

Initial Experience of Laparoscopic Incisional Hernia Repair

J Razman, MS, S Shaharin, MS, M R Lukman, MS, N Sukumar, MS, A Y Jasmi, MS

Department of Surgery, Faculty of Medicine, Hospital Universiti Kebangsaan Malaysia, Jalan Yaakob Latiff, 56000 Cheras, Kuala Lumpur

Summary

Laparoscopic repair of ventral and incisional hernia has become increasingly popular as compared to open repair. The procedure has the advantages of minimal access surgery, reduction of post operative pain and the recurrence rate. A prospective study of laparoscopic incisional hernia repair was performed in our center from August 2002 to April 2004. Eighteen cases (n: 18) were performed during the study period. Fifteen cases (n: 15) had open hernia repair previously. Sixteen patients (n: 16) had successful repair of the hernia with the laparoscopic approach and two cases were converted to open repair. The mean hernia defect size was 156cm². There was no intraoperative or immediate postoperative complication. The mean operating time was 100 ± 34 minutes (75 – 180 minutes). The postoperative pain was graded as mild to moderate according to visual analogue score. The mean day of discharge after surgery was two days (1 – 3 days). During follow up, three patients (16.7%) developed seroma at the hernia sac which was resolved with conservative management after three weeks. One (5.6%) patient developed recurrence six months after surgery. In conclusion, laparoscopic repair of incisional hernia particularly recurrent hernia has been shown to be safe and effective in our centre. 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 repair

Introduction

Incisional hernia is a common clinical problem that occurs in up to 20% of patients who had undergone laparotomy. Previously, open repair of the hernia was the treatment of choice. However, this is associated with recurrence rates ranging from 25-50%¹. Recent use of bioprosthetic material, tension free repair techniques and an alternative approach as described by Stoppa and Rives and then later by Wantz, has reduced the recurrence rates to 3.5-18%^{2,3,4,5}. Their technique is based on preperitoneal mesh application without any tension on closure of the defect. The disadvantages of the open repair include wound complications such as infection, hematoma and seroma. Postoperative pain and prolonged hospital convalescence with a higher incidence of further recurrence in cases of recurrent

incisional hernia has led to the development of a laparoscopic approach to repair these hernias. Coupled with the advantages of minimal access surgery, the recurrence rate has also been reduced⁶.

This is a prospective analysis of the initial 18 cases of incisional hernia repaired by laparoscopic approach at our centre. The report provides details of the procedure. The advantage, safety and efficacy of laparoscopic repair of incisional hernia are discussed.

Materials and Methods

A prospective study of laparoscopic incisional hernia repair was performed in our center from August 2002 to April 2004. Since this was a new procedure being

This article was accepted: 10 November 2005

Corresponding Author: Razman Jarmin, Department of Surgery, Faculty of Medicine, Hospital Universiti Kebangsaan Malaysia, Jalan Yaakob Latiff, 56000 Cheras, Kuala Lumpur

performed at our centre, detail explanations about the surgery, the risk and the possible outcome were informed to the patients. Once the consent was obtained, the patients were informed about the peri operative management and the follow up plan. Any co morbid factors were optimized before the surgery.

Operative Procedure

The patient was in supine position. Hassan's open method was used to introduce a 12mm trocar into the peritoneal cavity at the left anterior axillary line midway between the iliac crest and the subcostal border. The abdominal cavity was insufflated with carbon dioxide to a pressure of 12 mmHg. After visualization and inspection of the peritoneal cavity with a 10mm 30 degree laparoscope, two 5mm trocars were inserted at the left subcostal and left iliac fossa region under direct vision. The hernia sac was identified and adhesiolysis performed using a combination of sharp and blunt dissection. The use of electrocautery or ultrasonic dissector was discouraged to minimize the risk of thermal damage to surrounding structures and adjacent bowels. Once adhesiolysis was completed, the neck of the hernia defect was identified and the abdominal cavity was partially deflated. The diameter of the hernial defect was measured. A mesh was used for the repair. The size of the mesh used, was decided by adding at least 2cm to the diameters of the defects in all directions to ensure adequate coverage of the hernial defects (Figure 1). Four nonabsorbable sutures were fixed to the corners of the mesh before insertion into the abdominal cavity. These would anchor the mesh to the peritoneal layer of the anterior abdominal wall. A percutaneous suture passer was used to pull the fixed nonabsorbable sutures through the abdominal wall. Once the optimal position of the mesh was achieved and the defects adequately covered, the sutures were knotted onto the rectus sheath or external oblique aponeurosis. Finally, laparoscopic titanium tackers were placed between the sutures at approximately 1cm intervals to ensure adequate fixation of the onlay mesh to the anterior abdominal wall. The trocars were then removed and abdominal cavity deflated.

