TECNICHE CHIRURGICHE E SPERIMENTALI SURGICAL AND EXPERIMENTAL TECHNIQUES

Repair of small abdominal wall hernias. The comparison of open in-lay and on-lay techniques



Ann Ital Chir, 2019 90, 5: 463-466 pii: S0003469X19030677 Epub Ahead of Print - September 25 *free reading*: www.annitalchir.com

Murat Kalayci*, Orhan Agcaoglu**

*Yeditepe University, Faculty of Medicine, Department of General Surgery, Istanbul, Turkey **Koç University, School of Medicine, Department of General Surgery, Istanbul, Turkey

Repair of small abdominal wall hernias. The comparison of open in-lay and on-lay techniques

BACKGROUND: Our aim was to report the results of open in-lay placement of a composite mesh for repair of small abdominal wall hernias compared to a control group of on-lay polypropylene mesh placement.

Materials and Methods: The patients were divided into two groups in which group-1 (n=27) included patients who underwent a repair with composite mesh, Ventralex Patch, which was fixed in-lay to the abdominal wall and group-2 (n=34) included patients with a repair with simple polypropylene mesh fixed on-lay to the abdominal wall. Due to the limited dimensions of the Ventralex Patch, in order to match the defects in both groups no randomization was done prior to the operation and patients were divided into groups consequently. All the patients were explored under general or spinal anesthesia. No further subcutaneous dissection was performed in order not to increase the seroma during onlay mesh placement.

RESULTS: The demographic data between study groups were similar. The postoperative complication rate was significantly low in group 1 (0%), compared to group 2 (23.5%) which included seroma (n=3) and wound infection (n=5), however, the mean operative time was significantly high in group l (61 minutes) compared to group 2 (39 minutes). There were no recurrences occurred in both group.

CONCLUSION: Although, the patch itself has tendency to make a dome formation when placed intra-abdominally, a composite polypropylene and ePTFE hernia patch has better outcomes if placed precisely with minimal extra-peritoneal and extensive intra-peritoneal dissection. We assume that inadequate liberation of omental attachments around the defect enhances the prior reported failures of the product.

KEY WORDS: Composite mesh, Hernia, Ventralex patch

Introduction

Small ventral hernias have always been under estimated in any issue of the problems of hernia. We assume that a great majority of surgeons worldwide, do not use any prosthetic material for the repair of epigastric or umbilical hernias, which includes defects smaller than 3 cm. The primary suturing of the defect of midline ventral or incisional hernias have considerably high recurrence rates, even those with defect sizes less than 3 cm [1-4]. The laparoscopic approach to the defects greater than 3 cm seems to be the best choice; where as there are still debates about the technique with defects less than 3 cm in dimension⁵.

In our country, the majority of the patients with small umbilical hernias are obese, and the widely preferred repair technique is generally open, thus results with major infectious complications ranging from simple seroma formation to the mesh infection. Recurrence rates are also high in obese and especially female population. The Ventralex bi-layer memory-ringed hernia patch (Davol Inc., C.R.Bard, Inc., RI., USA) has been in the market for several years. This self-expanding mesh is placed intra-abdominally and fixed to the fascia by two polypropylene straps. The most important part of the

Pervenuto in Redazione Aprile 2019. Accettato per la pubblicazine Maggio 2019

Correspondence to: Orhan Agcaoglu, Davutpasa Cad 4, Topkapi 34010, Istanbul, Turkey (e-mail: oagcaoglu@gmail.com)

placement of mesh is the wide liberation of all the omental attachments circumferentially of the defect. The reported failures are confined to the inadequate dissection which intercorporates the true fixation of mesh to the abdominal wall ⁵.

Although there are several reports about the use of this patch, as far we know, there is not any study regarding the comparison of open in-lay repair with standard open on-lay mesh placement.

Materials and Methods

A total of 61 patients who were operated for small ventral/umbilical hernias with defects less than 3 cm between June 2008 and May 2010 were analyzed prospectively. The patients were divided into two groups consequently. Group 1 included 27 patients who underwent a repair with composite mesh, Ventralex Patch, which was fixed in-lay to the abdominal wall and group 2 included 34 patients with a repair with simple polypropylene mesh which was fixed on-lay to the abdominal wall.

Due to the limited dimensions of the Ventralex Patch, in order to match the defects in both groups, no randomization was done per-operatively after the defect has been reached via small skin incision and measured to be a diameter ≤ 3 cm. All the patients were given an informed consent and accepted the surgical technique prior to the surgery. Patient' demographics, operative data, body mass index, operative time, defect size, mesh diameter, duration of hospital stay, post-operative analgesic use, post-operative complications and recurrences were analyzed prospectively. All the patients were explored under general or spinal anesthesia. No further subcutaneous dissection was performed in order not to increase the seroma during on-lay mesh placement.

