

Original Article

Initial Experience Of Laparoscopic Incisional Hernia Repair

SK Biswas¹, MM Arefin², JC Saha¹, T Ahmed⁴, MM Rahman⁵

Abstract

The laparoscopic incisional hernia repair is a safe alternative to open mesh repair. The procedure has the advantages of minimal access surgery and lower recurrence rate. A prospective study of laparoscopic incisional hernia repair of our first 11 patients was performed from July 2008 to December 2009. No serious intraoperative or postoperative morbidity was encountered, only two patients developed seroma. The mean operating time was 90 minutes (60 to 180 minutes). The mean day of discharge after surgery was 3 days (2-7 days). No patient developed a recurrence during mean follow up period of 10 months. Laparoscopic repair of incisional hernia has been shown to be feasible, safe and effective. However, careful patient selection and acquiring the necessary advanced laparoscopic surgical skills coupled with the proper use of equipment are mandatory before embarking on this procedure.

Key Words: Incisional hernia, Laparoscopic repair, Mesh, Polypropylene

Introduction

Incisional hernia, a failure of the abdominal wall fascia to heal properly after laparotomy, is an important postoperative problem. Advances in anesthetic techniques, adequate prevention and treatment of infection during surgery, and use of new suture materials have reduced the incidence of incisional hernia. Nevertheless, incisional hernias still occur in 3 to 20 per cent of patients undergoing a laparotomy¹⁻³. Many different techniques are in use for repairing incisional hernia, and with advent of laparoscopy, yet another technique is being advocated^{4,5}. Laparoscopic repair of incisional hernia has been reported in many studies to be superior to open repair owing to fewer complications, less pain, and earlier return to work and this procedure is fast emerging as an alternative to open repair⁶⁻⁸. However, laparoscopic repair requires experience and expensive equipment and supplies. This article examines the result of our initial experience of laparoscopic mesh repair of incisional hernia.

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Materials and Methods

Patients

Between July 2008 and December 2009, 11 patients with Incisional hernia were treated laparoscopically at Department of Surgery of Faridpur Medical College Hospital and Shahid Shuhrawardhy Medical College Hospital, Dhaka and Faridpur Central Hospital. Patient with Incisional hernia who are agreed to undergo laparoscopic repair, included in this study. Patients who are not agreed, defect size <3 cm or >12 cm and medical condition which contraindicated a laparoscopic approach are excluded from this study. To begin with, we felt it best to also exclude from our initial operative experience of any patient in whom incisional hernia repair operation had been previously done with or without a mesh and in whom having huge pendulous stretched skin over incisional hernia.

The demographic characteristics of all patients were recorded. Operative report such as length of the procedure (Initial incision through wound closure), location, size and number of fascial defects, types of prosthetic mesh used were recorded. The length of hospital stay and any postoperative complications were also noted. All patients were evaluated preoperatively by complete blood counts, blood sugar, chest radiography and electrocardiography. Bowel preparation was done selectively. A single dose of inj. Cefuroxime 1.5 gm was administered at induction of anaesthesia. Patients were followed up at 1 month, 3 months and 6 monthly thereafter.

Technique

All operations were performed under general anaesthesia and with the patient in the supine position. A nasogastric tube and a Foley catheter were inserted. Access to the abdominal cavity was obtained by a veress needle (Karl-Storz, Germany) on left hypochondrium through Palmer's point (3 cm below the left costal margin in the mid-clavicular line) in all cases (Figure 1). Pneumoperitoneum was then established at 12 mm Hg pressure and a 10 mm, 30° or 0° telescope was used. The abdominal cavity, the hernia defect, and its contents and adhesions were identified (Figure 2). The others trocars, all 5 mm, were placed as laterally as possible over left side of abdomen under direct vision in a triangular fashion according to location of fascial defect(s). All of the operations were completed with three trocars.

