A new technique for laparoscopic trocar site closure in dogs

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Introduction

Trocar site closure is crucial to any laparoscopic procedure. While in small animals there have so far been no reports of trocar site herniation this is a well-known issue in humans (Owens et al., 2011; Swank et al., 2012). To limit hernia-related complications, defects caused by trocar insertion need to be closed. Some authors do not advocate closing 5-mm trocar sites, apparently overlooking the risk of complications that still may occur, even from such small wounds (Reardon et al., 1999; Yee and Duel, 2006; Ng, 2007; Bergemann et al., 2011). In small animal surgery, however, it is recommended that all trocar ports be closed for reasons related to the size of the wound itself and to that of the animal. Closure of such small wounds can be difficult and many techniques and devices have been developed for port sites closure. Each method carries its own advantages and disadvantages; however all are geared towards avoiding puncturing or suturing abdominal organs while closing trocar ports. The aim of the present report is to describe a simple, effective port-closure technique in dogs and its application in clinical cases.

Laparoscopy

Laparoscopy was performed on 15 dogs of various breeds (14–37 kg, aged 2–13) for the following procedures: hepatic biopsy (n=3), ovariectomy (n=8), and either laparoscopically-assisted (n=2) or totally laparoscopic (n=4) incisional gastropexy. Two dogs underwent both laparoscopically-assisted incisional gastropexy and laparoscopic ovariectomy. After abdominal insufflation, one to three portal sites (depending on the surgical procedure) were made with either disposable or non-disposable trocars. At the end of surgery, all trocar sites were closed using a newly proposed technique (Gandini and Giusto, 2014). The cannula was not removed from the abdominal wall but was instead tilted either cranially or caudally (Fig. 1A). A half-circle needle with USP 0 (or 2-0) Glycomer 631 was inserted through the whole abdominal wall (Fig. 1B), advanced along the cannula and retrieved through the trocar wound (Fig. 1C). The trocar was then tilted in the opposite direction (Fig. 1D). The needle was inserted through the wound along the cannula (Fig. 1E) and exited through the abdominal wall (Fig. 1F). The suture was cut, leaving approximately 6–8 cm on both sides of the wound (Fig. 1G). The port-closing procedure was performed under direct vision with the aid of a laparoscope on the instrumental ports, and blindly on those ports through which the laparoscope itself had been inserted. After all ports were thus prepared, all cannulas were removed, the abdomen deflated and either mosquito forceps or a crochet were inserted in the subcutis to retrieve the sutures (Figs. 1H-1I), which were then tied and cut. The subcutis was closed with a single suture using 3-0 Glycomer 631. The skin was approximated with surgical glue. Clinical examination and ultrasonography were performed at discharge and at 14 days after surgery. Follow-up was recorded at a minimum of three months post-operation. At each time-point, complications at trocar sites, defined as the presence of seroma, infection, or hernia, were recorded.

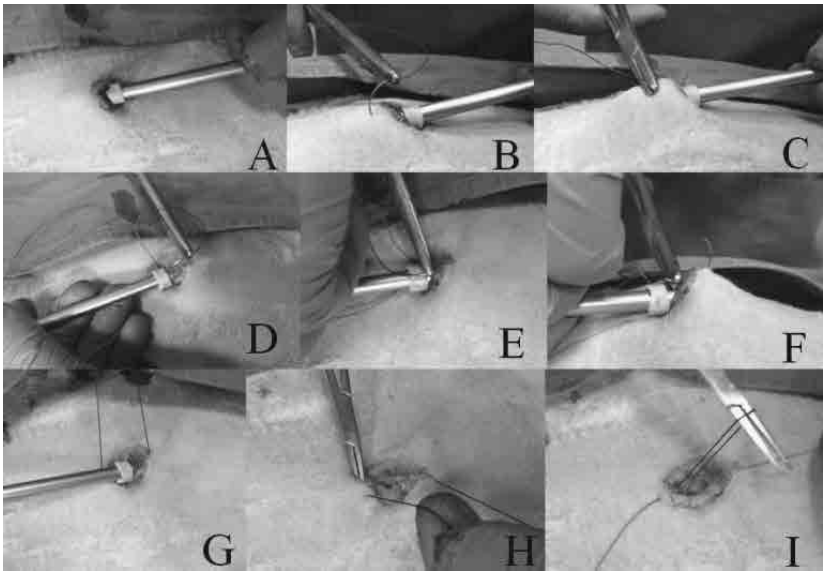

Figure 1: Step-by-step photographic illustration of the technique.

