

Open ventral hernia repairs with Kugel patch

Junsheng Li, MD, Zhenling Ji, MD, Yanan Zhang, MD.

ABSTRACT

الأهداف: عرض النتائج الأولية لإصلاح الفتق البطني المفتوح بتغيير توسع حلقة رقعة البولي بروبيلين (قطعة كيوقل).

الطريقة: أجريت عملية على 24 مريض يعانون من فتق قطعي بطني باستخدام هذه الطريقة خلال الفترة من ديسمبر 2004م إلى أغسطس 2008م في قسم الجراحة العامة - مستشفى زهونج التابع لجامعة الجنوب الشرقي. قمنا بتسجيل أحجام عيب الفتق، وتقنية العملية، وأوقات العملية، والمضاعفات ما بعد العملية الجراحية، والنكسة.

النتائج: تراوحت أعمار المرضى من 37 إلى 81 عام (متوسط العمر 10.3 ± 67.1) شاملة فتق الخط الأبيض البطني المتوسط، فتق سيجلي، فتق الحبل السري، الفتق الشقي، وتراوحت أحجامها من 1 سم إلى 18 سم (متوسط 6.7 ± 4.5 سم). كما كانت المضاعفات التالية للعملية، تورم مصلي، والتهاب الجهاز التنفسي العلوي، وألم متوسط، بينما سجل الوقت المتوسط لإجراء عملية إصلاح الفتق 118.5 ± 42.2 دقيقة. كانت مدة البقاء في المستشفى بعد العملية 8.1 ± 3 يوم من 3-16 يوم. لم تظهر أي نكسة خلال وقت المتابعة 54-8 شهر، والمتوسط 26 شهر.

خاتمة: تشير نتائجنا الأولية أن فتح إصلاح الفتق البطني المفتوح بواسطة رقعة قطعة كيوقل، أو قطعة كيوقل المعدلة عن طريق التقنية بسيطة وفعالة مع معدل منخفض لمضاعفات ما بعد العملية النادرة.

Objectives: To describe the initial results of open ventral hernia repair by sublay placement of the self-expanding ring polypropylene patch (Kugel patch).

Methods: Twenty-four patients with ventral/incisional hernias were operated upon with this technique between December 2004 and August 2008 in the Department of General Surgery, Affiliated Zhong-Da Hospital, Southeast University, Nanjing, JiangSu Province, China. Hernia defect sizes, operative technique, operative times, postoperative complications, and recurrence were recorded.

Results: The age range of the operated patients was 37-81 years with a mean of 67.1 ± 10.3 . The operation

includes hernia of linea alba, spigelian hernia, umbilical hernia, and incisional hernia, and with defect sizes ranging from 1-18 cm (mean: 6.7 ± 4.5 cm). Postoperative complications were seroma, upper respiratory infection, and mild pain. The mean operation time (estimated for hernia repair) was 118.5 ± 42.2 minutes, and the mean postoperative hospital stay was 8.1 ± 3 days (3-16 days). There was no recurrence during the follow-up time (8-54 months, median: 26 months).

Conclusion: Open repair of ventral or incisional hernias with Kugel, or modified Kugel patch by sublay technique is safe, simple, and effective with low postoperative complication rate.

Saudi Med J 2010; Vol. 31 (6): 668-671

From the Department of General Surgery, Affiliated Zhong-Da Hospital, Southeast University, Nanjing, JiangSu Province, China.

Received 19th January 2010. Accepted 20th April 2010.