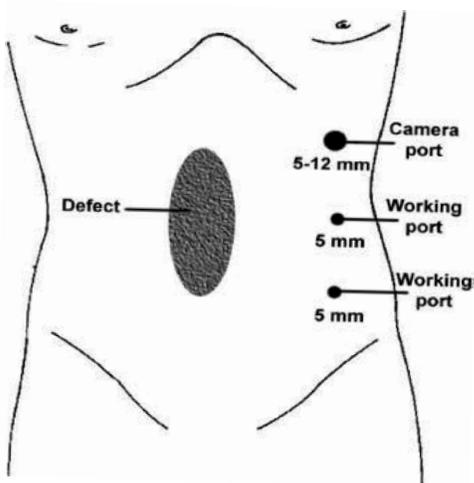


Figure 1: The view of the defect and trocar sites

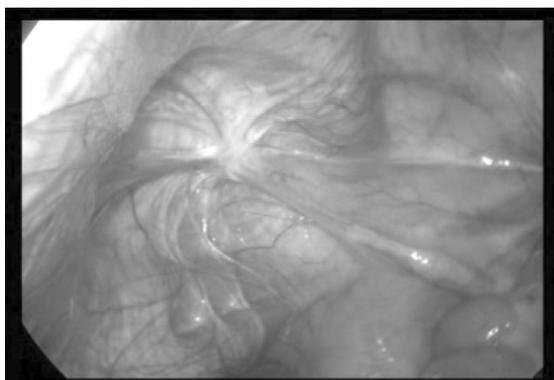


Figure 2: Laparoscopic view of a lower midline hernia defect

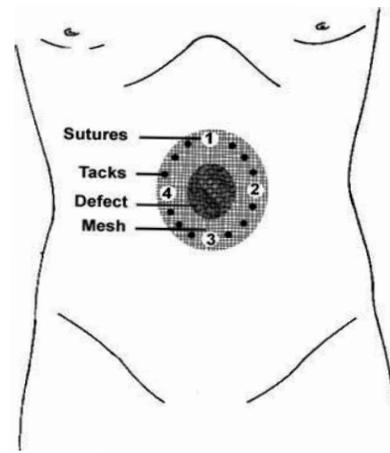


Figure 3: Suture fixation of mesh and tack application points

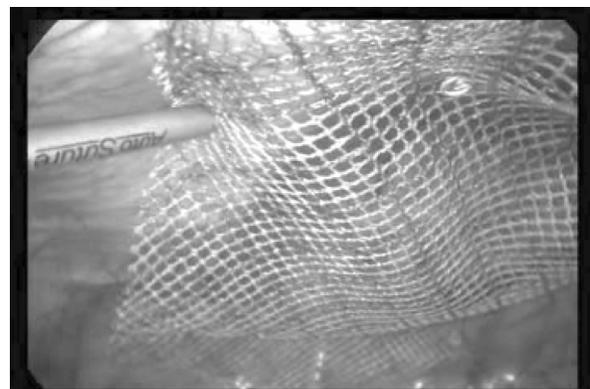


Figure 4: Operative view of fixation of a vicryl-prolene composite mesh (VYPRO II) in progress

Although Harmonic Scalpel is the best for adhesiolysis, we have done it by using diathermy due to economic consideration. Using blunt and sharp dissection with traction/ counter traction, adhesions to the ventral abdominal wall were taken down, exposing the entire rim of the hernia defect. All contents of the hernia were gently reduced, leaving the sac in situ.

