

Open Suture Repair and Open Onlay Technique for Incisional Hernia in Elderly Patients with Multiple Comorbidities

Jung-Sheng Chien MD¹, Pei-Jiun Tsai MD¹, Kuang-Yi Liu MD³, Shin-E Wang MD¹, Yi-Ming Shyr MD, FACS¹, Cheng-Hsi Su¹ MD, FACS¹, and Tien-Hua Chen MD^{1,2}

¹Department of Surgery, Taipei Veterans General Hospital, ROC

²Institute of Anatomy and Cell Biology, National Yang Ming University, Taiwan, ROC

³Department of Surgery, TaoYuan Armed Force general Hospital, Taiwan, ROC

Abstract

We present our clinical experience with open suture repair and open onlay technique for incisional hernia in elderly patients with multiple comorbidities. Observations and clinical data are described for 20 patients older than 70 years (18 males, two females) whose mean age was 78.6 years (range, 70-88 years). Each patient had an incisional hernia between January 2004 and December 2010. All patients' preoperative ASA scores were over III or IV and all had serious comorbidities. Mean operative time was 86.1±7.2 minutes and mean hernia size was 8.3 ± 3.7 cm. Mean hospital stay was 4.7 ± 1.7 days, and the recurrence rate was 10 % during a 24.2-month follow-up time. The complication rate was 30% and no patients died during the study period. Open suture repair and onlay technique is a simple and dependable procedure that can be performed quickly by general surgeons at varying experience levels.

Key Words: Onlay, Incisional hernia

1. Introduction

Incisional hernias are ventral hernias through a surgical scar. Serious complications of abdominal surgery and incisional hernias occur in 11–23% of laparotomies (Cassar & Munro, 2002). Incisional hernias enlarge over time and can give rise to complications, including pain, discomfort, bowel obstruction, incarceration, and strangulation. Incisional hernias also may adversely affect an individual's quality of life.

The recurrence rate after open suture repair may be as high as 24-54% (Luijendijk et al., 2000), and for open mesh repair, up to 34% (Ludijendijk et al., 2000; Paul et al., 1998; Burger, Lange, Halm, Kleinrensink, & Jeekel, 2005). Several methods of securing the mesh to the fascia have been described and the most common are mesh onlay, inlay, retrorectus underlay, preperitoneal underlay, and intraperitoneal underlay (Shell, de la Torre, Andrades, & Vasconez, 2008). The onlay technique (Fig. 2A) consists of relaxing incisions in the anterior rectus sheath with primary approximation of the linea alba and medial turnover of the anterior rectus sheath followed by mesh placement. The extraperitoneal onlay mesh repair is associated with a lower recurrence rate (10%) (Machairas, Misiakos, Liakakos, & Karatzas, 2004). The disadvantages are that it requires wide undermining of tissue, which may predispose the patient to wound-related complications, and that less pressure is required for disrupting the mesh from the anterior abdominal wall than that of other repair procedures.

The inlay technique involves excision of the hernia sac and identification of healthy fascial margins (Fig. 2B). This technique provides a tensionless repair at the time of surgery. Without the overlying support of the anterior abdominal wall, activities that increase intra-abdominal pressure impart significant tension on the mesh-fascial interface, which is the weakest point of the repair. The reherniation rate of the inlay technique is significantly higher than that associated with the underlay technique and also tends to be higher than the onlay technique (Millikan, 2003; de Vries et al., 2004).

In the retrorectal underlay technique, the mesh is placed between the posterior rectus sheath and transverse fascia, beneath the rectus muscle (Fig. 2C). In the preperitoneal underlay method, the mesh is placed between the transverse fascia and the peritoneum (Fig 2D). Recurrence rates of less than 10% have been reported with these techniques (Temudon, Siadati, & Sarr, 1996; McLanahan, King, Weems, Norotney, & Gibson, 1997).

The intraperitoneal underlay placement is a common technique used in open and laparoscopic approaches. Proponents of this technique state that the ability to place the mesh with a large underlay allows for better tissue ingrowth and that this technique allows greater variability in fixation, from approximation at the fascial margins to full-thickness lateral fixation (Millikan, Baptista, Amin, Deziel, & Doolas, 2003). The recurrence rates of the intraperitoneal underlay technique are reported to be less than 5%.

