

Complications of Laparoscopic Ventral Hernia Repair

Pythagoras M. Zerna, MD

Abstract

Introduction:

Since its introduction in 1993, laparoscopic ventral hernia repair has revolutionized the management of ventral hernia. To date, the laparoscopic approach has achieved better outcomes than have the historical conventional approach. Patients gain the routine benefits associated with laparoscopy, such as less pain, shorter length of hospital stay, and less blood loss. Despite good results from high-volume centers, significant complications may occur with this approach and the morbidity of ventral hernia repair may be underestimated.

Aim:

The purpose of this study is to review and analyze the complications of laparoscopic ventral hernia repair according to the experiences of different authors and determine how these complications can be avoided.

Materials and methods:

This study involves the review of literatures, journals and articles, and analysis of their results. English Language articles on Laparoscopic Ventral hernia repair (LVHR) from 1995 to 2008 were extracted from electronic databases. Pubmed and MEDLINE search. Seven articles were reviewed. The following parameters were studied including age and sex of the patient, body mass index, inpatient stay, defect size, defect location, mesh size, operative time, previous abdominal surgery, haematoma, seroma, wound infection, bowel perforation, ileus, obstruction, recurrence, chronic pain and other complications. One article reviewed patients who were obese that had body mass index of >35. The article reviewed had 3266 patients that were analyzed from 34 studies. The rest of the articles had a total range of 121-150 patients who underwent LVHR. One article showed 25 patients who underwent LVHR had hernial defect size of >15cm.

Conclusion:

Complication of LVHR includes:

Pain

In this review, 3% of patients had post operative pain

Seromas

7% seromas were noted.

Recurrence

One of the most important outcome measurements of hernia repair is recurrence. On analysis, in our study we found a recurrence rate 5.0%.

Wound infection / trocar site cellulitis

Trocar site cellulitis seen in laparoscopic repair resolves with antibiotics.

Intra-abdominal complications

Enterotomies have been reported to occur in up to 2.0% of patients undergoing laparoscopic ventral hernia repair

Other complications

In 1-2% of patients, a wound hematoma or significant bleeding at wound/trocar site was noted. Enterocutaneous fistula was reported in less than 1% of cases in a study by Bageacu *et al.*, Both the cases required surgical intervention for treatment. There have only been two deaths reported in the review (0.06%)

Conversion to open

Less than 2% of cases required to be converted to open procedure.

Introduction:

Since its introduction in 1993 by LeBlanc and Booth who first described laparoscopic repair of ventral hernia, many authors have published reports that has revolutionized the management of ventral hernia. Laparoscopic ventral hernia repair (LVHR) has been shown to be an effective way of treating ventral hernias. Postoperative incisional hernia is one of the most common surgical procedures being performed in General Surgery. The incidence of incisional hernia, as reported in literature is 3% to 20%.

Despite ongoing research in wound closure and reparative techniques, abdominal incisional hernia remains an unresolved problem. Approximately 100,000 ventral hernias are operated on each year in the United States. Laparoscopic techniques are being used on these cases increasingly and offer the potential benefits of a shorter hospital stay, decreased wound complications, and a lower recurrence rate. Despite good results from high-volume centers, significant complications may occur with this approach and the morbidity of incisional hernia repair may be underestimated.

Aim:

Laparoscopic ventral hernia repair (LVHR) is fast emerging as an alternative to open technique. The purpose of this study is to review and analyze the complications of laparoscopic ventral hernia repair according to the experiences of different authors and determine how these complications can be avoided.

Materials and Methods

English Language articles on Laparoscopic Ventral hernia repair (LVHR) from 1995 to 2008 were extracted from electronic databases Pubmed and MEDLINE. The search was done using following terms "complications", "ventral hernia", "laparoscopy" and "repair" to find out relevant laparoscopic studies. Original prospective and retrospective observational studies and randomised control trials were included.