By inserted the lighted telescopes into the hernia sac from within, the margins of the defect were readily visible at skin surface, the edges of the hernia defects also could be palpated. These edges of the hernia were outlined on the abdominal wall with a marker and to determine the size of the prosthetic mesh (the real size of the defect) the abdomen was desufflated. Two types of prosthetic material were used: Polypropylene (Ethicon, Johnson & Johnson Ltd, India) and Vicryl-Prolene composite (VYPRO II, Ethicon, Johnson & Johnson Ltd, India)

mesh. Meshes were tailored to overlap all defect boundaries by at least 3 cm. Depending upon size of the mesh to be used 4 to 6 sutures (3/0 prolene, 10 to 15 cm in length) were placed on edges of the prosthetic mesh. The suture sites were numbered with an ink marker to allow easier orientation of the prosthetic mesh in the abdominal cavity. The corners of the mesh were not used as suture points, to avoid a parachute-like effect. The tailored prosthetic mesh was rolled tightly and inserted into abdominal cavity through 10 mm port. It was unrolled inside and spread under defect(s). A small stab incision of 2 mm was made in the skin overlying normal fascia on the previously marked point on the abdominal wall. A homemade suture passer (making of a loop by inserting 3/0 prolene through 18G intravenous cannula) was inserted into the abdominal cavity through the stab incision in order to pull one end of the targeted suture back through the incision. The device was re-inserted into the same stab incision once again, piercing the fascia at a different site; the second end was pulled back through the incision, and the ends were tied extracorporally through the stab incision and the knots were buried subcutaneously. When all trans abdominal sutures are tied, the mesh was secured further by using 5 mm tacks (Autosuture, Tyco health care, USA) circumferentially to the fascial rim of the defect, and then more laterally to the fascia at the perimeter of the mesh (Figure 3 and 4). We altered our above approach in the last 3 cases where after tacking the mesh to the margins of the fascia, a series of stab skin incision were made, 2 to 3 cm apart, in line with perimeter of the mesh. Through these incisions, additional 3/0 prolene sutures were passed through the fascia and the mesh, which when tied, provide a more secure perimeter closure. The bowel lying underneath the mesh was covered with omentum which serves as a barrier between mesh and intestine. No drain was used. The pneumoperitoneum was then evacuated, the fascial edges of the larger port sites were approximated and the skin wounds were approximated with sterile dressing tape. Lastly pressure dressing was made over hernia in an attempt to prevent seroma formation.

Results

Of 11 patients, all were female. Mean age was 36 Years (range 26 to 50 years). Eight patients had incisional hernia at lower midline (All following abdominal hysterectomy), two had incisional hernia at right lateral end of pfannenstiel incision and one had hernia at grid iron incision of right iliac fossa following appendectomy. Overall defect size ranged from 4 to 12 cm (mean 7 cm).

One had two fascial defects, others had single defect. The hernia sac contained greater omentum in 7 cases and small bowel in rest 4 cases. No intraoperative morbidity was incurred except in one case in which bleeding occurs from inferior epigastric artery due to trauma by suture passer, managed well by diathermy coagulation.

In 6 cases we use polypropylene mesh and in rest 5 cases we use Vicryl-Prolene composite mesh. The mean operative time was 90 minutes (range, 60 to 180 minutes). The postoperative hospital stay was 3 days (range, 2 to 7 days). Only 2 (18%) patients developed seroma during postoperative period. No other complications were detected during postoperative period. The mean postoperative follow up period was 10 months (range, 3 to 18 months). No patient developed recurrence during follow up period.

Discussion

Incisional hernia is the most common long term complication of abdominal surgery and an important source of morbidity. Treatment involves further major surgery either open suture repair or open mesh repair or laparoscopic mesh repair. Before introduction of knitted polypropylene mesh in early 1960s, the most incisional hernias were repaired by direct suture techniques⁴. These included simple fascial closure, modified Mayo technique with overlap of fascial edges, use of internal retention sutures, 'Keel' procedure, the Nuttall procedure and others^{9,10}. The reported rate of recurrence for direct suture technique is between 7 and 44 percent^{4,11,12}. George and Ellis¹³ argued that the underlying problem was that in all direct suture repair techniques, the tissues are under tension and this increases the risk of ischaemia, suture cut-out and repair failure. Usher¹⁴ introduced knitted monofilament polypropylene mesh into clinical practice in 1963. Since then various studies of mesh repair of incisional hernia have been reported with a recurrence rates vary between 0 and 10 percent with a follow up period of at least 12 months^{4,15,16} which is markedly less than recurrence rates reported for suture repair. Different types of mesh are available: polypropylene, expanded polytetrafluoroethylene (ePTFE), composite polypropylene+collagen, dacron and vicryl-prolene composite mesh⁴. The techniques used for open mesh repair vary considerably but basic principle is dissection of hernia sac and dissection of fascial edge and placement of mesh which must overlap abdominal tissue at least 3 cm¹⁶. Satisfactory results have been obtained with onlay, extraperitoneal, subfascial and intraperitoneal placement of mesh^{15,17,18}.

