



Original article

Laparoscopic port closure with a simple, inexpensive, effective and easy procedure to prevent port-site hernia



Amulya Mohan Acharya*

PG Dept. of General and Laparoscopic Surgery, Hitech Medical College and Hospital, Bhubaneswar, India

ARTICLE INFO

Article history:

Received 13 September 2018

Accepted 17 December 2018

Available online 26 December 2018

Keywords:

Laparoscopic port-site closure

Port-site hernia

Spinal needle

ABSTRACT

Background: In this modern era of surgery, laparoscopy is more popular than before and widely practised. Although the surgeons focus more on the laparoscopic technique of specimen extraction, less attention is given for port-site sheath and peritoneum closure, resulting in port-site hernia (PSH). Various methods and use of number of instruments have been described for closure of port-site defects. We are reporting a simple, inexpensive, but effective, technique for closure of port-site sheath as well as peritoneum to prevent PSH.

Materials and methods: We have used a looped spinal needle and another thread introducing spinal needle for closure of port-site sheath along with peritoneum under camera vision in 84 patients and compared with conventional open blind port closure in another 70 patients.

Results: This procedure was used to close port-site defects in 84 patients (66 female and 18 male) after laparoscopic procedures during April 2016 to August 2018. Neither PSH nor other post operative complications was reported over a mean follow-up of 18 months with our described port-site closure method using spinal needles. But, we recorded 2 cases (2.85%) of PSH and one case (1.43%) of omental incorporation, resulting in persistent postoperative pain in the abdomen in the group of patients in whom conventional blind fascial closure was performed.

Conclusion: Our described procedure using spinal needles is an easy, safe and inexpensive port-site defect closure method to prevent PSH.

© 2018 Sir Ganga Ram Hospital. Published by Elsevier, a division of RELX India, Pvt. Ltd. All rights reserved.

1. Introduction

Laparoscopic surgery is becoming more popular and widely used. But, the reputation of this minimally invasive surgery often marred due to occurrence of iatrogenic morbidity such as port-site hernia (PSH). Although this is less common, it has the potential serious complication of intestinal herniation with obstruction and even strangulation. The main reason of PSH is the inadequate closure of the fascial sheath and peritoneum as surgeons give less emphasis at the end of a successful laparoscopic surgery. Various factors have been described for PSH.¹ Larger trocar size of 10 mm and more has been described as an important factor in developing PSH; even the 5-mm trocar and 3-mm trocar in children have been reported to be causing PSH.² Umbilicus is the common site of PSH

due to its inherent weakness.³ Extension and dilatation of port site during specimen extraction results in PSH.⁴ It is recommended that all ports 5 mm or more in adults and all ports regardless of size in children should be closed taking the peritoneum along with the fascia together to obliterate the preperitoneal space to prevent Richter's hernia.^{1,5,6}

Various methods and instruments have been described for closure of ports.⁷ Most of them are costly and not available in average operation theatres of developing countries. Conventional practise is to suture the fascia blindly with the port closure needle, resulting in the potential incorporation of bowel with subsequent complications or incomplete closure and PSH. This study is to show the effectiveness and safety of a simple, inexpensive procedure to close the laparoscopic port defect.

2. Materials and methods

Laparoscopic procedures were performed in 154 patients during April 2016 to August 2018. Of them, 84 patients (66 females and 18

* New Forest Park, Plot 1465, Lane 5, Rashmi Villa Block 2, Flat No. 5, Bhubaneswar, 751009 (India).

E-mail address: dramulya.acharya@gmail.com.

males) were chosen randomly for port closure under camera vision using our described spinal needle procedure. Laparoscopic cholecystectomy was performed in 70 patients, and 14 underwent laparoscopic appendectomy. Another 70 patients (56 males and 14 females) had their port wounds closed by conventional open blind procedure using common port closure needles. The age of all these patients was ranging between 18 to 72 years, with a mean age of 38 years. Hypertension was present in 14.2%, diabetes in 7.8%, and chronic obstructive pulmonary disease (COPD) in 2% cases. Nine percentage of patients were obese. All patients were stabilised and made fit in pre-anaesthetic checkup (PAC) before operation. Postoperative follow-up was conducted over a period of 24 months physically and by phone contact.

