Abdominal incision closure: small but important bites

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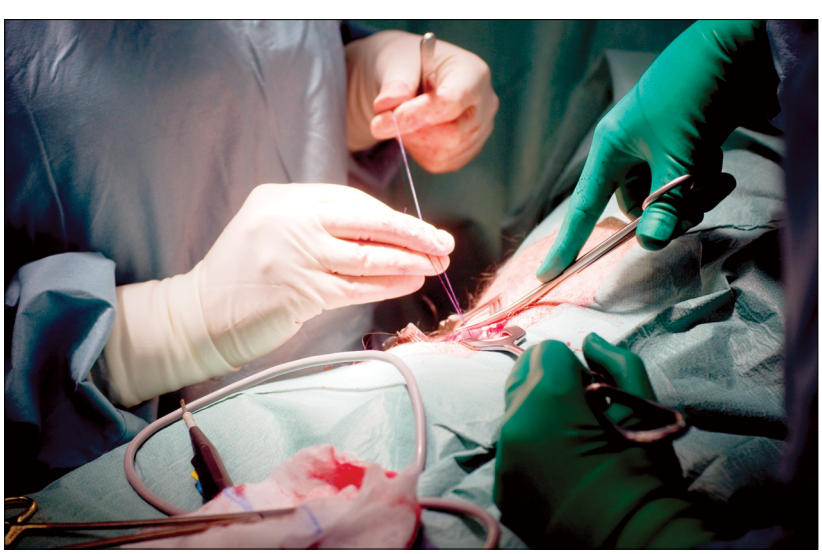
In *The Lancet*, Eva Deerenberg and colleagues' prospective, multicentre, double-blind, randomised controlled STITCH trial[1] shows that the rate of incisional hernia is lower with small tissue bites than with large bites. This finding contradicts what surgeons have thought and been taught for many decades. In the study, 560 patients undergoing abdominal surgery via midline incision at surgical and gynaecological departments in ten hospitals were randomly assigned to receive continuous wound closure with either large tissue bites (1 cm from the wound edge) or small tissue bites (5 mm from the wound edge). Patients in the small bites group had a higher ratio of suture length to wound length than those in the large bites group (5·0 [SD 1·5] *vs* 4·3 [1·4]) and a longer wound closure time (14 [6] *vs* 10 [4] min), because more stitches were placed in the wound (45 [12] *vs* 25 [10] stitches). At 1 year follow-up, the trial's primary endpoint of occurrence of incisional hernia was significantly less frequent in patients in the small bites group (35 [13%] of 268 patients) than in those in the large bites group (57 [21%] of 277 patients; covariate adjusted odds ratio 0·52, 95% CI 0·31–0·87). Postoperative pain or complications were similar between the groups. The investigators conclude that the previous clinical recommendation should be changed and that the small bites closure technique become the standard.

The process that has led to Deerenberg and colleagues' trial[1] is interesting. Why has there been a previous recommendation on bite size, why should it now be changed, and what will be the consequences of this change? The suture technique has proved very important in attempts to reduce the rate of wound complications in midline incisions. Closure with a suture length to wound length ratio higher than four is important: thus, if the suture used to close the wound is less than four times longer than the wound, the rate of incisional hernia is increased by four times.[2,3] Closure with a high ratio is an easy and cost-effective way of reducing the herniation rate.[4,5] An adequate suture to wound length ratio can be accomplished with either large or small bites. For the past 40 years, the recommendation in the literature and surgical textbooks has unanimously been that closure should be with large bites. Notably, but probably not widely known, is that this recommendation was based entirely on experimental studies.[6,7] Recommendations were to place stitches at least 10 mm from the wound edge because, in experimental studies, closure of the wound was weaker with smaller bites. Disagreements between these experimental findings and a few clinical reports showing a lower rate of wound complications with small bites attracted little attention.[8]

The disturbing discrepancy between the clinical recommendation, based on experimental studies, and the contradictory clinical reports encouraged further studies. Newer experimental studies comparing wound strength with small and large bites subsequently took the suture length to wound length ratio into account. Studies then showed that, in wounds closed with a similar ratio, the strongest wound was actually accomplished with small bites.[9,10] Investigators postulated that the rates of both wound infection and incisional hernia would be lower with small bites than with large bites. Findings from a randomised trial[3] showed a reduced rate of wound infection and incisional hernia with small bites. Additionally, the small bites technique was cost effective.[11]

Thus, experimental and clinical evidence suggests that the surgical standard of closing midline incisions with large bites should be changed. However, the clinical evidence in favour of small bites has until now been one single-site randomised trial.[3] The new STITCH trial[1] is a very thorough and well conducted



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trial, and that the follow-up in this trial consisted of both clinical and radiological examination is a great strength. Regrettably, emergency laparotomies were not included, so data for this group are still lacking. The congruence between findings in experimental studies, a single-centre trial, and a multicentre trial denotes that a high level of evidence exists in favour of small bites. Therefore, Deerenberg and colleagues[1] can conclude that the small bites technique should be used.

Increased knowledge about how to close midline incisions and monitor quality of the surgical technique is theoretically very interesting. However, implementation of this knowledge in daily surgical practice is now the most important point. The present challenge is for surgeons to acknowledge that sufficient data are available for a surgical standard to be changed, and to change their suture technique accordingly. This challenge has been recognised by the European Hernia Society that recommend the suture length to wound length ratio to be higher than four and accomplished with small bites.[12] These principles are taught to all Swedish residents in surgery in a mandatory surgical skills course. On a basic level, small bites could be achieved by providing surgeons with a suture mounted on a needle so small that only small bites are possible. Effective implementation, however, is probably only achievable if professionals in charge at local or even national levels direct this change. Otherwise, to change what has, during entire careers, been held as good surgical technique might be difficult for surgeons, especially senior surgeons. Yet the effect of that change on reduced patient suffering and health-care costs is certainly of a magnitude that encourages implementation. As Deerenberg and colleagues[1] point out, the annual cost for incisional hernia repair in the USA is US$3·2 billion; therefore, the possibility of reducing the number of repairs after midline incisions by almost 40% would have substantial economic effects.

The knowledge gathered about how to close midline incisions is now substantial. However, very few reports or studies exist for how to close other incisions such as grid-iron incisions, transverse incisions, laparoscopic port incisions, or Pfannenstiel incisions. The need for such studies is shown by a 2002 Swedish national survey, which showed that 35% of all incisional hernia repairs occurred after such incisions.[13]

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I declare no competing interests.

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