LE DEVENIR DES PROTHÈSES INTRA-PÉRITONÉALES: UNE NOUVELLE PATHOLOGIE ?

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“L’amicizia è ritorvarsi anche dopo molto tempo e riprendere il discorso interrotto”

“Friendship is to meet after a long time and start again the interrupted talk”

Francesco Alberoni - “L’amicizia”, Garzanti 1984

GREPA

Groupe de Recherche Européen
Sur la Paroi Abdominale

XIX^me CONGRÈS INTERNATIONAL
19th INTERNATIONAL CONGRESS

Naples, 16 Mai 1997 • Naples, May 16th 1997

Organizing Secretariat

ITALYMEETING s.r.l. Corso Italia, 261 • Sorrento (Napoli) 081/8073525
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At the Continental Hotel the world meeting of most qualified abdominal wall surgeons

A Surgery G7 in Naples

Yesterday a live telecast from the University allowed interactive sessions on hernia procedures

The introductive session of the Congress at the Court Theatre of Royal Palace in Naples

The international Congress of GREPA (Groupe de Recherche Européen sur la Paroi Abdominale) is taking place here in Naples at the Continental Hotel. This four-day conference, which is attended by the world most reputable abdominal wall surgeons, can be considered in its field as a kind of little G7 summit (we remind that the real one was held in Naples in 1994).

As a matter of fact, GREPA was founded in 1979 by a small group of French surgeons, experts in the pathology of the abdominal wall and soon attracted the interest and the participation of many surgeons from different countries. And, besides europeans, today many well-known hernia surgeons from overseas are partecipating to the Congress in Naples.

After the opening cerimony, that has taken place last Wednesday at the Court Theatre of the Royal

to be continued in page 4

Califano: We are working for surgery advance

During the opening cerimony, the President of Honour of the Congress, prof. **Giuseppe Califano**, remarked the "role of Naples as a real benchmark in the abdominal wall surgery, under the prestigious auspices of GREPA". "We are working all together for surgery advance - he said -. Being in touch with the most known european and north-american schools, as we have been doing in Naples for many years, is a key factor for high standard results".

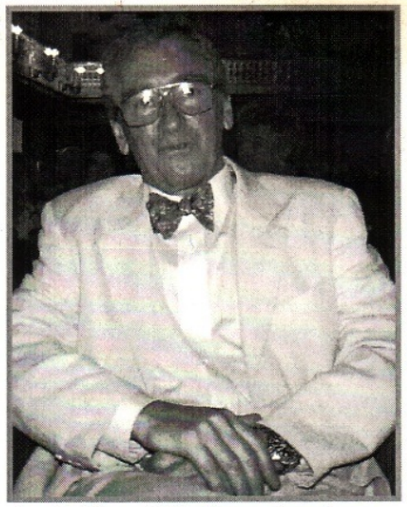
Corcione: We have to believe in cooperation

The Congress President **Francesco Corcione** appeared deeply moved by his role in opening such a significant event like GREPA is.

"This Congress focuses its attention on particular items and emerging pathologies which are not the usual issues of other conferences - he said -. As surgeons, we have to believe in the cooperation among different schools in order to achieve the results that people are waiting for".

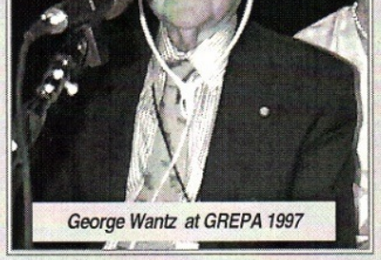
Chevrel: "GREPA will spread its activity all over the world"

"In the next years GREPA will extend its sphere of action. Our future is in spreading our activity throughout the world". **Jean Paul Chevrel** is the General Secretary of GREPA. He is one of the leading surgeons in the field who can more appropriately describe the scenary of modern adbominal wall surgery and focuse the Group goals.
"GREPA was born in 1979 as a small association founded by a group of French surgeons, experts in the pathology of the abdominal wall - he points out while restoring the history of the Group de Recherche et d'Etude de la Paroi Abdominale -. Our first goal was to reach an european dimension. Now we can say we have got it. And, for consequence, our next goal is to spread our activity throughout the world".
As a matter of fact, many overseas well-known surgeons are attending the 19th GREPA Congress here in Naples. "We are satisfied with our results. Next steps are the meeting in Koln in 1998 organized by H. Troidl and a conference in Madrid, where a similar associations to GREPA is going to be founded". Another one, the American Hernia Society, already exists in the United States. "We do believe in the information and divulgation project we are carrying out. Our member prof. Flament is constantly in touch with prof. Fitzgibbons of AHS. We share with AHS the same official organ, 'Hernia', the journal of hernias and abdominal wall surgery. And, we are planning a joint GREPA-AHS meeting which will take place in the year 2000".


Jean Paul Chevrel during the opening cerimony

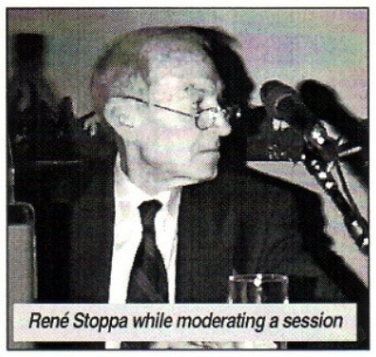
Wantz: "Hernia treatment will still be the surgical one"

George Wantz is one of the most qualified abdominal wall surgeons of the United States. In the past, he has been the personal surgeon of the U.S. President Richard Nixon. His attendance at the GREPA Congress here in Naples is definitely a recognition for the importance and the cruciality that GREPA activity has reached. "In future, hernia treatment will still be a surgical one - he has affirmed - this is a mechanic pathology and there is no medical remedy to it".
About the issue of laparoscopic procedures in hernia surgery, Wantz's opinion is that "in most cases it is not worth using it". "Laparoscopic procedure is still difficult and too expensive. Definitely, I think its results are not satisfying if compared with all the troubles it carries out. Furthermore, it is not less painful in all cases".
On the item of inguinal hernia, Wantz reveals that he generally prefers the anterior approach, keeping his own technique only for few selected cases.


George Wantz at GREPA 1997

René Stoppa: "The computers? Noboby would undergo an operation performed by a machine"

In the introductive session to the Congress, last Wednesday, René Stoppa, from Amiens (France), explained in a very appreciated lecture why hernia surgey must be loved. As a matter of fact, he is the man who can restore all the steps made in the last years by hernias surgery and describe the present state of the art. "In this moment - he says - I think that the present of hernias surgery is represented by the use of prosthesis, which is the most common technique all over the world. As far as hernia laparoscopic hernia surgery is concerned, I think it is a difficult technique. The point is that the tools are still to be perfected". Stoppa also appears sceptical about the role computers are going to play in the hernia surgery. "It is definitely true that computers can help a surgeon - he affirms - but nobody would like to undergo an operation performed by a computer".