2.1. Surgical technique

Two long spinal needles of 18 gauge (easily available in the OT) are used for port closure. Through one needle, 1–0 nonabsorbable (proline) suture is introduced and brought out of the needle opening which is tied with the distal end to make a loose loop to act as thread trapper. To get a better view, the laparoscope is introduced through another port opposite to the port wound requiring closure. For umbilical port-site closure, the laparoscope is inserted through the epigastric port. With the trocar in situ maintaining pneumoperitoneum, the thread trapper spinal needle (TTSN) is inserted into the abdomen through the sheath and peritoneum at one side of the port site requiring closure, under camera vision. Another thread passer spinal needle (TPSN) with 1–0 absorbable surgical suture (vicryl) is entered at the opposite side of the trocar through the sheath and peritoneum (Fig. 1). The tip of the thread passer needle is negotiated into the loop after withdrawing the trocar up to peritoneal layer, and the suture is passed into the loop (Fig. 2). The loop is then tightened, and the absorbable suture is brought outside (Fig. 3). Meanwhile, the trocar is withdrawn and the suture is knotted outside at subcutaneous level to close the port-site defect. If required, another absorbable suture is passed in a similar way without trocar to close any remaining defect. With this procedure, both the peritoneum and sheath are closed safely under camera vision (Fig. 4). No intraperitoneal assistance is required from other ports. Schematic diagrams of surgical technique are provided in Figs. 5 and 6.

3. Results

There was neither PSH nor other related complications observed in the group in whom the fascial sheath along with peritoneum was closed under camera vision, using our spinal needle technique. On

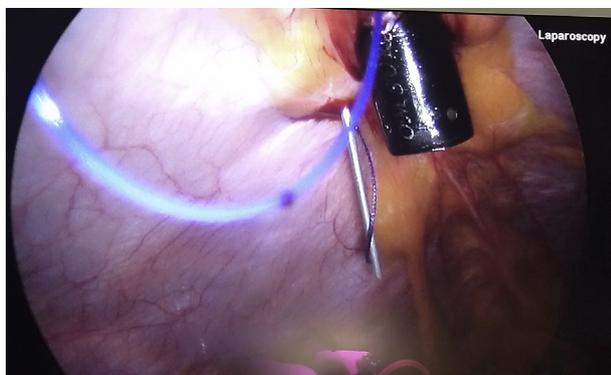


Fig. 1. Thread trapper looped spinal needle (TTSN) and thread passer needle (TPSN) at opposite side of trocar inserted through the sheath and peritoneum under camera vision.



Fig. 2. Tip of thread passer needle negotiated into the loop and absorbable suture passed through it.



Fig. 3. Loop tightened and absorbable suture brought out for knotting at subcutaneous level.

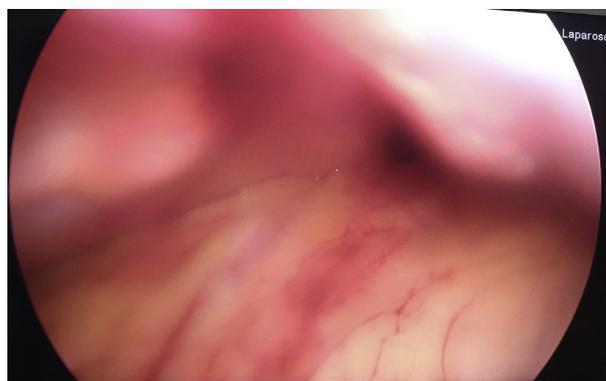


Fig. 4. Complete closure of peritoneum and sheath under camera vision.

the other hand, we recorded 2 cases (2.85%) of PSH and one case (1.43%) of omental incorporation in the conventional blind fascial sheath closure of the port site which was detected later by diagnostic laparoscopic for persistent postoperative pain.

