

Mesh versus direct suture for the repair of umbilical and epigastric hernias.

Ten-year experience



Ann. Ital. Chir., 2009; 80: 183-187

Cesare Stabilini, Mattis Stella, Marco Frascio, Luigi De Salvo, Rosario Fornaro, Giancarlo Larghero, Francesca Mandolino, Fabrizio Lazzara, Ezio Gianetta

Department of Surgery, School of Medicine, University of Genoa, Italy

Mesh versus direct suture for the repair of umbilical and epigastric hernia. Ten-years experience.

BACKGROUND: *The objective of this study was to evaluate outcomes of mesh versus primary suture procedures for repair of anterior abdominal wall midline hernias.*

RESULTS: *Between 1995 and 2005, 98 patients (46 males) underwent repair of umbilical (69 cases) or epigastric (29 cases) hernias. Primary suture of the defect was performed in 34 cases (group 1). A polypropylene mesh was positioned in 64 cases (group 2). Overall, mean aponeurotic defect diameter was 2.5 cm (range 0.5 – 10 cm). Procedures were carried out under local anesthesia in 76 instances (71% group 1 vs. 81% group 2). Complications occurring in group 2 comprised three seromas, one hematoma and one prosthetic infection. Follow up was scheduled yearly up to the fifth postoperative year. Recurrence rate in group 1 was 14.7% compared to 3.1% in group 2 (logrank test $p = 0.0475$).*

CONCLUSIONS: *Anterior preperitoneal mesh repair of abdominal wall midline hernias under local anesthesia seems to be a safe and effective technique that can be performed as a day surgery procedure. A slightly increased risk of postoperative local complications following mesh repair is offset by a reduced rate of recurrence in comparison to suture repair.*

KEY WORDS: Hernia.

Introduction

Epigastric and umbilical hernias are quite common, occurring in 10% of patients presenting with primary hernias¹. Obesity, multiple pregnancies and ascites are the main predisposing factors^{1,2}. The content of epigastric hernia is usually represented by preperitoneal fat, while omental fat and/or intestinal loops are usually present in umbilical hernias. Even if these hernias may increase in volume, the abdominal wall defect usually remains narrow, a condition which entails the risk of incarceration and strangulation^{1,3}. For these reasons surgical repair should be performed once diagnosis is made¹.

Despite the relatively high incidence of epigastric and umbilical hernias, there is still no consensus on the best surgical approach for their repair^{1,4}. This report describes

a series of consecutive repairs performed at the Department of Surgery of the University of Genoa between 1995 and 2005. The aim of the work was to evaluate which surgical procedure achieves the best results in terms of patient outcome, complications and recurrence rate.

Methods

Data on surgical repairs of primary umbilical and epigastric hernias performed consecutively between March 1995 and December 2005 were collected prospectively and evaluated. There were 98 patients (46 males and 52 females) with a mean age of 55 years (25-89 yrs.); ten patients were over 70 years old and three over 80. Thirty-six patients (36.7%) presented one or more significant concomitant diseases, the most frequent being cardiovascular disease, followed by diabetes, gastrointestinal and pulmonary diseases. Two patients with chronic renal failure were on continuous ambulatory peritoneal dialysis (CAPD) treatment and one was on hemodialysis. Mean duration of hernia was 6.2 years, ranging from 2 months

Pervenuto in Redazione Febbraio 2009. Accettato per la pubblicazione Aprile 2009

For correspondence: Ezio Gianetta, MD, DICMI, Largo Rosanna Benzi 8, 16132 Genova, Italy (e-mail: gianetta@unige.it)

TABLE I – Primary umbilical and epigastric hernias reported in the present series.

Hernia	Umbilical	Epigastric
Reducible	59	26
Incarcerated	9	3
Strangulated	1	0

to 45 years. A palpable abdominal mass was the main sign, accompanied by pain in complicated hernias. There were 69 umbilical and 29 epigastric hernias (Table I). Incarceration of the sac content was present in 12 patients (12.2%) and strangulation in one.