René Stoppa while moderating a session

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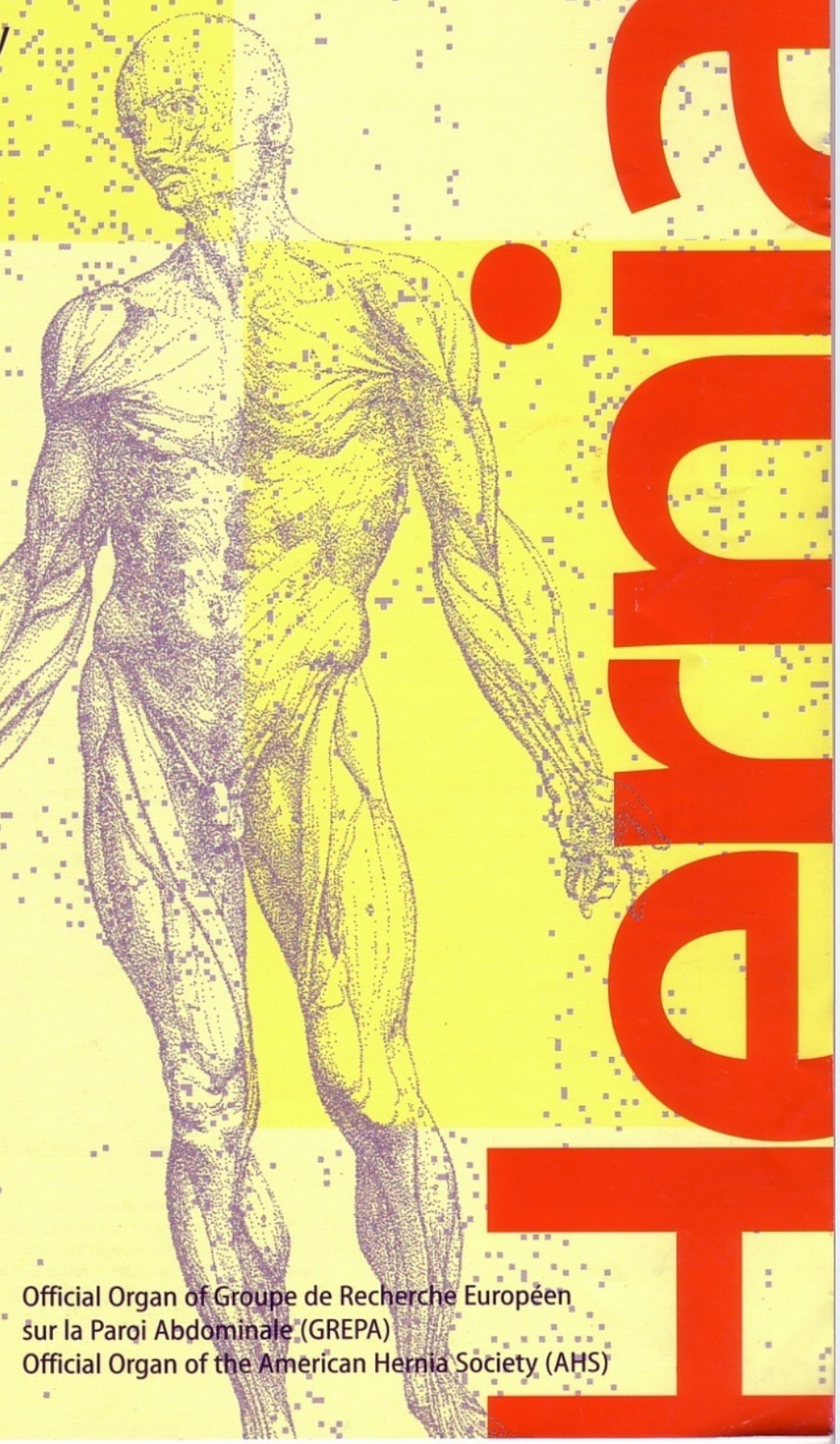
Hernia

The Journal of Hernias and Abdominal Wall Surgery



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Abstract Book

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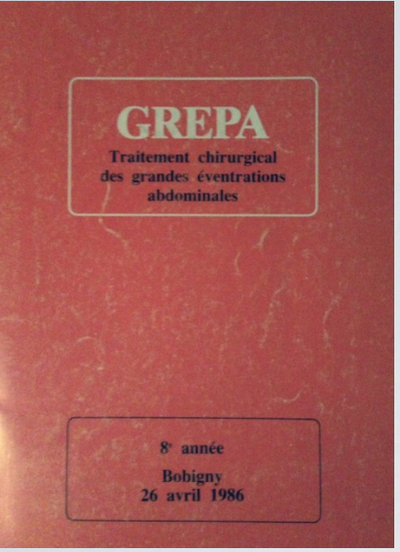
Official Organ of the American Hernia Society (AHS)

GREPA

Traitement chirurgical des grandes éventrations abdominales

8e année

Bobigny
26 avril 1986



Parois de l'Abdomen, « les éventrations... pourraient paraître bénignes, si nous ne savions pas qu'elles ont une redoutable tendance à l'aggravation ou à la récidive... la fermeture d'une éventration n'a rien à voir avec la fermeture d'une laparotomie... Cette chirurgie doit être considérée comme difficile, et les résultats ne peuvent être évalués qu'en fonction des lésions très différentes que nous pouvons avoir à traiter ».

J.
Rives

GREPA
Traitement chirurgical des grandes éventrations abdominales

8e année
Bobigny
26 avril 1986

GREPA (1986) 8 : 59-61

GREPA
1986

Expérience sur les prothèses intra-péritonéales portant sur 130 cas

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Résumé. A la suite des travaux de Bourgeon et après une étude expérimentale personnelle, les auteurs ont choisi de traiter les grandes éventrations abdominales par une prothèse en tulle de dacron, mise en situation intra-péritonéale et recouverte par une plastie musculo-aponévrotique type Welti-Eudel ou Chevrel. 130 malades ont été opérés selon ce protocole de 1973 à 1986. Il y a eu à déplorer 6 récidives survenues au début de cette expérience et liées à la trop petite taille des tulles de dacron. Actuellement la suture de la prothèse à distance des berges de l'éventration permet d'éviter ces récidives. Les auteurs n'ont observé ni fistules digestives ni complications occlusives.

Mots-clés : Eventration abdominale – Prothèses pariétales – Tulle de dacron

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Les problèmes thérapeutiques posés par les grandes déhiscences de la paroi abdominale sont parfois difficiles à résoudre. On se trouve, en effet, en présence de malades souvent obèses, polyopérés, présentant des tares multiples (en particulier cardio-respiratoires) et chez qui les muscles pariétaux sont de mauvaise qualité avec en plus, dans certains cas, herniation d'une importante masse viscérale qui a perdu droit de domicile. L'ancienneté de certaines de ces éventrations permet, par ailleurs, aux organes éviscérés de s'adapter à leur situation extra-abdominale pendant que l'abdomen se rétracte autour d'eux et élargit progressivement le

de la réintégration en force des viscères dans une cavité abdominale dont la capacité d'accueil a diminué [8, 9]. Trois grands principes devront dominer le traitement des éventrations : restauration d'une pression abdominale normale, réalisation d'une paroi abdominale solide, réinsertion des muscles abdominaux sous une tension moyenne.

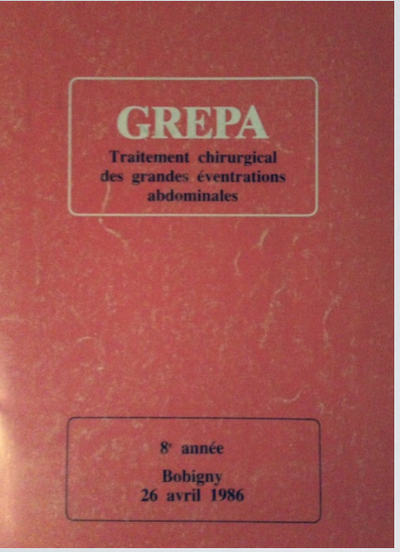
L'utilisation de matériaux prothétiques répond à ces trois impératifs et permet de traiter certaines lésions monstrueuses qui auraient pu être considérées comme au-dessus de toute ressource.