4. Discussion

Overall incidence of PSH after laparoscopic cholecystectomy was reported as 1.7% (range, 0.3–5.4%).⁸ Important factors were larger trocar size, midline port particularly umbilicus, port-site wound infection, port extension while retrieval of specimen, preexisting hernia and improper port closure.⁹ Comorbid conditions such as diabetes, COPD, obesity are other risk factors. Pyramidal tip trocars with sharp cutting edges and bladed trocars had higher incidence

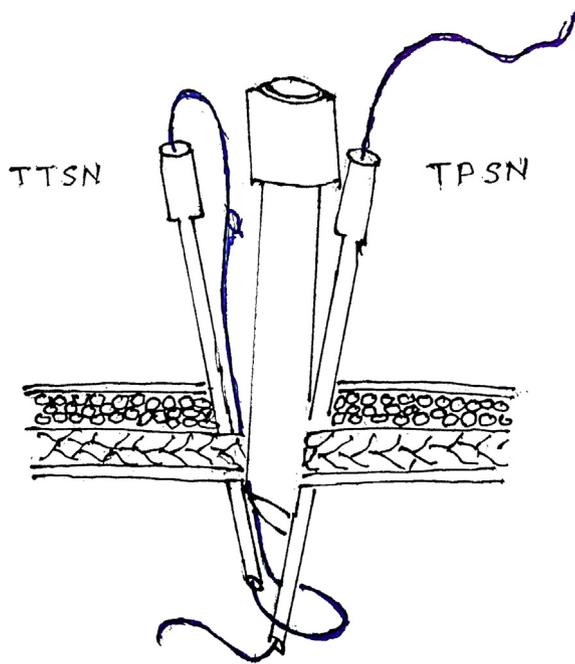


Fig. 5. Thread trapping spinal needle (TTSN) and thread passer spinal needle (TPSN) are being introduced at the port site.

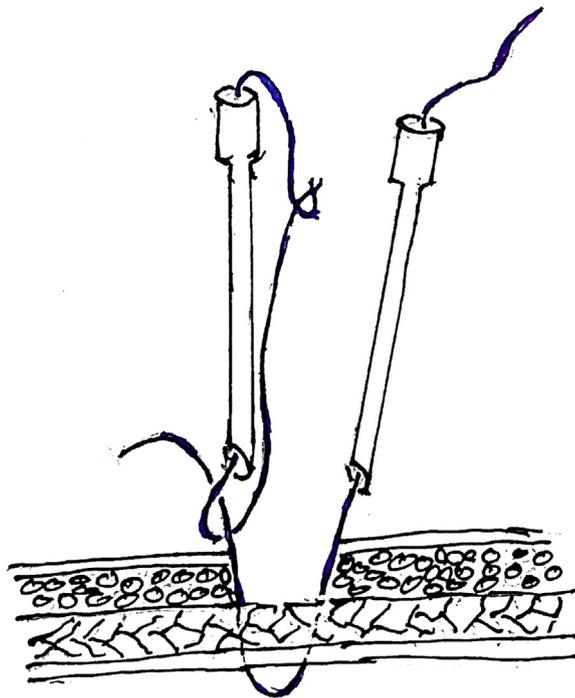


Fig. 6. Absorbable suture (Vicryl) is pulled out by the loop of the TTSN for suturing at subcutaneous level.

of PSH than the bladeless, conical tip, dilating-type trocars.¹⁰ The PSH and other potential complications of intestinal herniation occur due to the blind and inadequate fascial suturing. Simple fascial suturing without including peritoneum sometimes leads to preperitoneal hernia.