SURGICAL TECHNIQUE

All patients were given a single dose ampicillin-sulbactam 1 gram for prophylaxis at the induction of anesthesia. The operations were mainly performed under general anesthesia except one patient in group 1 and two patients in group 2 had operated under spinal anesthesia.

A transverse incision was made for umbilical hernias. The incisions for the epigastric hernias were horizontal on the hernia defect at the midline. All of the patients were minimally dissected just to reach the hernia defect. After thorough liberation of the defect edges, a sterile scale was used to measure the defect diameter.

PLACEMENT OF VENTRALEX MESH

The patients in this group (group 1) had no further subcutaneous dissection, however, all of the defects in this group was thoroughly liberated from the intra-peritoneal attachments. The surgeon used electro-cautery devices. None of the cases were controlled prior to the placement of mesh with a laparoscope or a choledocoscope introduced through the defect. The surgeon's examination was the only criteria for the liberation of defect. The patch was introduced to the abdomen by finger and lifted up from the straps in order to cover the defect intra-peritoneally. Then, both of the straps were fixed to the fascia to the left and right side of the defect respectively. Major attention was paid during the lifting of the mesh from the straps. No any further traction was done in order not to lead the "dome" formation of the mesh.

PLACEMENT OF STANDARD POLYPROPYLENE MESH

The patients in this group (group 2) had sufficient, but not extensive subcutaneous dissection in order to expose enough area of surrounding fascia to fix the mesh. The defects were not sutured, but left open prior to mesh fixation. The hernia sacs were dissected and if evident, the ruptures were sutured by 4/0 polyglycalic acid sutures. The hernia sac was used to form a barrier between mesh and viscera. The mesh dimensions were arranged according to the proper Ventralex mesh diamensions for each defect. The polypropylene mesh was secured with 3/0 polypropylene sutures separately.

Subcutaneous tissue was approximated in both groups with 4/0 polyglycaprone absorbable sutures and the skin incisions with 5/0 rapid polyglycolic acid sutures. After cleaning of operative field the wounds were closed by sterile wound dresses.

Results

The female/male ratio in group l was 14/13 and in group 2 17/17. There were no significant differences between two groups in mean age 48.3 (28-89) in group l and 50.6 (28-77) in group 2; mean BMI, 27 (21-36) in group l and 29.2 (22-40) in group 2; mean ASA Grades, for group l and 2 respectively, ASA l n:18 (65%) and n: 20 (%58.8); ASA 2 n:5 (19%) and n: 11 (%32.3); ASA 3 n:4 (15%) and n: 3 (%8.8). The mean operative time was significantly higher in group l with 61 (15-180) minutes versus 39 (22-62) minutes in group 2. The mean hospital stay was also significantly high in group l with 30 (10-120) hours compared to 9 (23-70) hours in group 2.

Among 27 patients in group l, 24 had umbilical, two of which were strangulated, 2 had incisional and 1 had epigastric hernias. 12 patients had concomitant operations. Four patients had abdominoplasty, 3 had laparoscopic cholecystectomy, 2 had inguinal hernia repair with mesh, 1 had a giant lipoma excision and 1 had bilateral inguinal hernia repair and cholecystectomy laparoscopically. Of the 34 patients in group 2, 27 had umbilical, 4 had incisional and 7 had epigastric hernias. Four cholecystectomies and 7 omentoplasties were performed concomitantly.

Two large and 25 medium sized Ventralex patches were used in group l; whereas 15 patients were repaired with larger meshes and in the remaining, 19 smaller meshes were used in group 2.

The complication rates were significantly different between two groups, with a 0 % in group 1 and 23.5 % in group 2. Three patients had post-operative seroma and all of them were aspirated percutaneously. There were 5 patients who had wound infections with hyperemia and draining of necrotic material. Skin stitches were removed and the necrotic fatty material were cleaned. All five of these patients were given oral antibiotics and followed at out-patient clinic. No recurrences occurred in either groups.

Discussion

The use of prosthetic materials in the repair of hernias is widely accepted. This is a consequence of the significantly lower recurrence rates after tension-free repairs using meshes. However, there is still a debate about the repair techniques in small ventral wall hernias. Although there are plenty of studies showing lower recurrence and complication rates in ventral hernias when repaired with mesh 6-8, many surgeons still prefer simple herniorrhaphy in small defects. This might be because of surgeons' tendency to avoid further subcutaneous dissection for mesh fixation which may lead infectious complications. When the issue is large hernias, the literature has a wide archieve on different techniques and materials. It can be briefly stated that, when large ventral wall hernias are in concern, laparoscopic approaches utilizing composite materials have significantly better results in post-operative morbidity, long term recurrences and cost-effectivity ^{9,10}.