Primary suture repair (Mayo technique) by unabsorbable (USP 0 or 2/0) separate stitches was routinely performed in the first cases of this series. It was thereafter episodically used in cases of very small (less than 1 cm) wall defects. Then a tension-free mesh repair was adopted. There were 12 cases in which a tridimensional plug fixed by unabsorbable stitches to the fascial defect was utilized⁵. In the remaining cases a preperitoneal polypropylene patch repair was adopted as the technique of choice for both epigastric and umbilical hernia repair. The edge of the wall defect and the posterior surface of the fascia were separated from the hernia and the peritoneum in order to create a suitable preperitoneal space for mesh placement. A flat polypropylene mesh, exceeding the edges of the defect in size (2 to 4cm depending on the diameter of the defect), was placed and fixed to the fascia by orthogonal absorbable stitches. The aponeurotic defect was closed over the mesh with a 0 absorbable interrupted suture when possible.

Repairs were performed under local anesthesia (mepivacaine Cl 2%, sodium bicarbonate 8.4% and saline) in 76 instances (77.6%). In cases of incarcerated or strangulated hernias or hernias requiring a large dissection (three cases) and of other associated surgical procedures, general anesthesia was utilized. Unplanned conversion from local to general anesthesia never occurred in the present series.

Prophylactic antibiotic administration (ampicillin sodium/sulbactam sodium i.v. 30 minutes before skin incision) was reserved only for patients with hernias requiring extensive dissection (three cases), for the sole emergency operation in the series, and for concomitant diseases that raised the risk of infection (five cases of diabetes and two cases of chronic renal failure).

Postoperative pain control in day cases was achieved with Ketorolac 60 mg i.v. for the first 12 hours after intervention and then on patient demand for the next 24 hours. Parenteral Ketorolac and/or morphine was administered in other instances.

Patient discharge after elective hernia repair under local anesthesia was scheduled for the same day or the day after the operation. In cases of procedures performed

under general anesthesia, discharge was decided on the basis of general and local conditions.

Follow-up visits were scheduled after one month and yearly thereafter up until the fifth postoperative year.

Results

Mean diameter of the abdominal wall defect, measured intraoperatively on its larger diameter with a sterile ruler, was 2.5 centimeters (SD 1.8, range 0.5 – 10 cm), being 2.3 cm in group 1 vs 2.6 in group 2 (p NS). The hernia content was represented by preperitoneal fat in 21 epigastric hernias, while a true sac, containing omental fat and/or intestinal loop was present in the umbilical hernias and in eight of the epigastric hernias. Preperitoneal fat was generally resected. On the contrary, the sac was simply dissected and inverted without opening it in most cases (68); in nine instances it was resected. Resection of omental fat (one case) and small bowel (one case) was required in two patients with incarcerated or strangulated umbilical hernia.

Three laparoscopic cholecystectomies, three anterior inguinal hernia repairs and one abdominal panniculectomy were performed as associated procedures to hernia repair.

The present series was divided into two groups: the first was submitted to primary closure of the defect with separated stitches (group 1, 34 cases), while the second (group 2, 64 cases) was treated with implantation of prosthetic material (12 three-dimensional polypropylene plugs and 52 preperitoneal polypropylene patches). Mean age, overweight status and wall defect size were similar in both groups (Table II). All comorbidities were equally distributed in the two groups, except for gastrointestinal disease (symptomatic diverticulosis and GERD), which was more frequent in the mesh repair group (χ^2 p 0.01) (Table III).

There were no postoperative deaths. One patient from each group required major analgesic therapy with morphine because of failure of first line analgesia.

Mean postoperative hospital stay was 1.8 days (range: three hours - 15 days) and was similar in the two groups (Student's *t*-test p not significant). A prolonged hospital stay (more than two days) was required for patients with severe associated diseases (seven cases), in one patient who developed a wound hematoma, in the one case of

TABLE II – Preoperative patient data of suture (group 1) and mesh (group 2) repairs

	Group 1	Group 2	P
Age - yrs	56	54	NS
BMI - Kg/m ²	25.0 ($\pm$ 2.2)	24.8 ($\pm$ 3.1)	NS
Wall defect - cm	2.9 ($\pm$ 2.2)	2.8 ($\pm$ 1.6)	NS

TABLE III – Concomitant diseases observed in patients undergoing suture (group 1) or mesh (group 2) repair of epigastric and umbilical hernia (36 cases; 36.7%).

Disease	Total	Patients		P
		Group 1	Group 2	
Cardiovascular (hypertension – myocardial ischemia)	15	3	12	0.17
Endocrine (diabetes)	6	0	6	0.07
Gastrointestinal (colon diverticulosis – gastroesophageal reflux)	11	0	11	0.01
Urological (benign prostate enlargement)	5	2	3	0.83
Pulmonary (chronic obstructive pulmonary disease)	3	2	1	0.25
Renal (chronic renal failure)	2	0	2	0.29

emergency surgery for hernia strangulation, in three patients with huge hernias, and in patients undergoing other associated surgical procedures. Most of the patients with uncomplicated hernias were admitted in the early morning of the operation and were discharged the same day of or the day after surgery.