Address correspondence and reprint request to: Dr. Junsheng Li, Department of General Surgery, Affiliated Zhong-Da Hospital, Southeast University, Nanjing 210009, JiangSu Province, China. Tel. +86 (25) 83243618. E-mail: Lijunshenghd@126.com

Ventral hernias are common surgical conditions, including incisional, umbilical, and other less common hernias. Although the risk factors for ventral hernia formation have been defined and the suture technique improved, still as many as 10-20% of patients after laparotomy wound develop ventral or incisional hernias,¹⁻³ rendering repair of ventral hernia a common procedure for general surgeons. It was shown that ventral hernia patients have connective tissue disease with abnormal collagen synthesis and collagen disorders.^{4,5} This means simple suture of a fascia defect alone would result in a high index of hernia recurrence.⁶ Many operative options for ventral hernia repair have been described, and the Mayo repair is still commonly used,^{7,8} however, this procedure was associated with high recurrence rates.⁹ Traditional open mesh repairs often fix the mesh with many sutures on the border of the mesh, and this suture placement not

only render difficulties to this procedure, but also causes postoperative pain, or bowel injury.^{10,11} At present, approximately 25-30% of mesh ventral hernia repairs are performed laparoscopically, however, laparoscopic mesh repairs have a considerable learning curve, generally more costly and time consuming, it also has specific complications.¹² Thus, an open tension free procedure still has its appropriate place in ventral hernia repair. Despite the large number of ventral hernias repaired annually, there is no clear consensus on the best method of treatment.^{13,14} Considering that most ventral hernia repairs are still performed with an open mesh procedure worldwide, and the underlying drawbacks of traditional open mesh repair, we described a simple technique of open procedure for the treatment of ventral hernias.

Methods. This retrospective study was carried out between December 2004 and August 2008 in the Department of General Surgery, Affiliated Zhong-Da Hospital, Southeast University, Nanjing, JiangSu Province, China. There were 24 ventral or incisional, and umbilical hernia repairs performed in our clinic with the Bard Kugel (or modified Kugel) patch (Bard-Davol Inc, Murray Hill, New Jersey, USA). Patients under 18 years of age, or who were American Society of Anesthesiologists (ASA) grade IV were excluded. Patient's demographics, operative technique, operative times, length of hospital stay, postoperative complications, and recurrences were documented. Patients' consent was obtained before the operation. The Ethical Committee of Affiliated Zhong-Da Hospital, Nanjing, Jiang Su Province, China approved this study.

Surgical technique. Patients were in supine position, and general or epidural anesthesia was used. Previous skin incision, and edges of the hernia defect were marked on the abdominal wall. The incision was directly carried out over the hernia. The hernial sac was dissected out from subcutaneous tissues, and dissection was performed superficial to the sack, circumferentially separating it from the subcutaneous tissue until the neck of the hernia. Any lacerations of the hernial sac were closed with absorbable sutures, and the contents of the sac were reduced into the abdomen. Next, the dissection was carried laterally and retromuscularly above the layer of the peritoneum beneath the rectus fascia, or the corresponding fascia and muscles, and by this, developing a potential space by blunt dissection to accommodate the patch. The dissection can be stopped when an overlap of 3-4 cm on all sides is reached. The Kugel or Modified Kugel patch (Bard-Davol Inc, Murray Hill, New Jersey, USA) is a self-expanding patch composed of double polypropylene mesh, and a "memorial recoil" helps ensure that the patch will spring open automatically, maintain its shape and

position, laying flatly in the preperitoneal space. The patches are available in different sizes; patch size was chosen according to the defect size, ensuring at least 3 cm overlap of the defect on all sides. The fascial edges were reapproximated as much as possible without creating tension, a closed suction drain was placed in the subcutaneous space, brought out through a separate stab wound when necessary, and the drain remains in place until the evacuates are less than 20 ml of fluid per 24 hours. In case of additional surgical procedures such as, enterolysis and bowel resection, the hernia defect may be enlarged when necessary, and we used scissors to sharply lyse adhesions between the intestines. Bowel resection, and anastomosis were performed with one-layer hand suturing or stapling extracorporeally, and after enterolysis and bowel resection, the peritoneum was closed.

