Leading article

The state of midline closure of the abdominal wall

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Midline closure is a seemingly simple procedure in open surgery, but represents a field where technical progress and research in abdominal wall repair intersects. A variety of new closure techniques (such as small bites, controlled traction) as well as sophisticated devices (elastic sutures, mesh sutures, mesh prophylaxis) are available and reflect the quest to reduce disturbingly high rates of incisional herniation. Results are mixed, however, with hernia rates ranging from 2 to 30 per cent in colorectal procedures, with equally high figures in open bariatric surgery[1–4]. Despite this frequency, there is little evidence of significant improvement or alteration in surgical practice over the past three decades[5].

Although a growing number of multicentre randomized clinical trials and recent guidelines from the European Hernia Society (EHS)[6] provide sound recommendations, this evidence seems to have been ignored by many surgeons who adhere to techniques associated with a high probability of the development of wound complications and incisional hernias[7].

There are three crucial aspects to midline closure that merit emphasis: suture technique, preservation of the anatomy of the abdominal wall and prophylactic mesh placement.

There is increasing evidence that non-resorbable, or at least slowly resorbable, running sutures should be preferred over single sutures or resorbable materials[3]. It is important to remember that the application of too much traction can cause ischaemia of entrapped muscle as well as trauma to the fascia, no matter what material has been chosen. To allow an equal distribution of tension, self-locking knots should be considered and a suture to wound ratio of 4 : 1, as recommended by the EHS[6,8]. It is still not clear, however, whether single running sutures are superior to slings and whether small bites are superior to large ones. These aspects of closure are the subjects of ongoing studies, such as the ESTOIH (Effect of Stitch Technique on the Occurrence of Incisional Hernia After Abdominal Wall Closure) trial[9]. This study uses an elastic suture, indicating a trend towards thermoplastic materials adaptive to local demands. Although thermoplastic sutures have been tested only in animal studies[10], other novel approaches are also close to translation to clinical practice, such as mesh suture that has an outer porous coat into which native tissue can grow[9]. The mesh structure formed a broad band leading to fast integration and performed better than polypropylene in a large animal model[11].

Preserving the integrity of fascial edges along with sparing of the rectus muscle is a key element of successful midline closure, whether performed with running sutures, slings, meshes or, perhaps in future, mesh sutures. To preserve fascial edges it is essential to identify and create a clean margin zone of some 2–4 cm along the linea alba. Blind stitches through subcutaneous fat or attempts to grasp recessed fascial edges with the needle inevitably lead to weak spots along the suture line. Preparation of the fascia is not time-consuming and should be seen as an essential step in all closure techniques. This is particularly so with prophylactic mesh placement, as described in detail in the EHS guidelines[6].

There is good evidence that prophylactic mesh placement is beneficial in high-risk patients[7]. Patients at high risk of incisional hernia include those having open surgery for abdominal aortic aneurysm and those with morbid obesity[12]. A recent study[13] derived from the Danish Hernia Database reported a cumulative incidence of about 10 per cent after transabdominal aortic reconstructive surgery, implying that, in future, prophylactic mesh should be seen as the standard of care. In obese patients, new findings underline the importance of distinguishing between visceral obesity and body mass index[14]. The latter alone seems a poor predictor of the development of an incisional hernia. Although prophylactic mesh placement has also been found beneficial in a recent study of open colorectal surgery[3], it is still not fully understood how much overlap is needed to prevent hernia development and whether resorbable biological mesh materials elicit sufficient ingrowth to provide a durable repair in the long term.

Guidelines on midline closure have been designed for all surgeons who use this approach to the abdominal cavity, and not exclusively for abdominal wall and hernia experts. Only wide acceptance will pave the way for a significant reduction in wound complications that contribute to the current incidence of incisional herniation.

The wider use of prophylactic mesh in the cohorts of patients outlined above seems appropriate. Training courses related to suture materials and techniques should be integrated into all surgical training programmes. Even experienced surgeons should consider participating in such courses fully to appreciate the possibilities and limitations of new closure concepts.

Disclosure

The author declares no conflict of interest.

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