In a recent Cochrane review, the authors conclude that mesh repair is superior to suture repair because of its lower recurrence rate (den Hartog, Dur, Tuinebreijer, & Kreis, 2008). Burger et al. (2004) have stated that the technique of suture repair of incisional hernias should be completely abandoned. Incisional hernia manifests differently in elderly patients compared with younger patients. A high mortality rate in patients over 75 years old with incisional hernia and a high postoperative morbidity rate are related to intestinal injury, higher American Society of Anesthesiologists (ASA) scores, and medical conditions (Alvarez Perez et al., 2003; Kulah et al., 2001).

In this study, we present our clinical experience with open suture repair and open onlay technique for incisional hernia in elderly patients with multiple comorbidities.

2. Methods

Twenty patients older than 70 years with incisional hernia complicated by comorbid conditions were included in this study. Appropriate informed consent was obtained from each patient. Under general anesthesia, each patient was placed in a supine position, and the skin was prepared and draped as usual. The skin was incised from the xiphoid process to the pubic symphysis. The wound was deepened between the deep fascia and the aponeurosis of the external abdominal oblique muscle. The hernia sac was identified, and an incisional mark was made at the external abdominal oblique muscle and about 2 cm over the hernia sac. We sutured the right side of the aponeurosis of external abdominal oblique muscle to the left side of the aponeurosis of external abdominal oblique muscle with interrupted 1-0 Prolene and pushed the hernia sac into the abdominal cavity (Fig. 1). Then, the onlay technique was performed with the optilene mesh between the deep fascia and the external abdominal oblique muscle, and was sutured with continued 1-0 Prolene. Two 19 French J-P drains were placed above the mesh. The skin was sutured with 3-0 nylon.

Incisional hernia after open tissue suture with open onlay technique is shown in Fig. 2A. Patients were followed up every 6 months for 3 years. On each follow-up visit, a CT scan of the abdomen was performed to detect any recurrent hernia and to assess the mesh.

3. Results

Twenty patients (18 male, two female) older than 70 years, whose mean age was 78.6 years (range, 70-88 years), were treated with incisional ventral hernioplasty. All patients had preoperative ASA scores over III or IV and all had serious comorbidities. The mean operative time was 86.1 ± 7.2 minutes (range 60-140 minutes), and the blood loss was less than 100 cc. The mean hernia size was 8.3 ± 3.7 cm and the mean hospital stay was 4.7 ± 1.7 days (range 2-9 days) (Table 1).

All patients were able to resume oral intake on the day after surgery. Twenty patients were regularly followed up every six months. A CT scan of the abdomen was conducted at each follow-up visit in all patients. The mean follow-up was 24.2 months and two patients (2/20) developed recurrent incisional hernia. These recurrent ventral hernias were treated by reoperation after four months and three years, respectively. Otherwise, no recurrent incisional ventral hernia was identified by CT scan of the abdomen in the other patients during the follow-up period. Four patients had skin necrosis. One of the wounds was treated at the outpatient department for one week, while the other three wounds were debrided during re-admission. In two patients, intra-abdominal pressure increased without abdominal compartment syndrome. These two patients stayed in bed for three days and the symptoms disappeared. None of the patients died during 30 days' follow-up, and none of the 20 patients had major postoperative complications.

4. Discussion

Incisional hernia is a common complication after laparotomy; it is twice as common as intestinal obstruction. Although many predisposing factors for incisional ventral hernias are patient-specific, some factors such as type of primary closure and materials used may influence the overall incidence of incisional hernia. It has been suggested that early development of the incisional hernia is caused by perioperative factors such as surgical technique and wound infection. Late development may implicate other factors, such as connective tissue disorders (Burger et al., 2005). Repair of an incisional hernia is challenging. Long-term results are often disappointing, with a recurrence rate of about 40% to 60% (Santora & Roslyn, 1993; Duepree, Senagore, Delaney, & Fazio, 2003; Rutkow, 1998; Hessellink, Luijendink, De Wilt, Heide, & Jeekel, 1993; Geçim, Koçak, Ersoz, Bumin, & Aribal, 1996; Sørensen, Hemmingsen, Kirkeby, Kallehave, & Jørgensen, 2005).