Patients et méthodes

Protocole opératoire

Choix et site d'implantation du matériel prothétique. L'expérience des vingt dernières années montre que les matériaux prothétiques que l'organisme tolère le plus facilement sont ceux dont les mailles sont assez larges pour autoriser une réhabitation rapide par le tissu de granulation. Le tulle de dacron (Mersuture ex-Mersilène) nous paraît être la prothèse qui, actuellement, représente les avantages les plus grands. La réaction inflammatoire qu'il provoque est modérée et la réaction conjonctive importante. Sa tolérance à l'infection n'est certes pas totale mais elle est l'une des meilleures qui soit parmi les matériaux synthétiques comparables [1-4, 7, 10].

Le deuxième problème posé par ces prothèses est celui de leur site d'implantation. A la suite des travaux de Bourgeon et après une étude expérimentale person-



Les patients

De novembre 1973 au 1er janvier 1986, nous avons utilisé ce protocole chez 130 malades porteurs d'une volumineuse éventration post-opératoire. Ces 130 patients se répartissent en 84 hommes et 49 femmes,

Surg Endosc (1994) 8: 287–288

Surgical Endoscopy

Intraperitoneal mesh — a word of caution

In the United States and many parts of the world, mechanical small bowel obstruction (SBO) is primarily caused by adhesions from previously performed abdominal surgery. In a 1981 retrospective published study of 405 patients with small bowel obstruction by Bizer et al., 74% of the patients had adhesion related obstruction [1]. Obviously, the problem of intraperitoneal adhesions is serious and often leads to significant morbidity as well as mortality—a fact well known to all experienced abdominal surgeons. SBO can vary in severity and complexity but unquestionably it is a most uncomfortable and dangerous condition for all patients—especially the elderly.

The etiology of postoperative adhesions is related to rough surgical technique, surgical tissue trauma, local ischemic changes, and antifibrinolysis. The studies of Ellis have shown that the formation of dense adhesions represents a reparative process with revascularization of tissues that have lost or possess marginal viability. The revascularization process occurs through the formation of adhesions [4]. On the other hand, it is known that foreign substances in the peritoneal cavity can produce significant inflammatory and fibrotic reaction. Early reports of granulomas from intraperitoneal starch "dusting powder particles" initiated concern with the sensitivity of the peritoneal surfaces to foreign matter [2]. However, little current research has examined the response of the peritoneum to bulky foreign body materials like nonabsorbable mesh.

Dr. Schlecter's study, in the February issue of the journal, entitled "Intraabdominal Mesh Prosthesis in a Canine Model," experimentally examines the effect of prosthetic mesh in the free peritoneal cavity [5]. The animals in the study were sacrificed at 6 weeks after operation in order to evaluate the extent of adhesion formation. Six weeks after surgery may be too early to judge the full extent of adhesion-forming peritoneal inflammatory and fibrotic response. The foreign body reaction to a nonabsorbable prosthetic material may develop over a time period much longer than 6 weeks, and assessment should also be done at either 8 weeks or 12. In experimental studies examining the intraperitoneal adhesogenic reaction to mesh reported from our surgical laboratory, we found that extensive adhesions developed with polypropylene mesh peritoneal inserts at the end of 16 weeks in comparing polypropylene mesh to a polyglycolic acid (PGA) mesh, combined peritoneal surface excision and PGA mesh, and to simple peritoneal patch excision only. There was a decreasing tissue response in all groups except the polypropylene group, where cellularity was persistent at 4 months. However, there was a decrease in vascularity on microscopic examination [3]. The study established that the use of a totally absorbable form of mesh significantly reduced adhesions formed in response to a foreign body in the peritoneal cavity after a 4-month period of observation and that intraperitoneal foreign body response to polypropylene mesh is still active at that time. The quantitation of formation, thickness, vascularity, and longevity of intraperitoneal adhesions is difficult from an experimental as well as clinical point of view.

The long-term effect of using a large intraperitoneal foreign body and the possible formation of intraperitoneal adhesions and subsequent development of intestinal obstruction should be of concern to surgeons using an intraperitoneal insertion as a segment of mesh for hernia repair. The development of adhesive small bowel obstruction at a remote time from the insertion of the mesh and as a result of mesh-related adhesions would be catastrophic, especially considering that the standard technique for extraperitoneal or extraabdominal hernioplasty would not result in this complication. Current case data from our institution have shown that in the older-age patients, the length of time from the previous surgical event to development of adhesive obstruction has a mean of 11 years with a range up to 70 years. Thus it takes a long time to determine the incidence of this complication in the clinical situation.

Dr. Schlechter's article is a significant and important contribution. The value of research is not always in the numbers of animals or the sophistication of the study but rather in its implications for caution in the adoption of newer techniques by clinical surgeons. The study explores questions raised by the use of laparoscopic hernioplasty with intraperitoneal insertion of prosthetic mesh—questions that currently need answers before there is full endorsement of this procedure by the surgical community.