Results. Among the 24 patients, the operation included hernia of linea alba, spigelian hernia, umbilical hernia, and incisional hernia (Table 1). Six patients had concomitant procedures, enterolysis (2), cholecystectomy (2), bowel resection (1), inguinal hernia repair (1), and ileo-colon anastomosis (1). Hernia defect size was 6.3 ± 4.0 cm, ranged from 1-18 cm with small size (1-4cm) in 50% of the patients, medium size (4.1-8cm) in 5 patients, and large size (>8 cm) in 7 patients. Most patients were ASA grades I and II. Mean operative time (estimated for hernia repair) was 118.5 ± 42 minutes (40-210 minutes). Mean postoperative hospital stay was 8.1 ± 3 days (3-16 days). Most patients resumed their normal daily activities within 8 days, and did not feel significant pain 3 days after the operation. Postoperative complication rates were low, including 2 seromas and one upper respiratory infection. There was no recurrence at the time of follow-up (8-54 months, median: 26 months).

Discussion. Abdominal wall or ventral hernias can be small and asymptomatic, however, some of these hernias progress to incarceration and strangulation of bowel and other viscus, it is clear that ventral hernias remain a common, and costly health care issue.¹⁵ Although many surgical repair techniques have been described in the literature, herniorrhaphy using simple suturing and Mayo's technique are still the most frequently used methods, and these methods cause high recurrence rates (25-50%),^{6,15} while tension-free mesh repair can reduce the recurrence rates significantly.^{16,17} The size of hernial defect has important implications for recurrence, and studies¹⁸ have shown that defect size large than 4 cm was independently predictive of hernia recurrence. In our study, even small size defects (<4cm)

Table 1 - Patient demographics (N=24).

Parameters	Number
<i>Gender</i>	
Male	8
Female	16
<i>Age, years</i>	
Mean \pm standard deviation	67.1 \pm 10.3
Range	37-81
<i>American Society of Anesthesiology Grade</i>	
I	1
II	20
III	3
Duration of hernia occurrence after initial operation	9 months - 20 years
<i>Previous operation (causing incisional hernias)</i>	
Appendectomy	3
Colectomy	2
Cholecystectomy	2
Cesarean	2
Proctectomy	1
Uterus resection	1
Gastrectomy	1
Small intestine resection	1
Others	3
Umbilical hernia	6
Hernia of linea alba	1
Spigelian hernia	1

were repaired with meshes. Two randomized trials have proven that mesh repair is superior to non-mesh in terms of recurrence.^{16,17} Arroyo et al¹⁶ reported that mesh repair resulted in significantly fewer recurrences than simple suture repair (1 versus 11%), and Burger et al¹⁷ showed that lower recurrence rate was obtained for mesh repair in small incisional hernias than for simple sutured repairs (17 versus 68%).

Current debate focuses whether the mesh repair should be laparoscopic or open,^{19,20} and if open, in which abdominal wall plane the mesh should be placed. Numerous techniques used in ventral hernia repairs include placing the mesh onlay, inlay, properitoneal underlay, and intraperitoneal underlay. Onlay mesh repair method involves extensive subcutaneous dissection, and increases the risk of surgical wound complications (such as, hematoma, seroma, and infection). Furthermore, onlay repair is less mechanically sound since the abdominal wall forces tend to push the mesh off the repair,²¹ therefore, some authors²² pointed out that onlay mesh is used simply as an adjunct to a standard sutured repair rather a planned procedure of choice. Underlay repairs are considered the "gold standard" for open ventral or incisional hernia repairs.¹⁴ Placing the mesh in this plane has mechanical and physiological advantages, as intra-abdominal pressure tends to

push the mesh firmly against the adjacent abdominal wall.²³ Although some authors^{24,25} claimed that placing the mesh in the submuscular or sublay position is technically difficult, this is not our experience due to the self-expanding advantage of the patch, and the patch could be secured in place with a minimal number of sutures. The reduced suture numbers may contribute to less postoperative pain,¹⁰ since Martin-Duce et al¹¹ have claimed that the use of sutures to fix the prosthesis resulted in high tension and contributed to the high incidence of abdominal pain.