The Mesh repair method created by Usher et al. in 1958 opened a new era. The prosthetic mesh generated a scar-mesh compound to reinforce the abdominal wall. According to several studies (Burger et al., 2004; Millikan, 2003; de Vries et al., 2004), the results of the mesh repair method were excellent, with less recurrence rates compared to the primary suture repair method. With the advent of prosthetic meshes for incisional ventral hernia repair, the recurrence rate has dropped to approximately 10%. More recently, with the development of prosthetic mesh that is safe to place intraperitoneally, the recurrence rate has dropped to less than 5%.

The onlay and inlay techniques avoid direct contact with the small bowel, and the onlay technique has a lower recurrence rate (10%), but the inlay procedure has a recurrence rate significantly higher than the onlay technique. (Millikan, 2003; de Vries et al., 2004). The recurrence rates of the underlay techniques were less than 5% and these procedures create space for the mesh although they might injure the small bowel. Two patients we treated for incisional hernia six years ago have influenced our current approach to this condition. One of the patients was 56-year-old man with an incisional hernia, who was treated with open tissue repair and the retrorectus underlay procedure. Two days later, he developed a fever and peritonitis and was diagnosed with small bowel perforation. Segmental resection of the small bowel and an anastomosis were performed, but these interventions failed. An ileostomy was created and it was closed three months later. Six months later, the patient was treated with an open Composix Kugel mesh repair.

The second patient was an 86-year-old man who was treated for an incisional hernia with open tissue repair and the onlay procedure. The small bowel was injured when we performed the identification and excision of the hernia sac. A segmental resection of the small bowel and an anastomosis were performed. Postoperative ileus was noted, and the patient developed pneumonia and died two months later. Both of these cases had serious legal repercussions; consequently, we created a simpler and safer method for treating incisional hernias in elderly patients. When creating space for the mesh, these methods, except for the onlay technique, might injure the small bowel. Such injuries to the small bowel occur more often in frail and elderly patients. The associated decrease in mobility resulting in intestinal incarceration and subsequent intestinal obstruction is significant. Because these complications can be incapacitating, hernia repair should be considered early. In elderly patients with external hernias, early elective surgery is preferable to avoid the increased risks of emergency hernia repair.

In our review, the majority of patients (96%) had hernia repair under general anesthesia. Most patients with bowel obstruction or coexisting cardiopulmonary diseases were classified as ASA class III or IV. General anesthesia can result in severe postoperative cardiopulmonary complications in elderly patients. In 9 out of 10 patients who died, mortality was due to cardiopulmonary complications. Major complications were also found to be directly related to coexisting disease, and significantly increased with higher ASA class.

There are some critical reasons why we used the primary tissue and the onlay technique in elderly patients with multiple underlying diseases. These kinds of patients typically have severe comorbidities and a high ASA score. From our previous experience with cases that resulted in complications and mortality, we were motivated to develop a safe and effective method for incisional hernia repair. For elderly patients in poor health, our methods are safe, effective, and can be performed easily and quickly without concern for small bowel injuries and without prolonged use of general anesthesia. The day after surgery, patients can begin oral intake as well as leave their beds and participate in rehabilitation exercises. This allows these patients to recover smoothly after surgery.