The patient was allowed oral intake once fully conscious. During the initial 12 hours after the surgery, intramuscular analgesia was given. Subsequently, oral analgesia was used for pain control. Visual analogue score was used to assess the severity of the pain. They were discharged between first and third postoperative day once ambulating and able to tolerate the pain.

Results

Eighteen cases (n=18) of laparoscopic incisional hernia repairs were performed from August 2002 to April 2004. All the patients were females with a mean age of 50 years (39 – 72 years). Three patients (n=3) never had repair of the incisional hernia before; six had been repaired once and nine patients had been repaired twice. All the previous incisional hernia repairs were performed by open technique. The previous repairs were either anatomical or extraperitoneal mesh repair. None of the patients had any significant medical problems. Sixteen (n=16) (88.9%) cases had a successful laparoscopic repair of incisional hernia with onlay of mesh and two cases were converted to open repair in view of technical reasons (Table 1). In the laparoscopic repair group, 12 cases were repaired with composite mesh and four cases had polypropylene mesh for the repair. In the laparoscopic repair group, a 12 mm trocar and two 5mm trocars were used. No additional trocars were required. The two conversions were due to technical reason. The first conversion was due to unavailability of suture passer instrument for suture fixation to the rectus sheath. In the second conversion, the hernia defect extended down to the pubic bone. We were not able to apply the mesh because of the risk of bladder injury. The open repair was performed by modified Stoppa and Rives technique using extraperitoneal onlay of prolene mesh. No abdominal drain was inserted and all the patients tolerated enteral feeding within ten hours after the surgery. Seventeen (n=17) patients who had laparoscopic repair graded the pain score as mild to moderate within 24 hours after surgery. These patients had followed the pain control protocol of intramuscular analgesic for the first 12 hours followed by oral analgesia 12 hours after surgery. One patient who scored severe pain after 24 hours required intramuscular analgesia for pain control. The mean duration of hospitalization after surgery was 2 days (1-3 days).

During follow up, three patients developed seroma in the hernia sac one week after surgery. All of them had the hernia repaired with composite mesh. The seroma resolved with conservative management within four weeks after surgery. The mean follow up after surgery was 11 months (4-20 months). One patient (5.6%) in the laparoscopic group developed recurrent incisional hernia six month after surgery. The patient had the largest hernial defect in our series (300cm²) and the recurrence occurred below the repair site of the previous hernia. There was no recurrence of incisional

hernia in the open repair group with mean follow up of 11 months (6-22 months). All the patients are still on our follow up and will be reviewed annually for five years.

Discussion

Laparoscopic repair of an incisional hernia was first reported by Le Blanc in 1993⁶. Since then, the popularity of this approach has increased rapidly and is now recommended as the treatment of choice for all ventral hernias particularly recurrent incisional hernias. The laparoscopic technique has reduced the recurrence rate of incisional hernias to as low as 2.5% as compared to 20.7% in the open repair^{7,8}. Recurrence is usually associated with large defects, obesity, previous open repairs and perioperative complications⁹. We had one recurrence of hernia after laparoscopic repair 6 months after the surgery. This case had the largest hernial defect of 300cm². The hernia recurred below the lower border of the mesh. Although the overall rate of recurrence was 5.5%, our mean follow up of 11 month is still inadequate. Sixty six percent of incisional hernia recurrence develops within 1 to 2 years¹⁰. Longer follow up is still required for further evaluation of recurrence.

Factors that contribute to the lower recurrence rate include tension free placement of the mesh with wide coverage of the hernial defect; approaching the hernial defect from a distance through 'virgin' tissue negates the need to approach the hernia directly through poor quality fibrotic tissue which may have previously been infected and this can reduce the risk of infection at the repair site; reduction of the hernial contents under direct vision minimizes injury and bleeding to the visci which could reduce the risk of contamination of the surgical area; the absence of dissection of the subcutaneous tissue around the hernial sac also reduces the wound complication rate. These factors

have also led to a reduction of postoperative pain, shorter hospital stay (2 days vs 4 days, $p=0.02$) and lower perioperative complications (such as bowel perforations) as compared to open surgery (14% vs 27%)¹¹.