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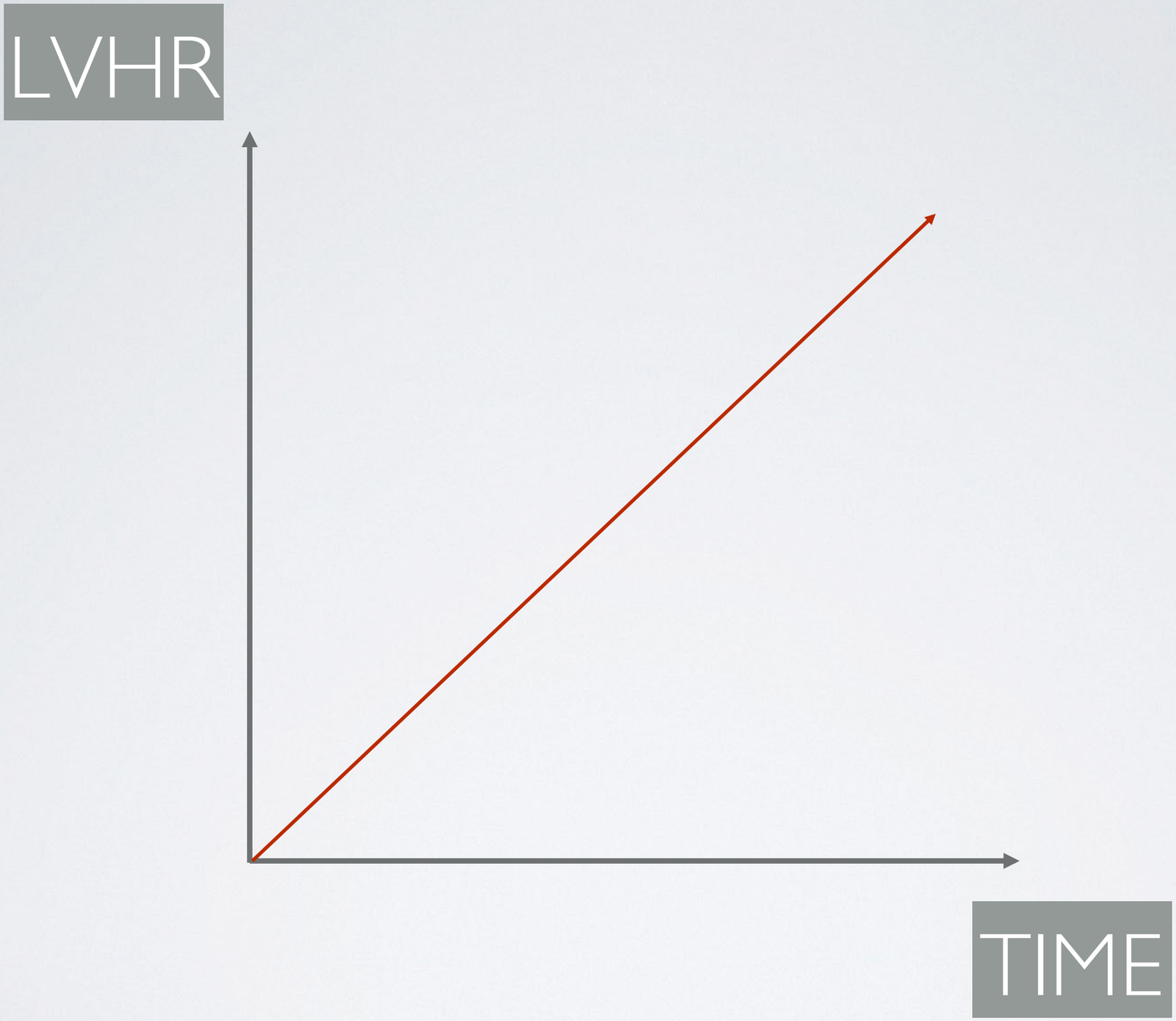
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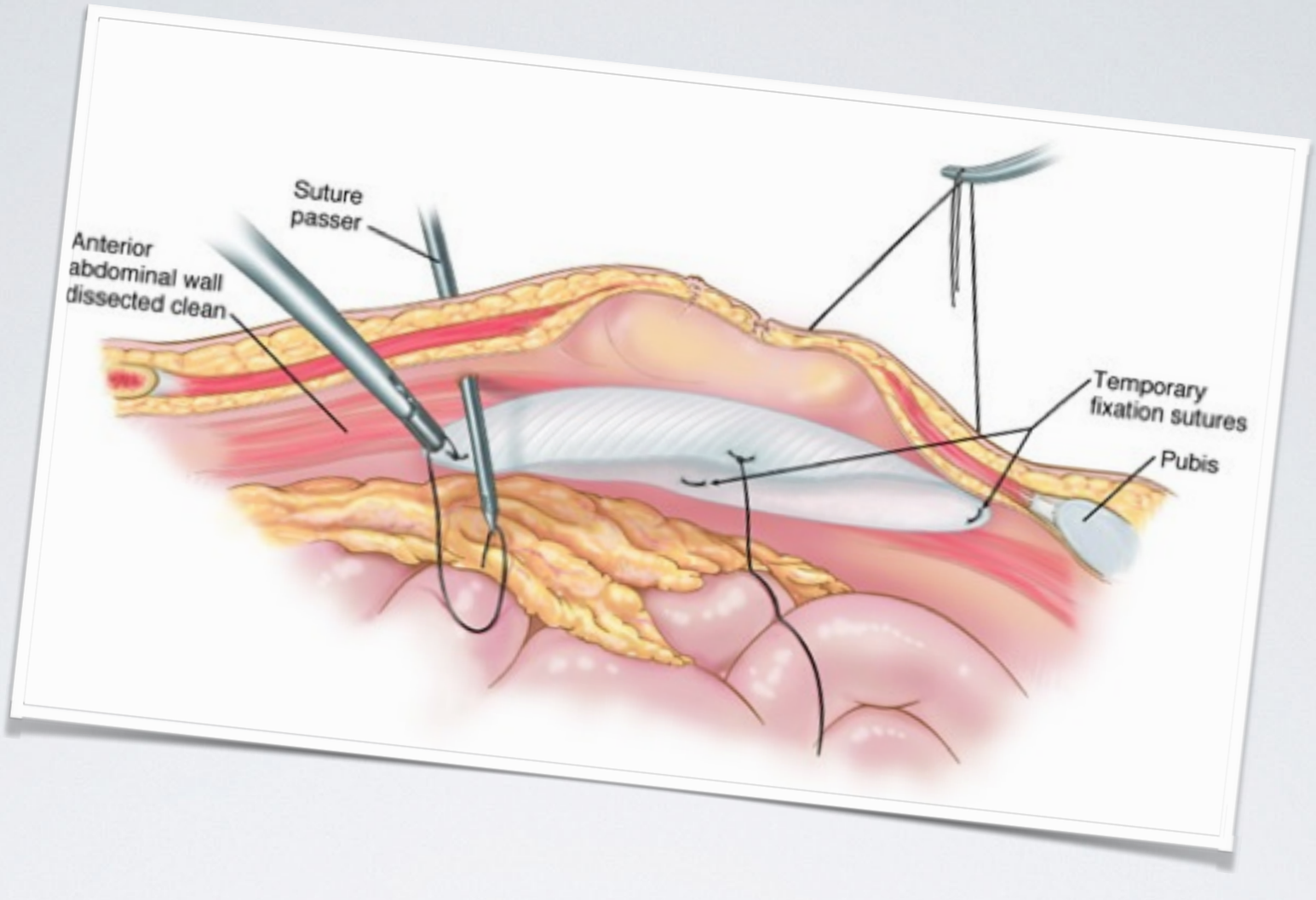


DIFFUSION OF LAPAROSCOPIC VENTRAL HERNIA REPAIR

EVOLUTION OF MATERIALS

3
Prostheses in Hernia Surgery: A Century of Evolution

James R. DeBord

Introduction

> "A serious consideration of prophylactic and remedial measures in large hernia, of whatever nature, is surely justified by the knowledge that the individual thus afflicted can be nothing but a miserable invalid. Not even the best fitting supporter can render life more than bearable, nor is it possible for such a person to make any severe exertion, whether it be in the pursuance of an occupation or in the enjoyment of an athletic sport." (Willard Bartlett, M.D., Washington University, St. Louis, Mo., 1903[1])

From the beginning of modern anatomical hernia surgery, ushered in by Bassini in 1887,[2] recurrences have plagued and frustrated surgeons of all ages, experience, skill, and nationality. Over the past century, it has become clear even to the most recalcitrant devotee of autologous tissue repairs that prosthetic biomaterials will sometimes be required to bridge or reinforce natural and unnatural defects in the integrity of the abdominal wall, inguinal canal, and chest wall.