During our clinical experience using open primary suture and onlay technique for incisional hernias in 20 elderly patients with comorbid conditions, the mortality rate was 0% and the recurrence rate was low (10%). Patients had a short hospital stay and experienced no major postoperative complications. In conclusion, for seriously ill elderly patients with incisional hernia, elective surgical repair using the open suture repair and onlay technique is a simple and dependable procedure that can be performed quickly even by less experienced general

References

- Alvarez Pérez, J.A., Baldonado, R.F., Bear, I.G., Solís, J.A., Alvarez, P., & Jorge, J.I. (2003). Emergency hernia repairs in elderly patients. *International Surgery*, 88(4), 231-217.
- Burger, J.W., Lange, J.F., Halm, J.A., Kleinrensink, G.J., & Jeekel, H. (2005). Incisional hernia: early complication of abdominal surgery. *World Journal of Surgery*, 29, 1608–1613.
- Burger, J.W., Luijendijk, R.W., Hop, W.C., Halm, J.A., Verdaasdonk, E.G., & Jeekel, J. (2004). Long-term follow-up of a randomized controlled trial of suture versus mesh repair of incisional hernia. *Annals of Surgery*, 240(4), 578–583.
- Cassar K., & Munro A. (2002). Surgical treatment of incisional hernia. *British Journal of Surgery*, 89(5), 534–545.
- den Hartog, D., Dur, A.H., Tuinebreijer, W.E., & Kreis, R.W. (2008). Open surgical procedures for incisional hernias. *Cochrane Database System Review*, (3): CD006438.
- de Vries Reilingh, T.Ss, van Geldere, D., Langenhorst, B., deJong D., van der Wilt, G.J, & van Goor, H., et al (2004). Repair of large midline incisional hernias with polypropylene mesh: comparison of three operative techniques. *Hernia*, 8(1), 56-59.
- Duepre, H.J., Senagore, A.J., Delaney, C.P., & Fazio, V.W. (2003). Does means of access affect the incidence of small bowel obstruction and ventral hernia after bowel resection? Laparoscopy versus laparotomy. *Journal of the American College of Surgeons*, 197(2), 177–181.
- Geçim, I.E., Koçak, S., Ersoz, S., Bumin, C., & Aribal, D. (1996). Recurrence after incisional hernia repair: results and risk factors. *Surgery Today*, 26(8), 607–609.
- Hesselink, V.J., Luijendijk, R.W., De Wilt, J.H., Heide, R., & Jeekel, J. (1993). An evaluation of risk factors in incisional hernia recurrence. *Surgery Gynecology and Obstetrics*, 176(3), 228–234.
- Kulah, B., Duzgun, A.P., Moran, M., Kulacoğlu, I.H., Ozmen, M.M., & Coskun, F., (2001). Emergency hernia repairs in elderly patients. *American Journal of Surgery*, 182(5), 455-459.
- Luijendijk, R.W., Hop, W.C., van den Tol, M.P., De Lange, D.C., Braaksma, M.M., & Ijzermans, J.N., et al. (2000). A comparison of suture repair with mesh repair for incisional hernia. [Clinical Trial. Journal Article. Multicenter Study. Randomized Controlled Trial] *New England Journal of Medicine*, 343(6), 392-398.
- Machairas, A., Misiakos, E.P., Liakakos, T., & Karatzas, G. (2004). Incisional hernioplasty with extraperitoneal onlay polyester mesh. *American Surgeon*, 70(8), 726-729.
- McLanahan, D., King, L.T., Weems, C., Novotney, M., & Gibson, K. (1997). Retrorectus prosthetic mesh repair of midline abdominal hernia. *American Journal of Surgery*, 173(5), 445–449.
- Millikan, K.W. (2003) Incisional hernia repair. *Surgical Clinics of North America*, 83, 1223–1234.
- Millikan, K.W., Baptista, M., Amin, B., Deziel, K.J., & Doolas, A. (2003). Intraperitoneal underlay ventral hernia repair utilizing expanded polytetrafluoroethylene and polypropylene mesh. *American Surgeon*, 69(4), 287-291.
- Paul, A., Korenkov, M., Peters, S., Köhler, L., Fischer, S., & Troidl, H. (1998). Unacceptable results of the Mayo procedure for repair of abdominal incisional hernias. *European Journal of Surgery*, 164(5), 361–367.
- Rutkow, I.M. (1998). Epidemiologic, economic and sociologic aspects of hernia surgery in the United States in the 1990s. *Surgical Clinics of North America*, 78, 941–951.
- Santora, T.A., & Roslyn, J.J. (1993). Incisional hernia. *Surgical Clinics of North America*, 73(3), 557–570.
- Shell, D.H. 4th, de la Torre, J., Andrades, P., & Vasconez, L.O. (2008). Open repair of ventral incisional hernias. *Surgical Clinics of North America*, 88(1), 61-83.
- Sørensen, L.T., Hemmingsen, U.B., Kirkeby, L.T., Kallehave, B., & Jørgensen, T. (2005). Smoking is a risk factor for incisional hernia. *Archives of Surgery*, 140(2), 119–123.
- Temudom, T., Siadati, M., & Sarr, M.G. (1996). Repair of complex giant or recurrent ventral hernias by using tension-free intraparietal prosthetic mesh (Stoppa technique): lessons learned from our initial experience (fifty patients). *Surgery*, 120(4), 738–743.