Preference of laparoscopic repair in ventral hernias that are smaller than 3 cm is generally costs expensive with respect to the tiny diameters of the defects. Therefore, open repairs, either with or without meshes is the preferred choice of treatment based on major concensus, with highly elevated recurrence rates and wound problems. Ventralex is a new gate-way to this kind of hernias; less prefascial-subcutaneous dissection, in-lay application of mesh, lower wound and mesh associated infections. Recurrences of this material has pros ¹¹⁻¹⁵ and cons ⁵ in the literature. Hadi et al. reported on 51 patients and only in 1 case recurrence occurred, in whom prolene sutures were taken accidentally in outpatient clinic ¹¹. Pernaute et al. whom are running a bariatric institution used this material for 15 mm port site defects and reported successful results in especially preventing Reichter's hernias ¹². However, Berrevoet et al. from Belgium also

reported 14.8 % recurrence rate in 25 months follow up in 28 patients with defects smaller than 3 cm¹⁶. Berrevoet and friends operated 28 patients and applied the mesh as a routine in-lay to the abdominal wall after finger dissection. The major impact of this study was the control of positioned mesh laparoscopically via a port before fixation. They noted that although the surgeon was sure that the surrounding area of the defect was totally freed from omental adhesions; laparoscopic evaluations demonstrates small omental artifacts that resides and interferes between the mesh and abdominal wall hence preventing the through coverage of the defect. One patient had to have intestinal resection and mesh removal due to mesh migration in to the intestinal wall. A total of 4 out of 27 patients had recurrences due to shrinkage of polypropylene part. Increased number of repositioning peroperatively were needed up to 5 times in one patient. They extensively dissected the surrounding tissue, sometimes including the division of umbilical ligament. Moreover, in one patient four fixation sutures were placed and this patient had a recurrence after 8 months.

These discouraging results are also conflicting at first sight. Although, a very extensive dissection which is done under vision and multiple re-positioning as much as needed by the surgeon, suture fixation of the edges could not be sufficient enough to secure the mesh and prevent complications, and recurrence.

In this study we operated 27 patients with the mesh and compared the procedure with a controlled group of 34 patients who underwent on-lay mesh placement with respect to the same size defect and same size mesh principle. The patients were randomized to form the groups. We chose the same size defects in both groups and used the same size simple polypropelene meshes for each defect synonym to the Ventralex patch suitable for that defect. We aimed briefly the efficacy of on-lay polypropelene mesh and in-lay Ventralex hernia patch. We obtained similar results with Hadi and Pernaute. No recurrences occurred in neither groups. Wound associated complications were prominent in on-lay group, whereas none was seen in in-lay group. This result may be the only correlating part of our study when compared with the Belgium group. Instead we think that our technique is totally different than the Belgium group with minimal pre-fascial dissection and less extensive surrounding tissue liberation.

We respected the standart technical and applicable rules in our daily surgery and aimed to compare the efficacy with cheaper on-lay repair. Our study was designed to include the standart surgery's defects and to observe its short and mid-term results. We placed the mesh as a routine mesh placement. We did not aim to control its proper positioning and we did not aim to correct it peroperatively. This would give us the true surgeon related factors that interfere with the complication and recurrence rates. We think that further attempts to reduce the interfering tissue presence between mesh and abdominal wall provokes exaggerated fibrosis which leads to deformation of the mesh itself. Moreover, finger palpation was enough to place the mesh in our cases. If there were a resident existed tissue after finger dissection, it did not increase our recurrence rates. We also tried not to hang the mesh with increased tension during fixation. In conclusion, we believe that this device is feasible and cost-effective when compared to the on-lay placement of simple, "cheap" polypropylene mesh with respect to our social security program and patient portfolio.

Riassunto

OBIETTIVO DELLO STUDIO: riferire sui risultati dell'inserimento di una rete composita per la riparazione di piccole ernie della parete addominale rispetto a un gruppo di controllo trattato con l'apposizione di una rete di polipropilene.

I pazienti su cui abbiamo eseguito il confronto sono stati divisi in due gruppi, di cui il 1° gruppo comprendeva 27 pazienti sottoposti a riparazione con mesh composita, Ventralex Patch, che era fissata alla parete addominale, e un 2° gruppo di 34 pazienti con riparazione mediante rete di polipropilene semplice fissata sulla parete addominale.