Autologous Repair

Techniques for the use of free pedicle-based autografts of external oblique aponeurosis and fascia lata were developed and utilized for the repair of hernias from 1901 to the present-day use of the tensor fasciae latae myocutaneous flap, which provides both vascularized fascia and viable soft tissue and skin coverage.[3–11] While the advantages of autogenous fascia are apparent, and each patient can provide his own perfectly biocompatible tissue with good tensile strength and long-term viability, the disadvantages of these techniques have prevented the use of autologous fascial transplants from becoming more popular. The disadvantages center primarily on the negative aspects of a second operation to harvest the autologous graft, which involves the added operating room time and expense, the discomfort and scar associated with the donor wound, and the potential for surgical complications at the donor site. These same objections apply to the use of autologous skin and dermal grafts, which have been used with some success, but also have been associated with added local complications such as sinus tracts, cyst formation, and epidermoid carcinoma related to retained epidermal elements which cannot be completely removed from these grafts.[12–17]

Preserved fascial homografts and xenografts were the next logical step in the development of tissue patches for hernia repair. Over the years these have included "freeze-dried" human fascia lata,[18,19] lyophilized homologous aorta,[20] preserved human dura mater,[21,22] heterologous bovine (ox) fascia,[23] and porcine dermal collagen.[24,25] While these biomaterials have had anecdotal success in hernia repair and appear to provide an adequate matrix for autologous fibroblastic ingrowth, there remain problems related to the host local inflammatory reaction to these nonautologous tissues as well as the modern concerns about occult viral disease (HIV) transmission, however remote, that might possibly occur whenever "preserved" tissues are transplanted. There remains, however, a role for careful autologous closure of large abdominal wall defects using local tissue transfer techniques such as the bilateral advancement flap technique of Lucas and Ledgerwood, which mobilizes the external oblique and recti muscles medially via a lateral relaxing incision.[26]

Metal Prostheses

Silver Filigrees

The earliest use of man-made prosthetic reinforcements for hernia repair was the placement of silver wire coils on the floor of the inguinal canal by Phelps in 1894.[27] This concept was expanded by the German surgeons Witzel[28] and Goepel,[29] who utilized for hernia repair hand-made silver wire filigrees. *Filigree* is a term originally referring to fine, lace-like ornamental work of intertwined wire of gold or silver; in surgery, it describes an open arrangement of fine silver wire into a prosthesis for hernia repair. The filigree became the first prosthetic "mesh" to be routinely incorporated into the surgical armamentarium for repair of difficult or recurrent hernias, and many variations of the silver wire filigree were developed (Fig. 3.1). Seemingly crude by today's standards, the use of filigrees in the repair of hernias nevertheless persisted, with refinements, over a longer period than any other prosthetic material, including the most popular meshes in use today. Meyer in 1902,[30] and Bartlett[1] in 1903, utilizing different styles of filigrees (wire netting versus a wire loop filigree), reported small series of successful repairs of difficult hernias, the first reports in the North American literature on this technique. Lawrie McGavin of the Seaman's Hospital in England, reported on his technique of the double filigree method of hernia repair in 1907.[31] In this technique one filigree was placed deep to the transversalis aponeurotic arch, which was sutured over the filigree to the shelving edge of Poupart's ligament, and the superficial filigree was placed above the cord and beneath the external oblique apopneurosis. Percival Cole reviewed the extensive experience of the Seaman's Hospital with the double filigree technique of McGavin in 1941 and noted that from 1920–1940, 23% of the inguinal hernia operations performed at that institution were done with silver wire filigree implants.[32] Ball, in 1958, reported from Melbourne on his use of a larger silver wire filigree placed in the preperitoneal space and covering the entire posterior floor of the groin.[33] Ball stated, "Silver wire filigrees appear to be the best method of repair if properly used, and I believe that the method has fallen into some disrepute because of technical faults in the placing of the filigree. It must be placed in a properly prepared bed and kept perfectly flat. The silver wire does slowly disintegrate and therefore is a mild tissue irritant and stimulates the production of fibrous tissue." In this series of 500 patients, Ball reported only two known recurrences, and this probably reflects the known benefits of the preperitoneal placement of any prosthesis in hernia surgery. Despite these results, the use of silver filigrees gradually faded from the surgical scene primarily because of the discomfort reported by some patients due to silver wire's lack of pliability and its tendency to become work-hardened, as well as its lack of inertness in human tissues which, while stimulating a fibrous reaction, also led to fluid accumulation, sinus tract formation with occasional persistent drainage, and an increased potential for infection. The emerging development of newer prosthetic biomaterials at the time of Ball's report ended the long experience of surgeons with silver wire filigrees for hernia repair.

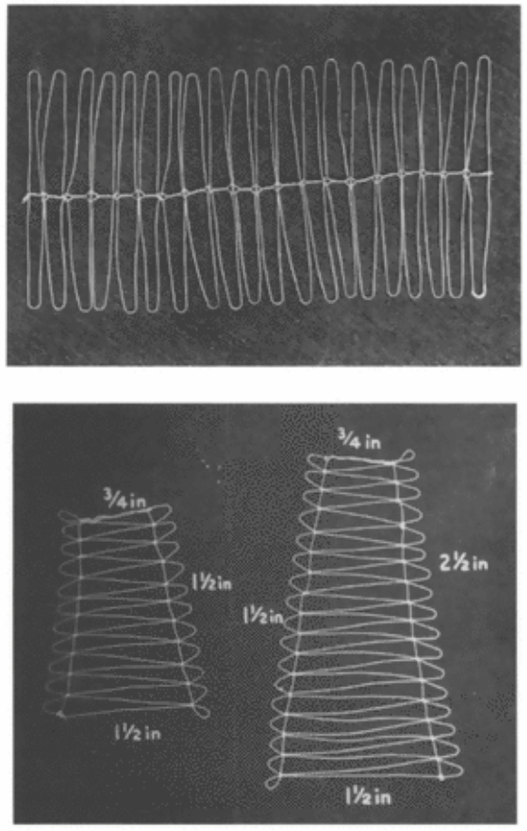


FIGURE 3.1. Examples of early silver wire filigrees for hernia repair.[30,32]

Tantalum Gauze

Tantalum approaches glass in resistance to acid and alkalis, making it inert in the physiochemical environment of living tissue. This element possesses high tensile strength, ductility, and malleability, allowing it to be drawn into fine wire and woven into a gauze (Fig. 3.2). In 1940, Burke introduced tantalum for general use in surgery and described its reaction and tolerance to human tissues.[34] Tantalum gauze became popular in hernia surgery after the reports of Throckmorton,[35] Koontz,[36] Douglas,[37] and Lam and colleagues.[38] All were published in 1948.

The clinical success reported in these four initial papers prompted an increase in the popularity of this procedure, as did the favorable report of Dunlop in 1950.[39] In 1951, Koontz reported on 77 patients with large direct inguinal hernias and poor tissues using tantalum gauze to buttress a McVay-Cooper's ligament repair, with one recurrence over a 25-month follow-up.[40] Also in 1951, Flynn et al. reported on 45 ventral incisional hernia repairs with tantalum mesh, with only one recurrence in a follow-up of four and one-half years.[41] A few years later, Burton[42] and Adler[43] reported several disadvantages to the use of tantalum gauze. These problems with the tantalum gauze became apparent only after a period of adequate follow-up and evaluation, and related primarily to fatigue fractures of the gauze mesh with resultant patient discomfort,

