Figure 1), the next three continuous bites are each taken 1 cm away from the edge of the fascial cut keeping 1 cm distance in between. The suture material is then pulled to achieve the optimum approximation of the fascial edges. Maintaining an adequate tension on the suture material at this stage, the fourth stitch is taken 1 cm away from the third bite and is then doubly inter-locked. Now, the suture thread is pulled downwards inline with the wound (to achieve a sound approximation of the fascial edges) and then upwards (so that it gets locked). Because of this step of double-locking (Figure 2) the edges of the fascia remain exactly in the required state of adequate approximation without any throw of the suture getting loose (Figure 3). At this stage, the surgeon can just release the suture material and go ahead for arranging the needle-grip for the next bite (Figure 3). Next, the same sequence of bites (three continuous and fourth double-locking) are repeated till the wound gets fully and securely closed [Figure 4]. For the larger laparotomy wounds, an additional suture material is employed starting from below-upwards. Subsequently, both the suture materials are tied in the centre of the wound.

Figure 1: The initial throws. The angle-stitch is taken with 1/0 monofilament non-absorbable loop suture at the upper end of fascial wound. Figure 2: The “double inter-lock” after every three throws.
Closure of an exploratory laparotomy wound is a frequent procedure in any surgical unit. The importance of its adequacy has been revealed by the fact that 9%-20% patients will eventually develop incisional hernias after midline abdominal wall closure. Moreover, their further complications like incarceration (6 – 15%) and strangulation (2%) may become life-threatening. Prevention of incisional hernia remains a major issue in any abdominal wall closure. Hence, it demands apt attention towards its technically perfect execution.

The proposed criteria for an ideal abdominal-wall closure technique include quickness, simplicity and cost-effectiveness apart from producing minimum complications. However, there are still no standardized guidelines/techniques for achieving them. Broadly speaking, two issues are generally discussed, as regards the method of the abdominal-wall closure: the continuous versus interrupted suturing and the layered versus mass-closure. Proponents of the interrupted closure may argue about the division of the stress at the points of sutures so that in an untoward event of any suture cut-through, the others maintain the wound-integrity. However, apart from being a time-consuming procedure, it may require a great length of the suture material and tend to add multiple knots to the subcutaneous space those are likely to cause more pain to the patient postoperatively. Proponents of the continuous suturing method may evoke about the suture’s “see-saw effect” of adjusting to the dynamic stresses and strains occurring during one’s physical movements. Apart from being faster and cost-effective, it also minimizes the number of sub-cutaneous knots and the risk of incisional hernia formation. However, the integrity of such a wound depends entirely on the security of the single filament of the suture material. In this regard, the technique described here tries to maintain the advantages of both the continuous and the interrupted methods of laparotomy closure by dividing or breaking the tension on the entire length of suture material at the points of double-locking. This, not only tends to allow an equal distribution of tension throughout the suture length, but also remains more physiological as far as the motion-dynamics of the anterior abdominal wall are concerned. It may be especially useful for the patients who are at a high risk of wound dehiscence like the obese patients and the patients with immune-compromised status as well as during emergency settings.

The issue of the mass-closure versus the layered-closure of an abdominal wound has been studied in great detail and has produced a high-quality level 1-a evidence of the former’s significant superiority regarding the wound-dehiscence/incisional hernia formation. Being a mass-closure technique, the method discussed here also has a potential to reduce early as well as late wound dehiscence. This technique has been used in 483 exploratory laparotomies (both, elective and emergency) over 2 years period without any wound dehiscence. However, the only limitation of this technique is the extra length of suture material that may be required in the process of multiple double-locking.

DISCUSSION

This technique is simple, easy to learn and, most importantly, secure method of abdominal wall closure which can be readily worked out without any assistant. Although, high volume randomized trials are required to consolidate these issues, it may be considered a standard technique of closing all the laparotomy wounds.

CONCLUSION

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