Early local complications, namely one subcutaneous wound hematoma, three seromas and one infection of the mesh, occurred in five patients (overall 5.1%, split for type of repair 7.8%) in group 2 (χ^2 test $p = 0.09$). Complications resolved spontaneously, with the exception of the mesh infection in an elderly diabetic patient with chronic renal failure for whom hospital readmission and mesh removal with primary closure of the defect were required.

Three patients died in the postoperative period from unrelated causes in the mesh group. Two subjects died from liver cirrhosis and cerebral infarction within the first postoperative year, and one, on CAPD treatment for chronic renal failure, died during third postoperative year. Five patients, one in the suture group and four in the mesh group respectively, were lost at follow-up (8, 18, 20, 22, 38 months postoperatively). Mean postoperative followup was 52.9 months (range 8-60). Two-year rate of follow-up is 94.9%. Seven recurrences (7.5%) were observed, the pattern and the rate being lower in the mesh repair group (3.1% vs. 14.7%; mean estimated survival 46.4m vs 35.8m; log-rank test $p = 0.0475$) (Fig. 1). One patient refused surgery for the recurrent hernia, another was operated on elsewhere, while the other five were treated in our center.

Discussion

Out of 1675 primary anterior abdominal wall hernia repairs performed between March 1995 and December 2005 in our Department, 98 were for epigastric or umbilical hernias, corresponding to a 5.8% incidence of midline hernias. This percentage corresponds to nearly one-half the incidence rate reported by other authors ¹. Although preoperative workup including ultrasound and/or CT scan has been recommended to rule out oth-

er diseases, such as subcutaneous lipoma, fibroma or neurofibroma ¹, in this series physical examination alone sufficed for the correct diagnosis in all cases. The mean diameter of wall defects was 2.9 cm: thus, due to the narrow aponeurotic defect and the inherent risk of strangulation, repair in the vast majority of cases was performed, as in other series ^{1,3,4,6,7}, soon after diagnosis. Hernia content, in keeping with literature findings ¹, was preperitoneal fat in most epigastric hernias, while a peritoneal sac was prevalent in the umbilical hernias series. Since the introduction of the primary overlapped closure of the fascia defect (direct suture repair), numerous techniques for the surgical repair of midline hernias have been developed, such that today no single approach enjoys absolute consensus ^{1,2}. Open primary repair still remains the operation of choice for some surgeons faced with defects of less than 2 cm in diameter ⁸, while others advocate the use of a three-dimensional plug for defects of up to 3 cm in diameter, and of a mesh sheet for larger lesions ².

In the present series primary closure of the aponeurotic defect was routinely performed in the early years of the experience, given the limited diffusion of prosthetic materials; thereafter, it was performed episodically in the presence of very small defects (< 1 cm) and in one case where, due to local infection, use of a mesh was contraindicated. A three-dimensional plug was used in the earliest mesh repairs in the present series; subsequently, following the lead of the original advocate of the plug ⁵, it was abandoned in favor of placement of a flat mesh in the preperitoneal space, with closure, when possible, of the aponeurotic defect. This technical alternative was chosen for either of two reasons: to avoid complications of three-dimensional plug repairs, such as intraperitoneal migration with possible bowel lesions ^{9,10} or seroma and infection due to contact between the mesh and subcutaneous fat, or to implement the concept that hernia repair should entail, if possible, the reconstitution of musculo-aponeurotic layer integrity. Great care was also taken to dissect without opening the hernia sac, unless required or necessary, in order to prevent mesh/intraperitoneal organ contact and possible bowel lesions ¹¹. Thanks to this precaution, intraperitoneal complications