Several devices have been used for closure. Meciol suture needle, Carter-Thomason device, Gore-Tex Suture passer, Deschamp needle, Reverdin needle, spinal needles by Critblow,¹¹ Berci

needle¹² and aneurysm needle.¹³ Lasheen et al.¹⁴ reported percutaneous transabdominal technique using two long looped needles for patients with obesity. Aziz¹⁵ had described closure of port using two 'S'-shaped retractors. However, many of these devices are costly and not available in most of the hospitals and periphery surgical centres of developing countries. Some of the techniques require additional ports and are time-consuming. Our technique of port closure using two long spinal needles is commonly available in all OT and inexpensive. The procedure is easy to perform by an average surgeon. As the port closure is performed under camera vision with pneumoperitoneum, it is very safe and does not produce any bowel injury. No additional ports or any intraperitoneal assistance is required. There is complete prevention of PSH including preperitoneal hernia as sheath along with peritoneum is closed.

5. Conclusion

Our described procedure for laparoscopic port-site closure is effective, safe, inexpensive and easy to perform. It is minimally invasive and less time-consuming. It is suitable for all port sites and even for patients with obesity. PSH including pre peritoneal hernia and other potential complications can be avoided using this simple technique.

Conflicts of interest

None.

Source of funding

None.

Ethical approval

Ethical approval was obtained from the Ethical Committee of Hitech Medical College and Hospital.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.cmrp.2018.12.004>.

References

1. Tonouchi H, Ohmori Y, Kobayashi M, Kusunoki M. Trocar site hernia. *Arch Surg*. 2004;139:1248–1256.
2. Bergeman JL, Hibbert ML, Harkin G, Narvaez J, Asato A. Omental herniation through a 3mm umbilical trocar site: unmasking a hidden umbilical hernia. *J Laparoendosc Adv Surg Tech*. 2001;11:171–173.
3. Plans WJ. Laparoscopic trocar site hernia. *J Laparoendosc Surg*. 1993;3:567–570.
4. Owens M, Barry M, Janijua AZ, Winter DC. A systematic review of laparoscopic port site hernias in gastro intestinal surgery. *Surgeon*. 2011;9:218–224.
5. Bowrey DJ, Blom D, Crookes PF, et al. Risk factors and the prevalence of trocar site herniation after laparoscopic fundoplication. *Surg Endosc*. 2001;15:663–666.
6. Cottam DR, Gorecki PJ, Curvelo M, Weltman D, Angus LD, Sheftan G. Pre peritoneal herniation into laparoscopic port site without a fascial defect. *Obes Surg*. 2002;12:121–123.
7. Shafer Z. Port closure techniques. *Surg Endosc*. 2007;21:1264–1274.
8. Bunting David Mark. Port site hernia following Laparoscopic Cholecystectomy. *J Soc Laparoendosc Surg*. 2010 Oct-Dec;14(4):490–497.
9. Pulle Mohan Venkatesh, Siddhartha Rahul, Dey Ashish, Mittal Tarun, Malik Vinod K. Port site hernia in laparoscopic surgery: mechanism, prevention and management. *Cur Med Res Pract*. 2015;5(3):130–137.
10. Shafer DM, Khajanchee Y, Wong J, Swanstrom LL. Comparison of five different abdominal access trocar systems: analysis of insertion force, removal force and defect size. *Surg Innovat*. 2006;13(3):183–189.
11. Critblow IT. Trocar site closure: a simple inexpensive technique. *J Soc Laparoendosc Surg*. 1997;1:273–275.
12. Calik A, Ucel Y, Topalogic S, Hos C, et al. Umbilical trocar site closure with

- Berci's needle after laparoscopic cholecystectomy. *Hepato-Gastroenterology*. 2008;88:1958–1961.
13. Rajendiran A, Maruthupandian D, Karunakaran K, Sayed MN. Aneurysm needle as an effective tool in laparoscopic port closure. *J Laparoendosc Adv Surg Tech*. 2015;A9:744–746.
 14. Lasheen Ahmed E, Safwat Khaled, Elshweal Abdelhafez, et al. Effective, simple, easy procedure for laparoscopic port closure in difficult cases. *Ann Med Surg*. 2016;10:36–40.
 15. Aziz HH. A simple technique of laparoscopic port closure. *J Soc Laparoendosc Surg*. 2013;17:670–674.