Common complications associated with laparoscopic repair of incisional hernia are seroma formation, nausea and vomiting. These seromas almost always resolve spontaneously within six weeks and usually require no active intervention¹². Aspiration of the seroma will carry the risk of contamination which could lead to infection of the mesh. In our series three cases developed seroma within a week of surgery but there were no signs of infection. All the cases had the hernia repair using composite mesh. The patients were reassured and three weeks later the seroma subsided with conservative management. Mesh infection rate is very low and is usually associated with bowel injury during adhesiolysis or when a subclinical infection of the operation site is present¹². In our practice we

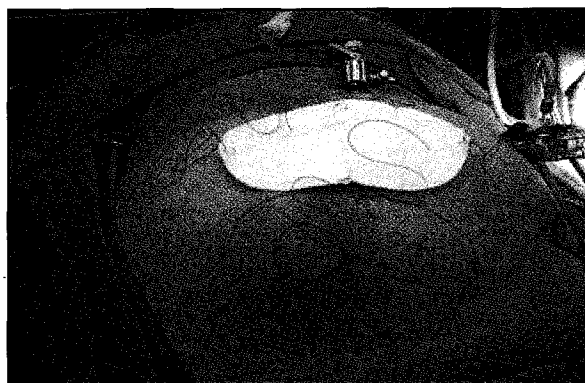


Fig. 1: Two hernia sacs with the border for the mesh application and the location of the trocars.

Table 1: Outcome of the surgery

Results/Complications	Value
Mean operating time (\pm SD)	120 \pm 34 minutes (75 – 180)
Mean hernia defect size (Range)	156 cm ² (30 – 300 cm ²)
Conversions (%)	2 (17%)
Mean postoperative stay (Range)	2 days (1-3)
Postoperative complications	
- Seroma	2 (17%)
Mean follow up (range)	11 months (6-20)
Recurrence (%)	1(10%)

routinely give broad spectrum prophylactic antibiotics at induction of anaesthesia.

The single most challenging and critically important aspect to ensure a successful laparoscopic repair of the hernial defect is performing the adhesiolysis¹³. This is necessary to ensure the correct identification and delineation of the abdominal wall defect; identify the additional multiple small defects that are commonly present in incisional hernia; avoiding visceral injury as dissection is done under vision and creates adequate peritoneum space free of adhesions for the mesh attachment to the abdominal wall. Recognizing visceral injury during adhesiolysis requires careful inspection of the dissected viscera. Once bowel perforation has occurred, there is a risk of mesh infection if the intracorporeal mesh placement is to be performed during the same setting. Others favour a staged procedure where the bioprosthetic repair will be done at a separate session following repair of the perforation¹⁴. This avoids infection of the mesh that can lead to a disastrous outcome. In our series, there was no case of bowel injury during adhesiolysis. Selection of cases during the initial period of performing laparoscopic incisional hernia repair is important. Hernia associated with incarcerated bowel should only be performed by experienced laparoscopic surgeons in order to avoid bowel injury.

Conversion to open repair was required in two patients. The conversion occurred amongst the first five cases. The first conversion was due to unavailability of suture passer instrument for suture fixation to the rectus sheath. However, Chowbey *et al* had shown fixation of the mesh with laparoscopic tacking device is adequate for fixation of the mesh to the rectus sheath¹⁵. In the second conversion, the hernia defect extended down to the pubic bone. We were not able to apply the mesh because of the risk of bladder injury. The conversions were attributed to inexperience and poor selection of patient during our learning curve.

Currently the bioprosthetic materials used in our center are composite mesh and polypropylene mesh. The composite mesh has two surfaces. The rough surface which adheres to the peritoneum promotes tissue ingrowths thus, strengthening the repair and the smooth surface minimizes adhesions and potential bowel erosion. Polypropylene mesh has been found to be unsuitable due to direct exposure to the intra-abdominal viscera causing an unacceptably high rate of bowel related injury and infection although Franklin *et al* have reported polypropylene mesh produced minimal complication in 384 cases of laparoscopic onlay ventral hernia repair^{16, 17}. Furthermore the polypropylene mesh is less costly and easier to handle laparoscopically as compared to composite mesh.