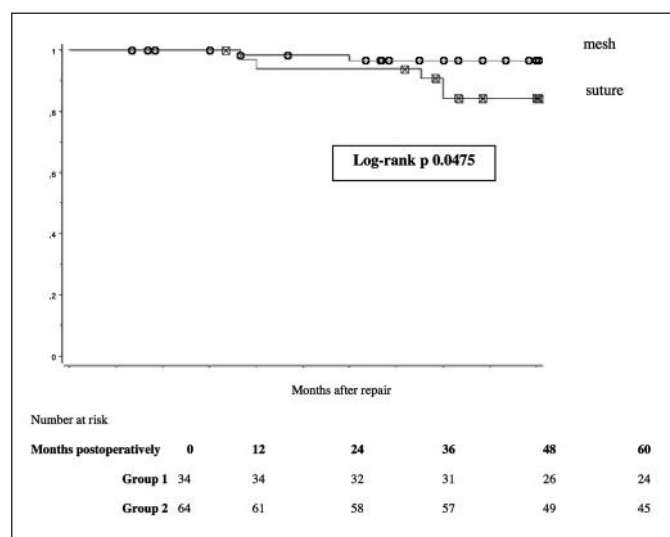


Fig. 1: Kaplan-Meier cumulative survival plot: Hernia recurrence.

never occurred in this series. Furthermore, the preservation of peritoneal integrity, together with the reconstitution of abdominal wall layers, allowed the immediate resumption of treatment in the patients with chronic renal failure undergoing CAPD¹².

As mentioned above, more than one-third of the operated patients had one or more concomitant medical problems that raised operative risk. The anterior repair utilized in this series was carried out in the majority of cases under local anesthesia. The absence of general complications in this at-risk population can likely be attributed to this anesthetic approach, which, compared to other techniques, entails fewer risks and allows a quicker mobilization and earlier discharge of operated patients^{2,3,13}. In fact, the majority of operations were performed as day case procedures, while longer postoperative stays were necessary for huge hernias requiring a large dissection, for recurrent hernias, for the emergency operation and for patients undergoing dialysis treatment or concomitant surgical procedures.

Antibiotics were not routinely given, their use being reserved only for patients at risk of infectious complications due to related diseases, for cases of complicated hernia, or if required by concomitant surgical procedure. However, in compliance with national ministerial guidelines¹⁴, over the last two years routine prophylaxis with lactonic antibiotics β -lactamide was administered unless otherwise contraindicated. Nonetheless, postoperative local infection occurred only in one instance in this series (1.1%); this is an acceptable rate, and one that is lower than that reported by others^{2,3}. In this case, the removal of the mesh with simple suture of the defect was performed, and no further complications or recurrence occurred. The four other complications observed in this series, three seromas and one wound hematoma, were managed conservatively. The aforementioned complications arose when a mesh repair was adopted, and

even if not statistically significant, this finding could signify that this type of intervention, which requires a larger dissection, entails a higher risk of local complications. There were six recurrences in this series. The recurrence rate after mesh repair was 3.3 %, a higher incidence than the 0.95 to 1% reported in other series¹⁵. Nonetheless, this rate is consistently lower than that of direct suture repair, showing that, even in cases of epigastric and umbilical hernia, mesh repair is more effective than direct suture procedures. Recurrences occurred within the first two postoperative years in the mesh repair group, while recurrences in the direct suture group were observed up until the fourth postoperative year. This observation suggests that recurrence after mesh repair is likely attributable to a technical defect, while relapses after direct suture can be also considered to be due to a lack of effectiveness of the herniorrhaphy.

In conclusion, although reported data were not obtained in a randomized setting, the outcomes, the low recurrence rate, and the absence of major surgical and general complications of this series strongly support the safety and effectiveness of anterior open preperitoneal mesh repair with reconstruction of musculo-aponeurotic layer integrity under local anesthesia for umbilical and epigastric hernias. This suggests that primary suture should be reserved for cases of very small defects and in cases presenting local contraindications to mesh placement. The slight trend towards an increased risk of postoperative local complications following mesh repair is offset, in terms of long-term results, by a reduced rate of recurrence. The procedure is especially indicated in subjects with increased operative risk, and can easily be performed in a day surgery setting.

Riassunto

Le ernie della linea alba (epigastrica e ombelicale) costituiscono da sole il 10% dei casi di ernia primitiva dell'adulto. Il rischio di complicazioni acute indica la tempestiva riparazione di queste ernie quando esse vengano diagnosticate. Tuttavia le loro frequenti piccole dimensioni possono creare spesso il dubbio al chirurgo sul tipo di tecnica da adottare ponendo in alternativa la rafia semplice e la plastica protesica.