A causa delle dimensioni limitate del patch di Ventralex, al fine di poter confrontare il difetto parietale dei due gruppi non è stata effettuata alcuna randomizzazione, e i pazienti sono stati assegnati di conseguenza ad un gruppo. Tutti i pazienti sono stati trattati in anestesia generale o spinale. Non è stata eseguita alcuna ulteriore dissezione sottocutanea per non aumentare la formazione del sieroma nella sovrapposizione in sede della rete. RISULTATI: i dati demografici tra i gruppi di studio erano simili. La percentuale di complicanze postoperatorie era significativamente bassa nel gruppo 1 (0%), rispetto al gruppo 2 (23,5%) che comprendeva il sieroma (3 casi) e l'infezione della ferita in 5 casi, tuttavia, il tempo operatorio medio era significativamente maggiore nel 1° gruppo (61 minuti) rispetto al 2° gruppo (39 minuti). Non si sono verificate recidive in entrambi i gruppi.

CONCLUSIONE: Sebbene il patch in se stesso abbia la tendenza a formare una cupola quando posizionato intraaddominalmente, quello di polipropilene composito e quello di PTFE per riparazione erniaria hanno risultati migliori se posizionati con precisione con minima dissezione extraperitoneale ed estesa dissezione. Riteniamo che l'inadeguata liberazione delle aderenza omentali attorno al difetto aumenti l'incidenza dei riferiti difetti del prodotto.

References

1. Eryilmaz R, Sahin M, Tekelioglu MH: Which repair in umbilical hernia of adults: primary or mesh? Int Surg, 2006, 91:258-61.

2. Luijendijk RW, Hop WC, Van del Tol MP, et al.: *A comparison of suture repair with mesh repair for incisional hernia*. N Engl J Med, 2000, 343:392-98.

3. Sanjay P, Reid TD, Davies EL, et al.: A retrospective comparison of mesh and sutured repair for adult umbilical hernias. Hernia, 2005; 9:248-51.

4. Arroyo A, Garcia P, Perez F, et al.: *Randomized clinical trial comparing suture and mesh repair of umbilical hernia of adults.* Br J Surg, 2001; 88:1321-323.

5. Berrevoet F, Van den Bossche B, de Baerdemaeker L, et al.: *Laparoscopic evaluation shows defficiencies in memory ring deployment during small ventral hernia repair.* Worl J Surg, 2010; 34:1710-715.

6. Scott N, Go PMNYH, Graham P, et al.: *Open mesh versus nonmesh for groin hernia repair.* Cochrane Database Syst Rev 2001 (3):CD002197.

7. den Hatrog D, Dur AHM, Tuinebreijer WE, et al.: *Open surgical procedures for incisional hernias.* Cochrane Database Syst Rev, 2001; (3):CD006438.

8. Burger JW, Roland, Luijendijk RW, et al.: Long-term follow-up of a randomized controlled trial of suture versus mesh repair of incisional hernia. Ann Surg, 2004; 240:578-85.

9. Sajid MS, Bokhari SA, Mallick AS, et al.: *Laparoscopic versus open repair of incisional/ventral hernia: A meta-analysis.* Am J Surg, 2009; 197(1):64-72. Epub 2008 Jul 9.

10. Barbaros U, Asoglu O, Seven R, et al.: *The comparison of laparoscopic and open ventral hernia repairs: A prospective randomized study.* Hernia, 2007; 11(1):51-6. Epub 2006 Nov 28.

11. Hadi HIA, Maw A, Sarmah S, et al.: *Intraperitoneal tension-free repair of small midline ventral abdominal wall hernias with a ventralex hernia patch: Initial experience in 51 patients.* Hernia, 2006 10:409-13.

12. Pernaute AS, Aguirre EP, Botella AG, et al.: *Prophylactic closure of trocar orifices with an intraperitoneal mesh (Ventralex®) in laparoscopic bariatric surgery.* Obes Surg, 2008; 18:1489-491.

13. Stylopoulos N, Gazelle GS, Rattner DW: A cost-utility analysis of treatment options for inguinal hernia in 1,513,008 adult patients. Surg Endosc, 2003; 17:180-89.

14. Israelsson LA, Jönsson L, Wimo A: Cost analysis of incisional hernia repair by suture or mesh. Hernia, 2003; 7:114-17.

15. Salani N, Brown CJ: Does mesh offer an advantage over tissue the open repair of umbilical hernias? A systematic review and metaanalysis. Hernia, 2010; 14(5):455-62. Epub 2010 Jul 16.