Most surgeons preferred to use suction drains in an attempt to prevent seroma and haematoma. Wound infection, seroma formation and rare formation of fistula are important complication of open mesh repair of incisional hernia.

The laparoscopic mesh repair of incisional hernia was introduced into practice by LeBlanc and Booth in 1993¹⁹. Since then many non-randomized and few randomized studies of laparoscopic mesh repair have been reported with a recurrence rates similar to those of open mesh repair and with an improvement in recovery time, hospital stay and complication rate^{2,5,8,20-22}. The techniques used for laparoscopic mesh repair by different authors are almost very similar. After achieving a pneumoperitoneum, a variable number of trocars are inserted; all are as far laterally from hernia defect as possible^{20,22,23}. The majority of surgeons preferred using a 30° or 45° laparoscope^{2,5,23}, while others used a 0° instrument²⁴. We uses both 30° and 0° telescopes and our experience is 30° telescope provide a good panoramic view of hernia defect. Adhesions are divided and contents of hernia sac reduced, this allows exposure of the defect or defects on all sides. In all cases hernia sac is left in situ, which is the main cause of seroma formation in postoperative period. Once the size of the hernia defect is defined, the proper size of mesh is determined which inserted into peritoneal cavity through 10 mm port. There appears to be universal agreement that an overlap of at least 3 cm between the mesh and fascial edge is necessary²²⁻²⁶. Different suture passer, tacks and staples are available for fixation of mesh. We uses homemade suture passer and tacks for fixation of mesh. No drain is required as compared to open mesh repair. Pneumoperitoneum is then deflated gradually and operation ends with placement of pressure dressing over hernia in an attempt to prevent seroma formation.

There are many meshes available on the market for laparoscopic hernia repair. The literature cannot give general recommendation for choice of mesh based on randomized controlled trial and the final choice of mesh for laparoscopic hernia repair will therefore typically be based on surgeon's preference and cost^{27,28}. Although many study report a better surgical outcome with the use of two dual sided ePTFE mesh¹⁷⁻²⁰, we uses polypropylene and vicryl-prolene composite mesh in our cases due to mainly economic consideration. Adhesions seems to be more frequent with polypropylene mesh but it does not seem to affect the repair success or recurrence rate^{21-23,25,26}. Initial concern

about complication associated with intraperitoneal polypropylene mesh placement such as extensive adhesion formation with intestinal obstruction and enterocutaneous fistula formation now seems to be subsiding, although debate persists^{4,5,21,25,27-29}. Vrijland et al.²⁹ concluded that enterocutaneous fistula formation appears to be very rare after incisional hernia repair with intraperitoneal placement of polypropylene mesh. Franklin et al.²⁵, in a study including³⁸⁴ patients with ventral hernia, used polypropylene mesh in 75% of cases reported no such complication.