Patient education is important before laparoscopic repair is offered to them. The relative risks, benefits, expectations and financial cost of the technique and materials used should be discussed before surgery. The patient must comply with preoperative recommendations to ensure a good outcome. As with any new surgical procedure, the surgeon must use careful patient selection criteria to establish confidence and good outcome in the initial period¹⁸. Experience in laparoscopic surgery and adequate training in this procedure is mandatory. Initially, this procedure should be offered to patients with small to moderate size hernia, should not be obese or have had previous intraperitoneal mesh placement. Once the surgeon has gained enough experience and confidence, any patient who is medically fit for general anesthesia can undergo this operation, regardless of the size of the hernia.

In conclusion, laparoscopic repair of incisional hernia particularly recurrent hernia has been shown to be safe and effective in our centre. 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.

References

1. Flum DR, Horvath K, Koepsell T. Have outcomes of incisional hernia repair improved with time? A population-based analysis. *Ann of Surg.* 2003; 237(1): 129-35.
2. Stoppa RE. The treatment of complicated groin and incisional hernias. *World J. Surg.* 1989; 13: 545-54.
3. Rives JE, Pire JC, Flament JB et al. Treatment of large eventrations. New therapeutic indications apropos of 322 cases. *Chirurgie.* 1985; 111: 215-25.
4. Wantz GE. Incisional hernioplasty with Mersilene. *Surg. Gynecol. Obstet.* 1991; 172: 129-37.
5. Sakorafas G, Sarr MG. Repair of ventral hernia and incisional hernia using modifications of Rives-Stoppa techniques. *Prob In Gen Surg.* 2002; 19(4): 51-58.
6. Ramshaw BJ, Esartia P, Schwab J *et al.* Comparison of Laparoscopic and open ventral herniorraphy. *Am Surg.* 1999; 65: 827-32.
7. Le Blanc KA, Booth WV. Laparoscopic repair of incisional abdominal hernia using expanded polytetraflouroethylene: Preliminary findings. *Sur Laparosc. Endosc.* 1993; 3: 39-41.
8. Bencini L, Sanchez LJ, Scatizzi M, *et al.* Laparoscopic treatment of ventral hernias: Prospective evaluation. *Surg Laparosc Endosc.* 2003; 13(1): 16-19.
9. Heniford BT, Park A, Ramshaw BJ, Voeller G. Laparoscopic repair of ventral hernias- Nine years' experience with 850 consecutive hernias. *Ann Surg.* 2003; 238: 391-400.
10. Hesselink VJ, Luijendik RW, De Wilt JHW, Heide R. An evaluation of risk factors in incisional hernia recurrences. *Surg Gynecol Obstet.* 1993; 176: 228-34.
11. Goodney PP, Birkmeyer CM, Birkmeyer JD. Short-term Outcomes of Laparoscopic and Open Ventral Hernia Repair: A Meta-analysis. *Arch Surg.* 2002; 137(10): 1161-65.
12. Weiss CA, Park AE. Laparoscopic Incisional Hernia Repair. *Prob Gen Surg.* 2002; 19(4): 59-64.
13. Robbins SB, Pofahl WE, Gonzales RP. Laparoscopic ventral hernia repair reduces wound complications. *Am Surg.* 2001; 67(9): 896-900.
14. Le Blanc KA. The critical Technical aspects of laparoscopic repair of ventral and incisional hernia. *Am Surg.* 2001; 67(8): 809-12.
15. Chowbey PK, Sharma A, Khullar R, *et al.* Laparoscopic ventral hernia repair. *J Laparoendosc Adv Surg Tech.* 2000; 10: 79-84.
16. Leber GE, Garb JL, Alexander AI, *et al.* Long-term complications associated with prosthetic repair of incisional hernias. *Arch Surg* 1998; 133: 378-82.
17. Franklin ME, Gonzalez Jr JJ, Glasi JL, Manjarrez A. Laparoscopic ventral and incisional hernia repair. An 11 year experience. *Hernia.* 2004; 8: 23-27.
18. Le Blanc KA, Whitaker JM, Bellafer DE, Rhynes VK. Laparoscopic incisional and ventral hernioplasty. Lessons learned from 200 patients. *Hernia.* 2003; 7: 118-24.