Table 1. Clinical data of patients undergoing mesh incisional hernioplasty

Patient	Age	Critical comorbidity	operative	Operative time	Size of ventral hernia	Hospital LOS	complications	Follow up	recurrence
1	70	Intracranial hemorrhage Acute renal failure; Respiratory failure	PPU s/p gastric body partition	2 hours	5 x 7 cm	5 days	nil	50 months	No
2	78	Old CVA, COPD CAD s/p PTCA	Open cholecystectomy	1 hour, 15 min	7 x 4 cm	7 days	Intra-abdominal pressure increased	48 months	No
3	77	CAD s/p PTCA BPH s/p TURP HT, Hypercholesterolemia	Colon Ca s/p left hemicolectomy	1 hour	7 x 8 cm	4 days	nil	48 months	No
4	75	CAD, BPH s/p TURP DM, HT	Gastric lymphoma s/p RSG Acute cholecystitis s/p open cholecystectomy Incisional hernia s/p primary repair	2 hours, 20 min	10 x 12 cm	5 days	nil	43 months	No
5	84	COPD	cholecystitis s/p open cholecystectomy	1 hour	5 x 7 cm	7 days	nil	39 months	No
6	75	CVA	appendectomy	1 hour, 30 min	5 x 5 cm	5 days	nil	48 months	No
7	87	CAD, CHF, COPD, Uremia	Colon Ca s/p LAR	1 hour, 30 min	12 x 7 cm	9 days	Intra-abdominal pressure increased	36 months	No
8	75	Old MI	Cholecystitis s/p open cholecystectomy	1 hour	6 x 7 cm	5 days	nil	34 months	No
9	75	DM nephropathy	PPU s/p simple closure	1 hour, 20 min	6 x 8 cm	4 days	nil	30 months	No
10	82	CHF	Open renal lithotripsy, ventral hernioplasty x 2	1 hour	10 x 10 cm	5 days	nil	27 months	No
11	71	CAD	Gastric ca s/p Gall stones s/p	1 hour	20 x 4	2 days	nil	25 months	Recurrence (4 months post-op)
12	73	DM, uremia, CHF, Parkinson's disease, s/p thyroidectomy	CAPD	1 hour	10 x 5	3 days	Wound infection	24 months	No
13	88	CAD, CHF	AAA s/p	1 hour	10 x 8	3 days	nil	14 months	No
14	79	CAD	AAA s/p	1 hour	12x10	3 days	nil	1 month	No
15	81	CAD, HT	Gallstones s/p Ventral hernia s/p	2 hours	6x8	4 days	nil	3 month	Recurrence (3 years post-op)

16	7	CAD	AAA s/p Colon perforation s/p	2 hours, 5mins	5x6 6x6	5 days	nil	3 months	No
17	81	CAD, DM BPH, HT	Colon cancer s/p	1hour, 35mins	4x4	4 days (32 days)	skin necrosis	4 months	No
18	80	DM, HT	Gallstones s/p Perforation of jejunum s/p	2 hours, 20mins	10x5	3 days (4 days)	skin necrosis	4 months	No
19	80	CAD, COPD	Uterine prolapse s/p SUI with enterocele s/p	1 hour	6x6	7 days (14 days)	skin necrosis	2 months	No
20	84	CAD, CHF, COPD, DM	Gallstones s/p Ventral hernia s/p	1 hour	8x6	4 days	Nil	2 months	No