Bowel injury during adhesiolysis is the most feared complication of the laparoscopic incisional hernia repair procedure^{18,21,23}. No such complication occurs in our cases. Common postoperative complications of laparoscopic repair include seroma, wound infection including trocar site infection, ileus, haematoma and pain. We found that 2 (18%) of our patients developed a seroma, one had resolved spontaneously within 6 weeks and another needs aspiration of two times which was done at the end of 6 weeks. It is hypothesized that these seromas likely developed from secretions of the hernia sac that is not excised during laparoscopic procedure. It is suspected that the incidence of this phenomenon may well be related to the use of a micropore mesh (Dual mesh), which is more impervious barrier to the hernia sac secretions than is the macropore polypropylene mesh^{22,27,28}. The rate of seroma formation in our series is similar to other series. One of our patient developed ileus which improved with IV fluid and nasogastric suction. No infection, heamatoma or chronic pain is reported in our series. The recurrence rates obtained with laparoscopic incisional hernia repair vary between 0 and 10 percent²³⁻²⁶. No of our patients developed recurrence with mean follow up of 10 months. Overall, our results of initial 11 cases of laparoscopic hernia repair are in accordance with those of other series. As a result, we believe that laparoscopic repair of incisional hernias is feasible, safe, and is a good alternative to its open counterpart, particularly in skilled and experienced hands.

Conclusion

Incisional hernias continue to complicate current surgical practice. The repair of an incisional hernia continues to be a challenge and many operations have been described to repair this defect. There are several theoretical advantages for using a laparoscopic approach. First, adhesions from previous abdominal surgeries provide inherent danger for open repair. With a laparoscopic approach, the placement of the trocars at a

distance far from the original incision allows the surgeon to view adhesions from a far, perhaps decreasing the chances of injuring viscera adherent to the incision. In addition, the actual defect can be manipulated from a distance, minimizing the involvement with a potentially contaminated wound site and decreasing the need for a subcutaneous drain. Another advantage of laparoscopic hernia repair is that there is minimum or no chance of missing any other hernia defect(s) which is more likely in open repair. Finally, the patient should receive much smaller incisions, which should translate into less postoperative pain, shortened healing time, decreased chance of wound dehiscence, and a more rapid return to daily activities. The evidence available at present suggests that laparoscopic repair is feasible, safe and at least as effective as open mesh repair, although experience with the new method is still limited. As laparoscopic skills improve, it is likely that laparoscopic repair of incisional hernia will become more widely performed. Some surgeon feels that now there is enough evidence to recommend laparoscopic repair as the first-line treatment for incisional hernia where there is available; where it is not, open mesh repair remains a suitable alternative.