In this procedure, overlap of the patch with the abdominal tissue by at least 3 cm was mandatory, this overlap allows a large surface area laterally for ingrowth of connective tissue, leading to a permanent fixation of the prosthesis within the abdominal wall. The wide placement also decreases the risk of recurrence at the lateral edge of the defect, since fibrous tissue infiltration would cause mesh contract. Literature reported similar low recurrence rates for both open (1-10%) and laparoscopic mesh repairs (0-9%).²⁶ With the improvement of laparoscopic skills, it is likely that laparoscopic repair will become more widely performed, however, considering the technique, learning curve, cost, and equipment facilitation it is clear that both laparoscopic and open procedure have their own indications and limitations. Therefore, some surgeons suggesting open mesh repair remains a suitable alternative, and both laparoscopic and open method will even find their appropriate place in the treatment of ventral hernia.^{27,28} With our procedure, associated postoperative complication rates were low (only 2 cases of seromas), there was no wound infection and no recurrence at follow up.

It is necessary to point out that this was not a randomized controlled study with small study size, and the follow-up period was short, and further prospective study with long term follow-up is needed.

In conclusion, open repair of ventral hernia by placing the self-expanding Kugel patch in the submuscular plane is highly effective, safe, and is an easy technique to perform, with low recurrence, and complication rates.

References

1. Halm JA, Lip H, Schmitz PI, Jeekel J. Incisional hernia after upper abdominal surgery: a randomised controlled trial of midline versus transverse incision. *Hernia* 2009; 13: 275-280.
2. Singh R, Omiccioli A, Hegge S, McKinley C. Does the extraction-site location in laparoscopic colorectal surgery have an impact on incisional hernia rates? *Surg Endosc* 2008; 22: 2596-2600.
3. Shell DH 4th, de la Torre J, Andrades P, Vasconez LO. Open repair of ventral incisional hernias. *Surg Clin North Am* 2008; 88: 61-83.