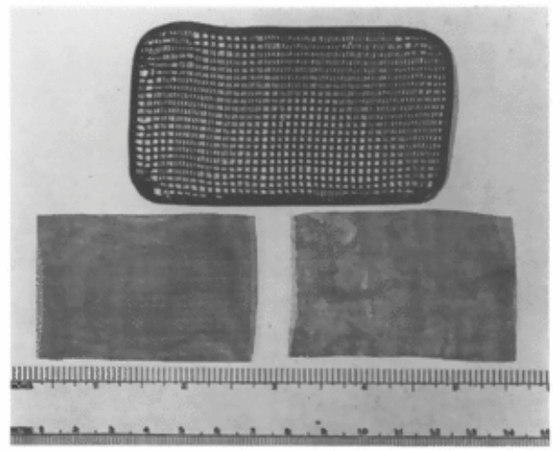
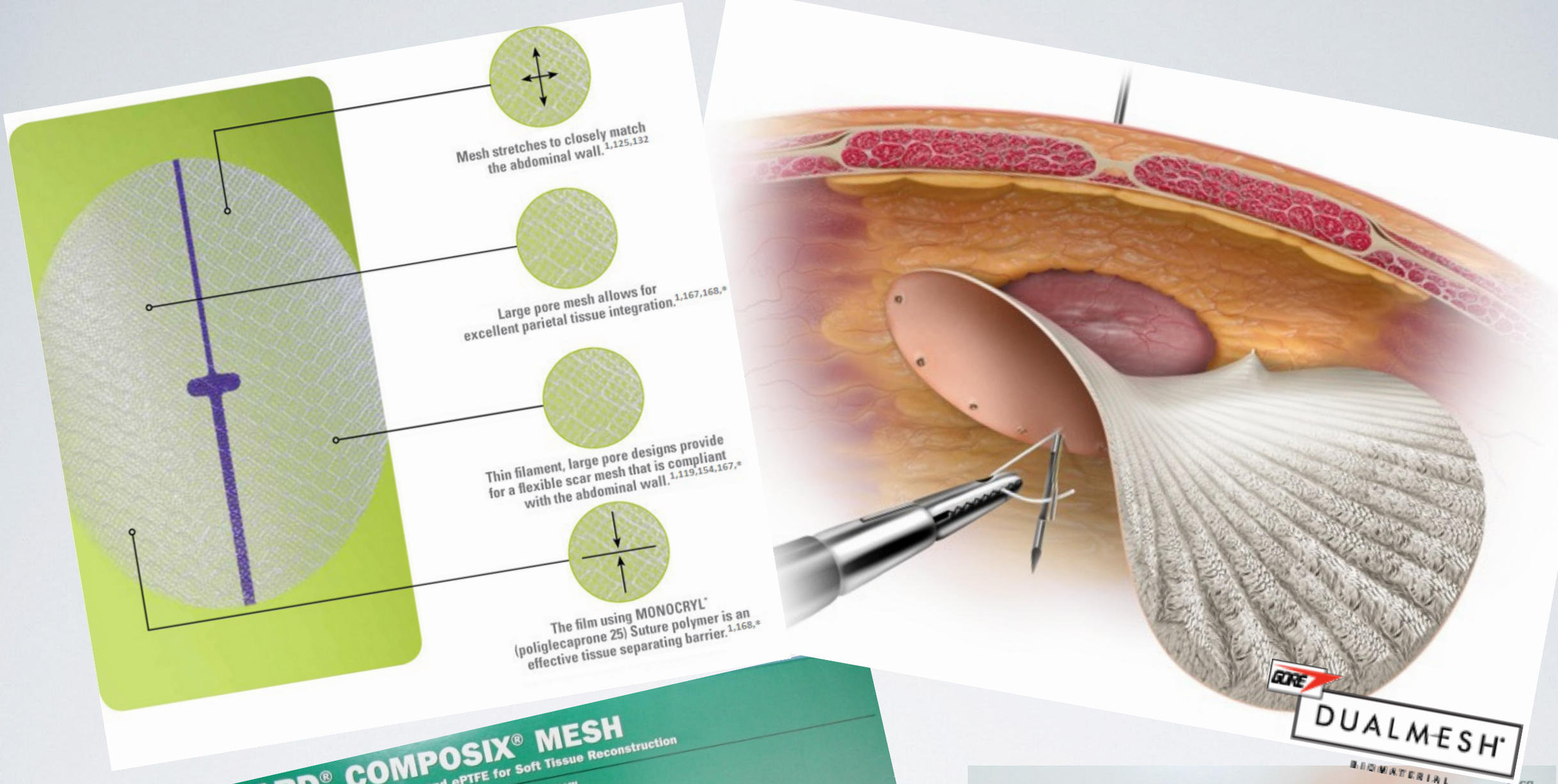


FIGURE 3.2. Tantalum gauze fabric in two mesh sizes (below) compared with older silver wire prosthesis (above).[34]

R. Bendavid et al. (eds.), *Abdominal Wall Hernias*


Mesh stretches to closely match the abdominal wall.[1,125,132]
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Surg Endosc (2006) 20: 1030–1035
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SURGICAL ENDOSCOPY
and Other Interventional Techniques

Laparoscopic versus open ventral hernia mesh repair: a prospective study

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Abstract
Background: An incisional hernia develops in 3% to 13% of laparotomy incisions, with primary suture repair of ventral hernias yielding unsatisfactory results. The introduction of a prosthetic mesh to ensure abdominal wall strength without tension has decreased the recurrence rate, but open repair requires significant soft tissue dissection in tissues that are already of poor quality as well as flap creation, increasing complication rates and affecting the recurrence rate. A minimally invasive approach was applied to the repair pf ventral hernias, with the expectation of earlier recovery, fewer postoperative complications, and decreased recurrence rates. This prospective study was performed to objectively analyze and compare the outcomes after open and laparoscopic ventral hernia repair.
Methods: The outcomes for 50 unselected patients who underwent laparoscopic ventral hernia repair were compared with those for 50 consecutive unselected patients who underwent open repair. The open surgical operations were performed by the Rives and Stoppa technique using prosthetic mesh, whereas the laparoscopic repairs were performed using the intraperitoneal onlay mesh (IPOM) repair technique in all cases.
Results: The study group consisted of 100 patients (82 women and 18 men) with a mean age of 55.25 years (range, 30–83 years). The patients in the two groups were comparable at baseline in terms of sex, presenting complaints, and comorbid conditions. The patients in laparoscopic group had larger defects (93.96 vs 55.88 cm^2; $p = 0.0023$). The mean follow-up time was 20.8 months (95% confidence interval [CI], 18.5640–23.0227 months). The mean surgery durations were 90.6 min for the laparoscopic repair and 93.3 min for the open repair ($p = 0.769$, nonsignificant difference). The mean postoperative stay was shorter for the laparoscopic group than for the open hernia group (2.7 vs 4.7 days; $p = 0.044$). The pain scores were similar in the two groups at 24 and 48 h, but significantly less at 72 h in the laparoscopic group (mean visual analog scale score, 2.9412 vs 4.1702; $p = 0.001$). There were fewer complications (24%) and recurrences (2%) among the patients who underwent laparoscopic repair than among those who had open repair (30% and 10%, respectively).
Conclusion: The findings demonstrate that laparoscopic ventral hernia repair in our experience was safe and resulted in shorter operative time, fewer complications, shorter hospital stays, and less recurrence. Hence, it should be considered as the procedure of choice for ventral hernia repair.

Key words: Comparative study — Hernia mesh repair — Incisional hernia — Laparoscopic surgery — Open surgery — Ventral hernia

Correspondence to: D. Lomanto

There have been few operative challenges more vexing in the history of surgery than the incisional hernia. An incisional hernia develops in 3% to 13% of laparotomy incisions, necessitating approximately 90,000 ventral hernia operations per year in the United States [18]. Primary suture repair of ventral hernias often yields unsatisfactory results, with reported recurrence rates of 25% to 52% [9, 23]. Because of the poor outcomes, incisional hernias have major social and economic implications.

The introduction of a prosthetic mesh to ensure abdominal wall strength without tension has decreased the recurrence rate to a still significant 12.5% to 19% [1, 11]. Unfortunately, the standard operation for open ventral hernia repair that requires a prosthetic mesh generally necessitates significant soft tissue dissection in tissues that are already of poor quality as well as flap creation, increasing complication rates. Hence, there is a continuing search for new repair techniques.