Il presente studio presenta i risultati di una coorte di 98 pazienti consecutivi affetti da ernia della linea alba e sottoposti a riparazione tramite rafia o plastica protesica presso il Dipartimento di Chirurgia dell'Università di Genova nel periodo compreso tra il 1995 e il 2005. Nella coorte 46 pazienti erano maschi, 29 portatori di ernia epigastrica e 69 di ernia ombelicale. Mediamente le dimensioni del difetto erniario dell'intera serie erano 2.5 cm (range 0.5 ± 10 cm) e normalmente distribuiti. Trentaquattro pazienti sono stati sottoposti a sutura diretta con tecnica di Mayo (gruppo 1), 64 a una ripara-

zione protesica preperitoneale mediante accesso anteriore (gruppo 2). La procedura è stata condotta in anestesia locale in 76 casi (71% gruppo 1 vs 81% gruppo 2). Postoperatoriamente si sono registrate complicazioni locali solo nel gruppo di pazienti sottoposti a plastica protesica (tre sieromi, un ematoma e una infezione di protesi). I pazienti sono stati seguiti ambulatorialmente dopo la dimissione fino a 5 anni dall'intervento e tutti i pazienti hanno completato i due anni di follow-up postoperatorio. Il tasso di recidiva osservato nel gruppo 1 è stato 14.7% rispetto al 3.1% del gruppo 2 (logrank test $p = 0.0475$). La riparazione protesica per via anteriore in anestesia locale per ernie della linea mediana di piccole dimensioni appare una tecnica affidabile ed efficace, eseguibile quindi in un ambito di day-surgery. Il maggiore rischio di complicazioni locali a cui si va incontro con questa tecnica appare controbilanciato da una garanzia di migliori risultati a lungo termine rispetto alle tecniche di sutura diretta dell'ernia.

References

- 1) Muschaweck U: *Umbilical and epigastric hernia repair*. Surg Clin N Am, 2003; 83:1207-221.
- 2) 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; 88:1321-323.
- 3) Menon VS, Brown TH: *Umbilical hernia in adults: Day case local anaesthetic repair*. J Postgrad Med, 2003; 49:132-33.
- 4) Courtney CA, Lee AC, Wilson C, O'Dwyer PJ: *Ventral hernia repair: A study of current practice*. Hernia, 2003; 7:44-46.
- 5) Amid PK, Schulman AG, Lichtenstein IL: *Tension-free repair of umbilical, epigastric and incisional hernias*. Contemp Surg, 1994; 44(3):177-80.
- 6) Velasco M, Garcia Urena MA, Hidalgo M, Vega V, Carnero FJ: *Current concepts on adult umbilical hernia*. Hernia, 1999; 3:233-39.
- 7) Golub R, Cantu R: *Incarcerated anterior abdominal wall hernias in a community hospital*. Hernia, 1998; 2:157-61.
- 8) Wright BE, Beckerman J, Cohen M, Cumming JK, Rodriguez JL: *Is laparoscopic umbilical hernia repair with mesh a reasonable alternative to conventional repair?* Am J Surg, 2002; 184:505-09.
- 9) Moorman ML, Price PD: *Migrating mesh plug: Complication of a well-established hernia repair technique*. Am Surg, 2004; 70:298-99.
- 10) Chuback JA, Singh SR, Sills C: *Small bowel obstruction resulting from mesh plug migration after open inguinal hernia repair*. Surgery, 2007; 127:475-76.
- 11) Baptista ML, Bonsack ME, Delaney JP: *Seprafilm reduces adhesions to polypropylene mesh*. Surgery, 2000; 128:86-92.
- 12) Gianetta E, Civalleri D, Serventi A, Floris F, Mariani F, Aloisi F, Saffioti S: *Anterior tension-free repair under local anaesthesia of abdominal wall hernias in continuous ambulatory peritoneal dialysis patients*. Hernia, 2004; 8:353-57.
- 13) Gianetta E, De Cian F, Cuneo S, Friedman D, Vitale B, Marinari G, Baschieri G, Camerini G: *Hernia repair in elderly patients*. Br J Surg, 1997; 84:983-85.
- 14) Istituto Superiore di Sanità – Piano Nazionale delle Linee Guida (PNLG5): *Antibiotico profilassi perioperatoria nell'adulto*, Tabella 6 pag. 33 <<http://www.pnlg.it/LG/009/>>
- 15) Arroyo SA, Perez F, Serrano P: *Is prosthetic umbilical hernia repair bound to replace primary herniorrhaphy in the adult patient?* Hernia, 2002; 6:175-77.