Seven articles were reviewed. The following parameters were studied including age and sex of the patient, body mass index, inpatient stay, defect size, defect location, mesh size, operative time, previous abdominal surgery, hematoma, seroma, wound infection, bowel perforation, ileus, obstruction, recurrence, chronic pain and other complications. Operative blood loss, and body mass index >30 as parametric indicators were mentioned in the other articles. One article reviewed had 3266 patients that were analyzed from 34 studies. Another article had a total of 121 patients and likewise another article had 150 patients who underwent LVHR. In another article, 25 of the patients who underwent the procedure had hernial defect size of >15cm.

Results

Complications of LVHR were tallied from the different articles that were reviewed. Seroma was the most common early complication with an incidence of 7%. Recurrence was the most common late complication with an incidence of about 5%. Postoperative pain, wound infection and trocar site cellulitis, hematoma, ileus, bowel obstruction, bowel perforation, enterocutaneous fistula, trocar site hernia, mortality and other complications were also taken into account.

Complication	Percentage
Seroma	7
Recurrence	5
Post-op pain	3
Ileus	2
Bowel perforation	2
Trocar site cellulites	2
Hematoma	1-2
Bowel obstruction	1
Fistula	<1
Pulm embolism	<1
Death	0.06
Conversion to open	<2

Discussion

All the articles reviewed used peritoneal insufflation done away from the hernia site to gain intraabdominal access. [1], [2], [3] Left hypochondrium / subcoastal region has been found to be the preferred site for Veress needle insertion. [4], [3] Open Hassan technique [5] and Visiport were other alternatives used for access. [6], [7]. To obtain triangulation, working ports are placed

away from defect or lateral to the rectus muscle.[8], [9], [10], [9], [3], [2]
Dissection with diathermy were avoided or used sparingly because of concerns that energy transmission can cause delayed bowel perforation. [11] Harmonic scalpel was used with caution while doing adhesiolysis. [12], [4], [7], [2] Hydrodissection was another alternative to divide visceral adhesions with the parietes. (35) However, sharp dissection with scissors remains the safest tool and was the often employed tool used in dissection. [4], [3], [2], [13]
A 30 degree scope was mostly used by the authors because it provided a good panoramic view. [9],[11],[3],[22],[14],[2],[15],[13] Mizrahi *et al.* ,[16] have used 45 degree scope for surgery. [5] In a series of 200 patients Le Blanc *et al.*, [11] managed with a 0 degree scope. [6]
Longstanding hernia with incarcerated bowel posed a technical challenge. These have a higher chance of enterotomy rate during dissection. [17] Though they are not a contraindication for laparoscopic repair. [11] Incisional hernias extending to suprapubic or xiphoid region [18]are difficult to obtain a good overlap and fixation of mesh. Another demanding situation is repair of parastomal hernia where dissection and mesh placement is around hollow viscera.

In the series of review conducted, laparoscopic hernia repair mesh repair were done intraperitoneally [9],[19],[1],[20] or in preperitoneal / extraperitoneal space. [9],[4],[5] At least 3 to 5 cm mesh overlap of the defect by the mesh has been performed by different authors [9],[10],[1],[21],[11],[7],[16],[3],[14],[2] and this obtained good results.

Spiral tackers were used and placed in concentric pattern [16], [22], [2] along the periphery of mesh in one or two rows. The depth of penetration for the spiral tackers is < 4 mm. [13]. In obese patients, the tackers may not reach up to the fascial layers. However, this should not be the reason for not offering laparoscopic incisional hernia repair to a population with raised BMI (body mass index). [18], [3], [22] thus Transfascial sutures were used.

Transfascial sutures were used for initial orientation, to fix the mesh and to prevent mesh migration. [8],[4],[1],[11],[23],[24] This technique can cause chronic postoperative pain. Sutures can be used to fix the mesh in centre or periphery. Some authors recommend transfascial sutures at the 12'o clock and the 6'o clock position. [19], [25]The 3'o clock and the 9'o clock position is optional. [25]

The bowel lying underneath the mesh was covered with omentum. This serves as a barrier. It also prevents adhesions [1] and fistulization [9], [26], [27]of bowel.