A minimally invasive approach was applied to the repair of ventral hernias, with the expectation of earlier recovery, fewer postoperative complications, and de-

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SURGICAL ENDOSCOPY
and Other Interventional Techniques

A prospective study comparing the complication rates between laparoscopic and open ventral hernia repairs

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Abstract
Background: Although ventral hernia repair is increasingly performed laparoscopically, complication rates with this procedure are not well characterized. For this reason, we performed a prospective study comparing early outcomes after laparoscopic and open ventral hernia repairs.
Methods: We identified all the patients undergoing ventral (including incisional) hernia repair at a single tertiary care center between September 1, 1999 and July 1, 2001 (overall $n = 257$). To increase the homogeneity of the sample, we excluded umbilical hernia repairs, parastomal hernia repairs, nonelective procedures, procedures not involving mesh, and repairs performed concurrently with another surgical procedure. Postoperative complications (in-hospital or within 30-days) were assessed prospectively according to standardized definitions by trained nurse clinicians.
Results: Of the 136 ventral hernia repairs that met the study criteria, 65 (48%) were laparoscopic repairs (including 3 conversions to open surgery) and 71 (52%) were open repairs. The patients in the laparoscopic group were more likely to have undergone a prior (failed) ventral hernia repair (40% vs 27%; $p = 0.14$), but other patient characteristics were similar between the two groups. Overall, fewer complications were experienced by patients undergoing laparoscopic repair (8% vs 21%; $p = 0.03$). The higher complication rate in the open ventral hernia repair group came from wound infections (8%) and postoperative ileus (4%), neither of which was observed in the patients who underwent laparoscopic repair. The laparoscopic group had longer operating room times (2.2 vs 1.7 h; $p = 0.001$), and there was a nonsignificant trend toward shorter hospital stays with laparoscopic repair (1.1 vs 1.5 days; p = 0.10).
Conclusions: The patients undergoing laparoscopic repair had fewer postoperative complications than those receiving open repair. Wound infections and postoperative ileus accounted for the higher complication rates in the open ventral hernia repair group. Otherwise, these groups were very similar. Long-term studies assessing hernia recurrence rates will be required to help determine the optimal approach to ventral hernia repair.

Key words: Ventral hernia repair — Laparoscopy — Open repair

Correspondence to: J. M. McGreevy

Approximately 109,000 ventral hernias are repaired surgically each year in the United States [10]. Whereas open repair, preferably with mesh, [8] had long been the standard approach, the introduction of laparoscopic ventral hernia repair in the early 1990s [7] brought about new options for surgeons facing this challenging problem. Several studies have reported the potential advantages with laparoscopic repair, such as greater patient acceptance, shorter lengths of hospital stay, and lower recurrence rates [1–3, 5, 9]. Although many believe that laparoscopic repair also may be associated with lower complication rates, this assumption is not well tested. Most studies have involved case series lacking control groups (i.e., patients undergoing open repair) [4, 13]. Of the small number of controlled studies, most have been limited by small sample size [2, 5] or retrospective assessment of outcome variables, raising concerns about ascertainment bias. For a better examination of short-term outcomes after laparoscopic and open ventral hernia repairs, we performed a prospective cohort study of laparoscopic and open ventral hernias at our rural tertiary care medical center.

Methods

Patient selection

We prospectively identified all 257 patients undergoing ventral hernia repairs at our tertiary care medical center between September 1, 1999

Poelman et al. BMC Surgery 2013, 13:18
http://www.biomedcentral.com/1471-2482/13/18

BMC Surgery

STUDY PROTOCOL Open Access

The INCH-Trial: a multicentre randomized controlled trial comparing the efficacy of conventional open surgery and laparoscopic surgery for incisional hernia repair

Marijn Poelman[1,2*], Jan Apers[3], Han van den Brand[2], Huib Cense[4], Esther Consten[5], Jort Deelder[2], Boudewijn Dwars[6], Nanette van Geloven[7], Elly de Lange[1], Johan Lange[8], Rogier Simmermacher[9], Maarten Simons[10], Eric Sonneveld[11], Hermien Schreurs[2] and Jaap Bonjer[1]

Abstract

Background: Annually approximately 100.000 patients undergo a laparotomy in the Netherlands. About 15,000 of these patients will develop an incisional hernia. Both open and laparoscopic surgical repair have been proven to be safe. However, the most effective treatment of incisional hernias remains unclear. This study, the 'INCH-trial', comparing cost-effectiveness of open and laparoscopic incisional hernia repair, is therefore needed.

Methods/Design: A randomized multi-center clinical trial comparing cost-effectiveness of open and laparoscopic repair of incisional hernias. Patients with a symptomatic incisional hernia, eligible for laparoscopic and open incisional hernia repair. Only surgeons, experienced in both open and laparoscopic incisional hernia repair, will participate in the INCH trial. During incisional hernia repair, a mesh is placed under or on top of the fascia, with a minimal overlap of 5 cm. Primary endpoint is length of hospital stay after an incisional hernia repair. Secondary endpoints are time to full recovery within three months after index surgery, post-operative complications, recurrences, mortality and quality of life.

Our hypothesis is that laparoscopic incisional hernia repair comes with a significant shorter hospital stay compared to open incisional hernia repair. A difference of two days is considered significant. One-hunderd-and-thirty-five patients are enrolled in each treatment arm. The economic evaluation will be performed from a societal perspective. Primary outcomes are costs per patient related to time-to-recovery and quality of life.

The main goal of the trial is to establish whether laparoscopic incisional hernia repair is superior to conventional open incisional hernia repair in terms of cost-effectiveness. This is measured through length of hospital stay and quality of life. Secondary endpoints are re-operation rate due to post-operative complications or recurrences, mortality and quality of life.

Discussion: The difference in time to full recovery between the two treatment strategies is thought to be in favor of laparoscopic incisional hernia repair. Laparoscopic incisional hernia repair is therefore expected to be a more cost-effective approach.

Trial registration: Netherlands Trial register: NTR2808

Laparoscopic versus open surgical techniques for ventral or incisional hernia repair (Review)

Sauerland S, Walgenbach M, Habermalz B, Seiler CM, Miserez M

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[Intervention Review]

Laparoscopic versus open surgical techniques for ventral or incisional hernia repair

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ABSTRACT

Background

There are many different techniques currently in use for ventral and incisional hernia repair. Laparoscopic techniques have become more common in recent years, although the evidence is sparse.

Objectives

We compared laparoscopic with open repair in patients with (primary) ventral or incisional hernia.

Search methods

We searched the following electronic databases: MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials, metaRegister of Controlled Trials. The last searches were conducted in July 2010. In addition, congress abstracts were searched by hand.

Selection criteria

We selected randomised controlled studies (RCTs), which compared the two techniques in patients with ventral or incisional hernia. Studies were included irrespective of language, publication status, or sample size. We did not include quasi-randomised trials.

Data collection and analysis

Two authors assessed trial quality and extracted data independently. Meta-analytic results are expressed as relative risks (RR) or weighted mean difference (WMD).

