ABSTRACT

Trocar site complications continue to plague laparoscopic surgeons. Described in this report is an inexpensive simple technique to close all layers of the trocar site defect.

Key Words: Laparoscopy, Trocar site closure, Trocar site herniation - Prevention.

INTRODUCTION

Most authors are currently recommending closure of all trocar sites 10 mm and larger. This is often difficult to do well using conventional external suturing technique. In this report, a technique is described which closes all musculo-fascial layers. It can be accomplished with materials at hand, is simple to perform, and will not unduly prolong the time and cost of the procedure. This technique has been used in 60 patients and greater than 120 trocar sites without any evidence of incisional hernia or wound complication.

TECHNIQUE

All trocar sites are initially injected with bupivacaine both as a skin wheal as well as full thickness along the tract of the proposed trocar placement. The abdominal wall infiltration is done prior to trocar placement and under laparoscopic visualization to avoid any laceration of blood vessels.

Two 18-gauge spinal needles are loaded with monofilament suture. One needle is loaded with a suture passed through the needle and then passed back to exit at the hub, forming a loop at the tip. The second needle is loaded and monofilament suture passed through it as a single strand.

At the termination of the case, with the pneumoperitoneum intact, the monofilament loop is passed through the skin incision along the side of the trocar through the fat, and then more lateral to the trocar as the fascia is encountered (Figure 1). This ensures a full thickness fascial purchase without incorporating significant amounts of subcutaneous fat, which can cause skin dimpling. The needle is removed and the two ends of suture exiting the skin incision are clamped together to avoid inadvertent dislodgement. The second needle is then passed through the skin incision on the other side of the trocar and a single strand of monofilament is advanced into the peritoneal cavity. In a very thin patient it is occasionally possible to direct this second needle through the intra-abdominal loop without too much trauma to the fascia. When this is not possible, it is then a simple task to pass an instrument from another trocar site through the loop of monofilament to grasp the strand of monofilament. This strand of monofilament is then pulled through the suture loop (Figure 2). The looped monofilament is then pulled out of the peritoneal cavity which brings...
Figure 1. A loop of monofilament is placed alongside a trocar site. The subcutaneous fat is pushed away from the trocar so that the needle is passed only through myofascial layers.

Figure 2. After a second strand of monofilament is passed using the needle technique, it is grasped with an endoscopic instrument which has been passed through the previously placed loop. The strand of monofilament is then pulled through the loop.

Figure 3. The loop is then pulled out, bringing with it the strand of suture.

Figure 4. The knot is tied above the fascia closing the defect.

with it the strand (Figure 3). This can then be tied just above the fascia effecting a full thickness closure (Figure 4). All trocar sites to be closed should have the suture placed before any trocar is removed. However, when a trocar is removed and the suture is tied, the pneumoperitoneum is usually maintained allowing for visualization of the closure of the remaining trocar sites.

After the trocar is removed, the skin is elevated to ensure there is no fat incorporated into the suture. If there is a significant amount of fat incorporated into the suture, it will cause skin dimpling which might not be evident at that time but can be seen with the patient upright.

DISCUSSION

Closure of the midline trocar site is usually relatively simple to accomplish using an open technique. The passage of the trocar is more perpendicular to the fascia leaving a shorter and smaller defect than does a more oblique passage. In the midline the fascia is fused. Being only a single layer it is easier and safer to close. In some extremely obese patients, however, the fascial defect is too deep to see adequately and is closed with an open suture technique. These patients can best be closed using this technique. The lateral abdominal wall trocar sites pose more technical problems because of the multiple musculofascial layers and the often oblique path of the lateral trocar. This oblique path lengthens the defect to be closed, making the innermost layers especially difficult to safely suture through a small skin incision; this is especially true in the obese patient. Intrapерitoneal closure of the defect is often technically difficult and only closes the inner-most layers.

Several innovative techniques to close trocar sites defects have previously been reported.6-10 Most, however, require additional instrumentation, thereby increasing the cost of the procedure. This technique described requires no additional instrumentation aside from an 18-gauge spinal needle.

This technique works best with three trocar sites. This has not been a problem as most procedures call for at least two operative sites plus the trocar site for the camera. A clo-
Sure can be accomplished through a single trocar site by passing an angled instrument through the trocar, through the loop, and grasping the strand of monofilament. This is more awkward than using a second trocar site but certainly possible.

Initially, there was a concern that the cutting edge of the spinal needle might cut the suture as the loop passed through the fascia. For that reason the initial spinal needle used was blunted, using a jewelers file. This practice was quickly abandoned and a standardized spinal needle has been used on the last 100 trocar sites without difficulty. These trocar sites have been followed for up to four years without any evidence of incisional herniation or wound complication.

An advantage of this technique is the ability to place a full thickness suture while maintaining the pneumoperitoneum. This allows for intraperitoneal visualization and should decrease the incidence of incisional hematomas caused by blind suture placement. The technique has also been very useful to control persistent bleeding from lacerated vessels caused by trocar placement.

CONCLUSION

There is ample evidence that trocar sites 10 mm and larger should all be closed. Lateral trocar defects and some mid-line defects in extremely obese patients are often technically difficult to adequately close using open techniques. The technique described is a simple, quick, safe, reliable, and inexpensive method to effectively achieve a full thickness closure of trocar site defects.

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