References

- Mudge M, Hughes LE. Incisional hernia: a 10 year prospective study of incidence and attitudes. *Br J Surg.* 1985;72:70-71.
- Bedi APS, Bhatti T, Amin A, Zuberi J. Laparoscopic incisional and ventral hernia repair. *J Minim Access Surg.* 2007;3(3):83-90.
- Bucknall TE, Cox PJ, Ellis H. Burst abdomen and incisional hernia: A prospective study of 1129 major laparotomies. *Br Med J. (Clin Res Ed)* 1982;284:931-3.
- Cassar K, Munro A. Surgical treatment of incisional hernia. *Br J Surg.* 2002; 89:534-545.
- Rudmik LR, Schieman C, Dixon E, Debru E. Laparoscopic incisional hernia repair: a review of literature. *Hernia* 2006;10(2):110-119.
- Itani KMF, Hur K, Kim LT, Anthony T, Berger DH, Reda D, et al. Comparison of laparoscopic and open repair with mesh for the treatment of ventral incisional hernia. *Arch Surg.* 2010;145(4):322-328.
- Bingener J, Buck L, Richards M, Michalek J, Schwesinger W, Sirinek K. Long term outcomes in laparoscopic vs open ventral hernia repair. *Arch Surg.* 2007;142:562-567.
- Forbes SS, Eskicioglu C, Mcleod RS, Okrainec A. Meta-analysis of randomized controlled trials comparing open and laparoscopic ventral and incisional hernia repair with mesh. *Br J Surg.* 2009;96:851-858.
- Pollak R, Nyhus LM. Incisional hernias. In: Schwartz SI, Ellis H, eds. *Maingot's Abdominal Operations.* 8th ed. Vol. 1. Norwalk, Connecticut: Appellon-Century-Crofts, 1985:335-350.
- Akman PC. A study of five hundred incisional hernias. *J Int Coll Surg.* 1962; 37:124-142.
- Hesselink VJ, Luijendijk RW, de Wilt JH, Heide R, Jeekel J. An evaluation of risk factors in incisional hernia recurrence. *Surg Gynecol Obstet.* 1993;176(3):228-234.
- van der Linden FT, van Vroonhoven TJ. Long term results after surgical correction of incisional hernia. *Neth J Surg.* 1998;40:127-129.
- George CD, Ellis H. The results of incisional hernia repair: a twelve year review. *Ann R Coll Surg Engl.* 1986;68:185-7.
- Usher FC. Hernia repair with knitted polypropylene mesh. *Surg Gynecol Obstet.* 1963;117:239-40.
- Whiteley MS, Ray-Chaudhuri SB, Galland RB. Combined fascia and mesh closure of large incisional hernias. *J R Coll Surg Edinb.* 1998;43:29-30.
- Luijendijk RW, Hop WC, van den Tol MP, de Lange DC, Braaksma MM, Ijzermans JN, et al. A comparison of suture repair with mesh repair for incisional hernia. *N Engl J Med.* 2000;343:392-8.
- Gillion JF, Begin GF, Marecos C, Fournatier G. Expanded polytetrafluoroethylene patches used in the intraperitoneal or extraperitoneal position for repair of incisional hernias of the anterolateral abdominal wall. *Am J Surg.* 1997;174:16-19.
- Utrera Gonzalez A, de la Portilla de Juan F, Carranza Albarran G. Large incisional hernia repair using intraperitoneal placement of expanded polytetrafluoroethylene. *Am J Surg.* 1999;177:291-3.
- LeBlanc KA, Booth WV. Laparoscopic repair of incisional hernias using expanded polytetrafluoroethylene: preliminary findings. *Surg Laparosc Endosc.* 1993;3:39.
- Gananadha S, Sarma JS, Smith GS, Smith RC, Leibman S, Hugh TJ. Laparoscopic ePTFE mesh repair of incisional and ventral hernias. *ANZ Journal of Surgery* 2008;78:907-913.
- Yavuz N, Ipek T, AS A, Kapan M, Eyuboglu E, Erguney S. Laparoscopic repair of ventral and incisional hernias: our experience of 150 cases. *Journal of Laparoendoscopic & Advanced Surgical Techniques* 2005;15(6):601-5.
- Sanders LM, Flint LM, Ferrara JJ. Initial experience with laparoscopic repair of incisional hernias. *Am J Surg.* 1999;177:227-231.
- Toy FK, Bailey RW, Carey S, Chappuis CW, Gagner M, Josephs LG, et al. Prospective, multicenter study of laparoscopic ventral hernioplasty. Preliminary results. *Surg Endosc.* 1998;12:955-9.
- LeBlanc KA, Booth WV, Whitaker JM, Bellanger DE. Laparoscopic incisional and ventral herniorrhaphy: our initial 100 patients. *Hernia* 2001;5:41-5.
- Franklin ME, Dorman JP, Glass JL, Balli JE, Gonzalez JJ. Laparoscopic ventral and incisional hernia repair. *Surg Laparosc Endosc.* 1998; 8:294-9.
- 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.
- Eriksen JR, Gogenur I, Rosenberg J. Choice of mesh for laparoscopic ventral hernia repair. *Hernia* 2007; 11(6):481-492.
- Bringman S, Conze J, Cucurullo D, Deprest J, Junge K, Klosterhalfen B. Hernia repair: the search for ideal meshes. *Hernia* 2010; 14(1):81-87.
- Vrijland WW, Jeekel J, Steyerberg EW, Den Hoed PT, Bonjer HJ. Intraperitoneal polypropylene mesh repair of incisional hernia is not associated with enterocutaneous fistula. *Br J Surg.* 2000; 87:348-52.