CAD: coronary artery disease, CHF: congestive heart failure, COPD: chronic obstructive pulmonary disease, CVA: cerebral vascular accident, DM: diabetes mellitus, BPH: benign prostate hypertrophy s/p TURP: transurethral resection of the prostate, MI: myocardial infarction, PPU: perforated peptic ulcer.
RSG: radical subtotal gastrectomy, LAR: lower anterior resection

Figure: Legends

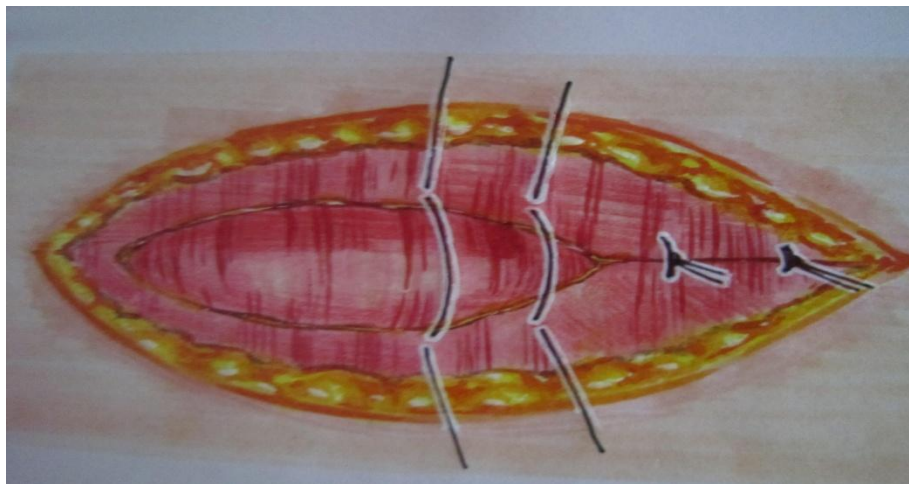


Figure 1. The hernia sac was identified and an incisional mark was made at the external abdominal oblique muscle and about 2 cm over the hernia sac. The right side of the aponeurosis of external abdominal oblique muscle was sutured to the left side of the aponeurosis of external abdominal oblique muscle with interrupted 1-0 Prolene, pushing the hernia sac into the abdominal cavity.

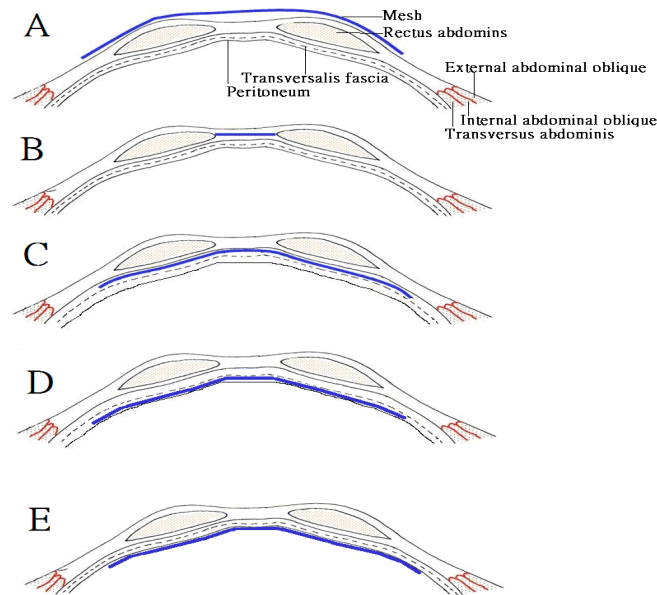


Figure 2. (A) The onlay technique: the mesh is placed between deep fascia and anterior rectus sheath. (B) The inlay technique: the mesh is placed between rectus muscles. (C) The retrorectus underlay technique: the mesh is placed between the posterior rectus sheath and the transverse fascia. (D) In the preperitoneal underlay method: The mesh is placed between the transverse fascia and the peritoneum. (E) Intraperitoneal underlay is placed under the parietal peritoneum.