These complications were the common denominator in all the articles that were reviewed:

1. Seromas

Seromas were noted in seven percent. In laparoscopic hernia repair, the hernia sac is not excised. [8],[17], [10],[5],[14],[2],[15] This effectively leaves behind a potential space for seroma formation. It happens to be one of the complications inherent to this procedure. [1],[5],[7],[28],[29] Rarely, they would require aspiration when persistent [8] or symptomatic. [12],[5],[11],[30],[14],[2],[31] Occasionally it will give an ominous appearance of recurrence. [32],[33]

2. Recurrence

One of the most important outcome measurements of hernia repair is recurrence. Review of these

articles found a recurrence rate of 5%. Some authors feel using just the tackers, without suture, increases the chances of recurrence. [19],[1],[14],[8],[12] Transfascial sutures prevent the migration of prosthesis and hence recurrence. [1] Recurrence rate is likely to improve with experience [11] and improved techniques of adequate mesh overlap at the periphery of hernia. [11]

3. Pain

In the series of reviews conducted, 3.0% had complained of pain in their surgical site. Sutures for mesh fixation may cause ischemic injuries to anterior abdominal wall musculature or neurovascular bundle which results in pain. Nerve entrapment in tacker is another possible explanation to the postoperative pain. [1], [32]

4. Wound infection / trocar site cellulitis

Trocar site cellulitis seen in laparoscopic repair resolves with antibiotics. [5]

Mesh, wherever possible, should not be brought in touch with skin to avoid contamination by skin flora

5. Intra-abdominal complications

Laparoscopic hernia repair causes decreased incidence of ileus. [10] This is because of less handling of the intestines and lesser tissue dissection. Ileus usually settles down spontaneously. However, mechanical obstruction should be ruled out if it tends to persist beyond 72h. [34] Post procedure adhesive bowel obstruction increases the morbidity and may require reoperation [9], [12]. In this review, enterotomies had an incidence of 2%. Hernia repair by some surgeons was deferred in cases of recognized enterotomy. [11], [25] Missed bowel perforation can have disastrous consequences. Intracorporeal knotting [8], [11], [2] can be done to manage serosal tear of bowel, if required.

6. Other complications

Postoperative fever of unknown origin prolongs the hospital stay and overall has financial bearings [12] .In 1-2% of patients; a wound hematoma or significant bleeding at wound/trocar site was noted [35], [8], [9], [19], [5], [16], [22]. This is a well known complication in laparoscopic surgery. Intra abdominal pressure during laparoscopy causes tamponade effect on vessels and hence the bleeding, arterial or venous, may manifest after surgery. [36]. Enterocutaneous fistula was reported in less than 1% in a study by Bageacu *et al.*, [19] These cases required surgical intervention for treatment. There have only been two deaths reported in the review [23] (0.06%).

7. Conversion to open

Two percent of cases required to be converted to open procedure. Technical difficulties in dissection and defining the right plane resulted in the conversion. [5]

Conclusion

Complications are always a part of any surgical procedure. In LVHR however, it is necessary to analyze these complications so that we can minimize these problems and hopefully avoid them.

Seromas tend to be a common complication with LVHR, which tends to settle down conservatively. Placing tacks and transfascial sutures judiciously can avoid recurrence and chronic postoperative pain. Meticulous tissue plane dissection can avoid bowel perforation. LVHR is still at the bottom of the learning curve. In time, complications will be expected to be at its minimum. However it just might not be fully eradicated.