Results and Discussion

A total of 33 ports were placed, of which 15 on the midline (12 with either 10- or 12-mm, 3 with 5-mm trocar) and 18 paramedian (with 10-mm, 5-mm or 3-mm trocars). Closing trocar sites was technically straightforward, and no complications arose during the procedure. Retrieving the suture from the subcutis was the only critical step, which occasionally turned out to be taxing and time-consuming. Increased dead space as a result of subcuticular suture retrieval, did not lead to complications in the immediate post-operative period. Likewise, at follow-up, no infection, wound dehiscence, or other complications were detected or reported by the owners. In 2 out of 3 hepatic biopsies, follow-up was limited to 15 and 40 days, respectively.

Our method proved to be both easy to apply and effective in closing trocar wounds of any diameter in dogs of various sizes. By sliding the needle along the cannula, this technique ensures a safe closure, because the internal organs are protected by the shaft of the canula itself. It can also be particularly advantageous in small-diameter wounds, where manipulation of the edges may be troublesome. Extending the subcutaneous space around the wound to retrieve the suture may occasionally present difficulties. Although with similar techniques things do run smoothly (Lasheen et al., 2010; Botea et al., 2011), there remains a risk of potentially cause subcutaneous emphysema around trocar sites. During a preliminary phase on cadavers, our technique failed to consistently ensure adequate peritoneal closure, an issue addressed as a cause of herniation in humans (Gandini and Giusto, 2014). While this is also the case with other techniques, and although our method does allow for effective fascial closure, this may remain a potential drawback, although it must be considered that peritoneal closure is not always necessary in small animals.

Conclusion

Our technique proved to be both, safe and effective in closing trocar wounds of various diameter in dogs and can be considered a sound procedural approach in laparoscopic surgery. It could be particularly useful in small animal surgery, where 5- or 3-mm wounds are often difficult to close.

Conflict of interest

None of the authors have any financial or personal relationships that could inappropriately influence or bias the content of the paper.

References

Bergemann J. L., Hibber M. L., Harkins G.: Omental herniation through a 3-mm umbilical trocar site. J. Laparoend. Adv. Surg. Tech. A. 2011, 11: 171–173.

Botea F., Torzilli G., Sarbu V.: A simple, effective technique for port-site closure after laparoscopy. J. Soc. Laparoendosc. Surg. 2011, 15: 77–80.

Gandini M., Giusto G.: A new technique for laparoscopic trocar site closure: feasibility study and comparison with a previously described method in pigs. In Proc. 49th Congress of the European Society for Surgical Research (ESSR) Budapest, Hungary 21-24 May 2014. European Surgical Research 2014, 52: 93–250.

Lasheen A. E., Eelzeftawy A., Ahmed A., Lofty W. E.: Anatomical closure of trocar site by using tip hole needle and redirecting suture hook. Surgical. Endosc. 2010, 24: 2637–2639.

Milad M. P., Terkildsen M. F.: The spinal needle test effectively measures abdominal wall thickness before cannula placement at laparoscopy. J.Am.Ass.Gyn.Laparosc. 2002, 9: 514–518.

Ng W. T.: A full review of port-closure techniques. Surg. Endosc. 2007, 21: 1895–1897.

Owens M., Barry M., Janjua A. Z., Winter D. C.: A systematic review of laparoscopic port site hernias in gastrointestinal surgery. Am. J. Surg. 2011, 9: 218–224.

Reardon P. R., Preciado A., Scarborough T., Matthews B., Marti J. L.: Hernia at 5-mm laparoscopic port site presenting as early postoperative small bowel obstruction. J. Laparoend. Adv. Surg. Tech. A. 1999, 9: 523–525.

Shaher Z.: Port closure techniques. Surg. Endosc. 2007, 21: 1264–1274.

Swank H. A., Mulder I. M., la Chapelle C. F., Reitsma J. B., Lange J. F., Bemelman W. A.: Systematic review of trocar-site hernia. Br. J. Surg. 2012, 99: 315–323.

Yee D. D. S., Duel B. P.: Omental herniation through a 3-mm umbilical trocar site. Endourol. 2006, 20: 133–134.

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