4. Klinge U, Si ZY, Zheng H, Schumpelick V, Bhardwaj RS, Klosterhalfen B. Collagen I/III and matrix metalloproteinases (MMP) 1 and 13 in the fascia of patients with incisional hernias. *J Invest Surg* 2001; 14: 47-54.
5. Klinge U, Conze J, Krones CJ, Schumpelick V. Incisional hernia: open techniques. *World J Surg* 2005; 29: 1066-1072.
6. Langer C, Schaper A, Liersch T, Kulle B, Flosman M, Füzesi L, et al. Prognosis factors in incisional hernia surgery: 25 years of experience. *Hernia* 2005; 9: 16-21.
7. Courtney CA, Lee AC, Wilson C, O'Dwyer PJ. Ventral hernia repair: a study of current practice. *Hernia* 2003; 7: 44-46.
8. Perrakis E, Velimezis G, Vezakis A, Antoniadis J, Savanis G, Patrikakos V. A new tension-free technique for the repair of umbilical hernia, using the Prolene Hernia System--early results from 48 cases. *Hernia* 2003; 7: 178-180.
9. Khaira HS, Lall P, Hunter B, Brown JH. Repair of incisional hernias. *J R Coll Surg Edinb* 2001; 46: 39-43.
10. Ladurner R, Trupka A, Schmidbauer S, Hallfeldt K. [The use of an underlay polypropylene mesh in complicated incisional hernias: successful French surgical technique] *Minerva Chir* 2001; 56: 111-117. Italian.
11. Martín-Duce A, Nogueras F, Villeta R, Hernández P, Lozano O, Keller J, et al. Modifications to Rives technique for midline incisional hernia repair. *Hernia* 2001; 5: 70-72.
12. Egea DA, Martinez JA, Cuenca GM, Miquel JD, Lorenzo JG, Albasini JL, et al. Mortality following laparoscopic ventral hernia repair: lessons from 90 consecutive cases and bibliographical analysis. *Hernia* 2004; 8: 208-212.
13. Witherspoon P, O'Dwyer PJ. Surgeon perspectives on options for ventral abdominal wall hernia repair: results of a postal questionnaire. *Hernia* 2005; 9: 259-262.
14. Park AE, Roth JS, Kavic SM. Abdominal wall hernia. *Curr Probl Surg* 2006; 43: 326-375.
15. Sinha SN, Keith T. Mesh plug repair for paraumbilical hernia. *Surgeon* 2004; 2: 99-102.
16. Arroyo A, García P, Pérez F, Andreu J, Candela F, Calpena R. Randomized clinical trial comparing suture and mesh repair of umbilical hernia in adults. *Br J Surg* 2001; 88: 1321-1323.
17. Burger JW, Luijendijk RW, Hop WC, Halm JA, Verdaasdonk EG, Jeekel J, et al. Long-term follow-up of a randomized controlled trial of suture versus mesh repair of incisional hernia. *Ann Surg* 2004; 240: 578-583.
18. Mittermair RP, Klingler A, Wykypiel H, Gadenstätter M. Vertical Mayo repair of midline incisional hernia: suggested guidelines for selection of patients. *Eur J Surg* 2002; 168: 334-338.
19. Rudmik LR, Schieman C, Dixon E, Debru E. Laparoscopic incisional hernia repair: a review of the literature. *Hernia* 2006; 10: 110-119.
20. Goodney PP, Birkmeyer CM, Birkmeyer JD. Short-term outcomes of laparoscopic and open ventral hernia repair: a meta-analysis. *Arch Surg* 2002; 137: 1161-1165.
21. Awad ZT, Puri V, LeBlanc K, Stoppa R, Fitzgibbons RJ Jr, Iqbal A, et al. Mechanisms of ventral hernia recurrence after mesh repair and a new proposed classification. *J Am Coll Surg* 2005; 201: 132-140.
22. Israelsson LA, Smedberg S, Montgomery A, Nordin P, Spangen L. Incisional hernia repair in Sweden 2002. *Hernia* 2006; 10: 258-261.
23. Novitsky YW, Porter JR, Rucho ZC, Getz SB, Pratt BL, Kercher KW, et al. Open preperitoneal retrofascial mesh repair for multiply recurrent ventral incisional hernias. *J Am Coll Surg* 2006; 203: 283-289.
24. Korenkov M, Paul A, Sauerland S, Neugebauer E, Arndt M, Chevrel JP, et al. Classification and surgical treatment of incisional hernia. Results of an experts' meeting. *Langenbecks Arch Surg* 2001; 386: 65-73.
25. Kingsnorth A. The management of incisional hernia. *Ann R Coll Surg Engl* 2006; 88: 252-260.
26. Cassar K, Munro A. Surgical treatment of incisional hernia. *Br J Surg* 2002; 89: 534-545.
27. Pring CM, Tran V, O'Rourke N, Martin IJ. Laparoscopic versus open ventral hernia repair: a randomized controlled trial. *ANZ J Surg* 2008; 78: 903-906.
28. Kurzer M, Kark A, Selouk S, Belsham P. Open mesh repair of incisional hernia using a sublay technique: long-term follow-up. *World J Surg* 2008; 32: 31-36.

Related topics

Osifo O, Amusan TI. Outcomes of giant inguinoscrotal hernia repair with local lidocaine anesthesia. *Saudi Med J* 2010; 31: 53-58.

Pala Y, Ozcan M, Dikmeer G, Taspinar V, Ornek D, Ozdogan L, Selcuk A, Dikmen B. Selective spinal anesthesia for inguinal herniorrhaphy. *Saudi Med J* 2009; 30: 1444-1449.

Osifo OD, Ovueni ME. Challenges in the management of neonatal surgical conditions under the absence of total parenteral nutrition. *Saudi Med J* 2009; 30: 971-973.

Gao JS, Wang ZJ, Zhao B, Ma SZ, Pang GY, Na DM, Zhang YD. Inguinal hernia repair with tension-free hernioplasty under local anesthesia. *Saudi Med J* 2009; 30: 534-536.