References

- Franklin ME Jr, Gonzalez JJ Jr, Glass JL, Manjarrez A. Laparoscopic ventral and incisional hernia repair: An 11-year experience. *Hernia* 2004;8:23-7.
- Olmi S, Magnone S, Erba Luigi. Results of Laparoscopic versus open abdominal and incisional hernia repair. *J Soc Laproendosc Surg* 2005;9:189-95.
- Muysoms F, Daeter E, Vander Mijnsbrugge G, Claeys D. Laparoscopic intraperitoneal repair of incisional and ventral hernias. *Acta Chir Belg* 2004;104:705-8.
- Chowbey PK, Sharma A, Khullar R, Soni V, Baijal M. Laparoscopic ventral hernia repair with extraperitoneal mesh: Surgical technique and early results. *Surg Laparosc Endosc Percutan Tech* 2003;13:101-5.
- Heniford BT, Park A, Ramshaw BJ, Voeller G. Laparoscopic ventral and incisional hernia repair in 407 patients. *J Am Coll Surg* 2000;190:645-50.
- Raftopoulos I, Vanuno D, Khorsand J, Ninos J, Kouraklis G, Lasky P. Outcome of laparoscopic ventral hernia repair in correlation with obesity, type of hernia and hernia size. *J Laparoendosc Adv Surg Tech A* 2002;12:425-9.
- LeBlanc KA, Booth WV, Whitaker JM, Bellanger DE. Laparoscopic incisional and ventral herniorrhaphy in 100 patients. *Am J Surg* 2000;180:193-7.
- Aura T, Habib E, Mekkaoui M, Brassier D, Elhadad A. Laparoscopic tension-free repair of anterior abdominal wall incisional and ventral hernias with an intraperitoneal Gore-Tex mesh: Prospective study and review of literature. *J Laparoendosc Adv Surg Tech A* 2002;12:263-7.
- Kua KB, Coleman M, Martin I, O'Rourke N. Laparoscopic repair of ventral incisional hernia. *ANZ J Surg* 2002;72:296-9.
- Eid GM, Prince JM, Mattar SG, Hamad G, Ikramudin S, Schauer PR. Medium-term follow-up confirms the safety

- and durability of laparoscopic ventral hernia repair with PTFE. *Surgery* 2003;134:599-603-4.
11. LeBlanc KA, Whitaker JM, Bellanger DE, Rhynes VK. Laparoscopic incisional and ventral hernioplasty: Lessons learned from 200 patients. *Hernia* 2003;7:118-24.
 12. Ben-Haim M, Kuriansky J, Tal R, Zmora O, Mintz Y, Rosin D, *et al* . Pitfalls and complications with laparoscopic intraperitoneal expanded polytetrafluoroethylene patch repair of postoperative ventral hernia. *Surg Endosc* 2002;16:785-8.
 13. Rosen M, Brody F, Ponsky J, Walsh RM, Rosenblatt S, Duperier F, *et al* . Recurrence after laparoscopic ventral hernia repair. *Surg Endosc* 2003;17:123-8.
 14. van't Riet M, Vrijland WW, Lange JF, Hop WC, Jeekel J, Bonjer HJ. Mesh repair of incisional hernia: Comparison of laparoscopic and open repair. *Eur J Surg* 2002;168:684-9.
 15. Verbo A, Petito L, Pedretti G, Lurati M, D'Alba P, Coco C. Use of a new type of PTFE mesh in Laparoscopic incisional hernia repair: The continuing evolution of technique and surgical expertise. *Int Surg* 2004;89:27-31.
 16. Mizrahi S, Lantsberg L, Kirshtein B, Bayme M, Avinoah E. The experience with a modified technique for laparoscopic ventral hernia repair. *J Laparoendosc Adv Surg Tech A* 2003;13:305-7.
 17. Bamehriz F, Birch DW. The feasibility of adopting laparoscopic incisional hernia repair in general surgery practice: Early outcomes in an unselected series of patients. *Surg Laparosc Endosc Percutan Tech* 2004;14:207-9.
 18. Bower CE, Reade CC, Kirby LW, Roth JS. Complications of laparoscopic incisional-ventral hernia repair: The experience of a single institution. *Surg Endosc* 2004;18:672-5.
 19. Bageacu S, Blanc P, Breton C, Gonzales M, Porcheron J, Chabert M, *et al* . Laparoscopic repair of incisional hernia: A retrospective study of 159 patients. *Surg Endosc* 2002;16:345-8.
 20. Lomanto D, Iyer SG, Shabbir A, Cheah WK. Laparoscopic versus open ventral hernia mesh repair: A prospective study. *Surg Endosc* 2006;20:1030-5.
 21. Franklin ME, Dorman JP, Glass JL, Balli JE, Gonzalez JJ. Laparoscopic ventral incisional hernia repair. *Surg Laparosc Endosc* 1998;8:294-9.
 22. Cushieri A, Steele R J C, Moosa AR. Disorders of the abdominal wall and peritoneal cavity. *Essential Surg Pract* 2002;4:156-7.
 23. Motson RW, Engledow AH, Medhurst C, Adib R, Warren SJ. Laparoscopic incisional hernia repair with a self-centring suture. *Br J Surg* 2006;93:1549-53.
 24. van't Riet M, De Vos van Steenwijk PJ, Kleinrensink GJ, Steyerberg EW, Bonjer HJ. Tensile strength of mesh fixation methods in laparoscopic incisional hernia repair. *Surg Endosc* 2002;16:1713-6.

25. Parker HH 3rd, Nottingham JM, Bynoe RP, Yost MJ. Laparoscopic repair of large incisional hernias. *Am Surg* 2002;68:530-4.
26. Holzman MD, Purut CM, Reintgen K, Eubanks S, Pappas TN. Laparoscopic ventral and incisional hernioplasty. *Surg Endosc* 1997;11:32-5.
27. Moreno-Egea A, Liron R, Girela E, Aguayo JL. Laparoscopic repair of ventral and incisional hernias using a new composite mesh. *Surg Laparosc Endosc Percutan Tech* 2001;11:103-6.
28. Heniford BT, Le Blanc KA, Voeller GR. Laparoscopic repair of incisional hernias: Surgical technique. *Contemp Surg* 2001;57:225-36.
29. Chowbey PK, Sharma A, Khullar R, Mann V, Baijal M, Vashistha A. Laparoscopic ventral hernia repair. *J Laparoendosc Adv Surg Tech A* 2000;10:79-84.
30. McGreevy JM, Goodney PP, Birkmeyer CM, Finlayson SR, Laycock WS, Birkmeyer JD. A prospective study comparing the complication rates between laparoscopic and open ventral hernia repairs. *Surg Endosc* 2003;17:1778-80.
31. Varghese TK, Denham DW, Dawes LG, Murayama KM, Prystowsky JB, Joehl RJ. Laparoscopic ventral hernia repair: An initial institutional experience. *J Surg Res* 2002;105:115-8.
32. Lau H, Patil NG, Yuen WK, Lee F. Laparoscopic incisional hernioplasty utilising on-lay expanded polytetrafluoroethylene DualMesh: Prospective study. *Hong Kong Med J* 2002;8:413-7.
33. Misra MC, Bansal VK, Kulkarni MP, Pawar DK. Comparison of laparoscopic and open repair of incisional and primary ventral hernia: Results of a prospective randomised study. *Surg Endosc* 2006;20:1839-45.
34. Bower CE, Reade CC, Kirby LW, Roth JS. Complications of laparoscopic incisional-ventral hernia repair: The experience of a single institution. *Surg Endosc* 2004;18:672-5.
35. Moreno-Egea A, Castillo JA, Girela E, Canteras M, Aguayo JL. Outpatient laparoscopic incisional / ventral hernioplasty: Our experience in 55 cases. *Surg Lap Endosc Percut Tech* 2002;12:171-4.
36. Le Blanc KA. Laparoscopic incisional and ventral hernia repair: Complications-How to avoid and handle. *Hernia* 2004;8:323-31.

For more information Please log on to <http://www.laparoscopyhospital.com>