Main results

We included 10 RCTs with a total number of 880 patients suffering primarily from primary ventral or incisional hernia. No trials were identified on umbilical or parastomal hernia. The recurrence rate was not different between laparoscopic and open surgery (RR 1.22; 95% CI 0.62 to 2.38; I^2 = 0%), but patients were followed up for less than two years in half of the trials. Results on operative time were too heterogeneous to be pooled. The risk of intraoperative enterotomy was slightly higher in laparoscopic hernia repair (Peto OR

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2.33; 95% CI 0.53 to 10.35), but this result stems from only 7 cases with bowel lesion (5 vs. 2). The most clear and consistent result was that laparoscopic surgery reduced the risk of wound infection (RR = 0.26; 95% CI 0.15 to 0.46; I^2= 0%). Laparoscopic surgery shortened hospital stay significantly in 6 out of 9 trials, but again data were heterogeneous. Based on a small number of trials, it was not possible to detect any difference in pain intensity, both in the short- and long-term evaluation. Laparoscopic repair apparently led to much higher in-hospital costs.

Authors' conclusions

The short-term results of laparoscopic repair in ventral hernia are promising. In spite of the risks of adhesiolysis, the technique is safe. Nevertheless, long-term follow-up is needed in order to elucidate whether laparoscopic repair of ventral/incisional hernia is efficacious.

PLAIN LANGUAGE SUMMARY

The repair of a defect in the anterior abdominal wall with minimal invasive (laparoscopic) or conventionally (open) technique

A defect in the abdominal wall through which organs can protrude is called hernia. Hernias may occur spontaneously (primary hernia) or at the site of a previous surgical incision (incisional hernia). A hernia is usually recognized as a bulge or tear under the abdominal skin. Occasionally it causes no discomfort for the patient but it can hurt while lifting heavy objects, coughing, or having bowel movements. Also after prolonged standing or sitting it can cause heavy discomfort.

For the repair of these hernias many different surgical techniques are in use. The conventional technique is the open technique, where with either a suture or a mesh prosthesis the defect of the abdominal wall will be closed. A mesh prosthesis is a synthetic material that reinforces the tissue or bridges the defect. On the other hand the laparoscopic hernia repair is a technique to repair the defect in the abdominal wall also with a mesh but using small incisions and a laparoscope. In this case, the mesh is always placed in the abdominal cavity. This review analysed randomised controlled trials, comparing the conventional, open technique with the laparoscopic technique.

Based on the results of nearly 1000 adult patients, the laparoscopic technique appears to be effective at least in the short-term evaluation. As laparoscopic surgery requires smaller incisions than open surgery, wound infection was fourfold less likely to occur in patients with laparoscopic repair. However, there is a rare but theoretically higher risk that intraabdominal organs are more likely to be injured during a laparoscopic procedure. Length of hospital stay after laparoscopic hernia repair was found to be shorter in the majority of trials. As most studies had evaluated only a follow-up of 1 or 2 years, data on the long-term effectiveness are still lacking. Most importantly, the risks of the hernia coming back (i.e. recurrence) are relatively unknown.

Therefore, the authors of the review believe that further studies are necessary, before laparoscopic repair can be considered a standard procedure for primary ventral or incisional hernia repair. Short-term results, however, are promising.

36TH ANNUAL INTERNATIONAL CONGRESS
OF THE **EUROPEAN HERNIA SOCIETY**
Edinburgh 28 – 31 May 2014

DEBATE 8: THAT THE LONG-TERM RISKS OF INTRA-PERITONEAL MESH OUTWEIGH THE SHORT-TERM BENEFITS.

For: Frederik Berrevoet, Belgium
Against: Salvador Morales-Conde, Spain

vote result: 50% for, 50% against


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The American Journal of Surgery


SURGERY
JUNE 2014


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World Journal of Surgery
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Induction Chemotherapy or Chemoradiotherapy for T4 Esophageal Cancer
Long-term Outcomes of Using Old Liver Grafts for Transplantation
Open Abdomen Therapy with Vacuum Assistance and Mesh Mediated Fascial Traction
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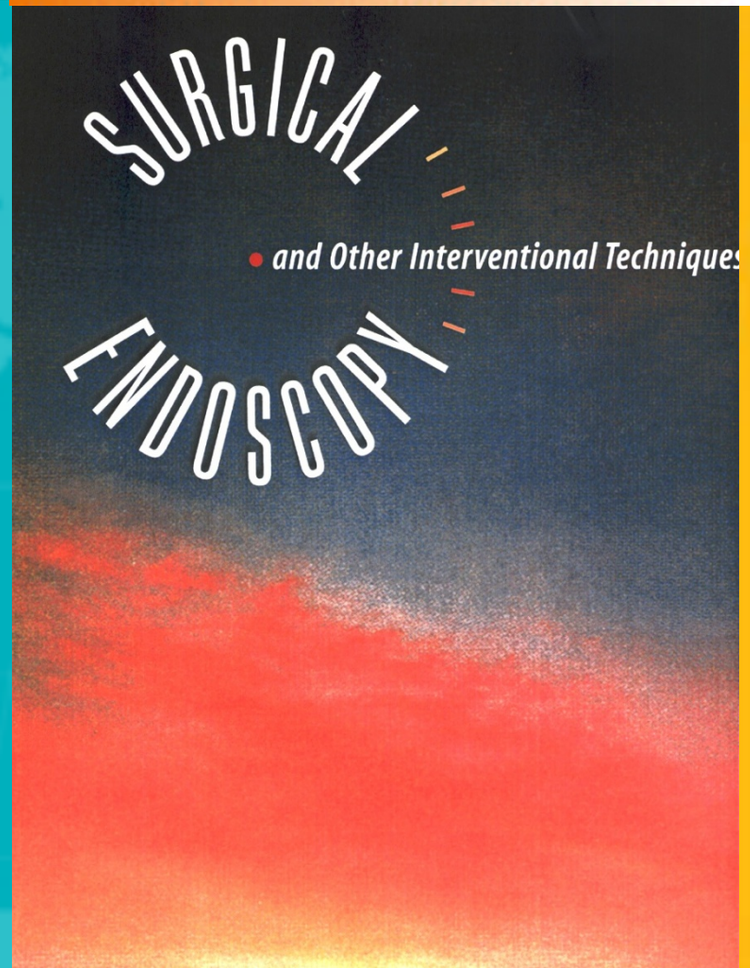
SURGICAL ENDOSCOPY
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Prospective evaluation of adhesion characteristics to intraperitoneal mesh and adhesiolysis-related complications during laparoscopic re-exploration after prior ventral hernia repair

Eric D. Jenkins · Victoria Yom · Lora Melman · L. Michael Brunt · J. Christopher Eagon · Margaret M. Frisella · Brent D. Matthews

Received: 25 April 2009 / Accepted: 19 March 2010 / Published online: 6 May 2010

Abstract
Background The purpose of this study was to characterize the adhesion characteristics of absorbable- and nonabsorbable-barrier-coated meshes and to report adhesiolysis-related complications during laparoscopic re-exploration after prior ventral hernia repair.
Methods Under an IRB-approved protocol, patients undergoing laparoscopic re-exploration after prior intraperitoneal mesh placement were prospectively graded intraoperatively for adhesion tenacity (0-4), adhesion surface area (0 = 0%, 10 = 100%), and ratio of adhesiolysis time to mesh surface area (min/cm^2). Adhesiolysis-related complications were also recorded. Data are given as mean ± SD. Statistical significance ($P < 0.05$) was determined using the t test and Fisher's exact test.
Results From March 2006 to March 2009, 69 patients underwent laparoscopic surgery after prior intraperitoneal mesh placement for ventral hernia repair. Previous meshes were absorbable-barrier-coated mesh ($n = 18$), permanent-barrier composite mesh [Composix® ($n = 17$)], permanent-barrier noncomposite mesh [DualMesh® ($n = 14$)], uncoated polypropylene mesh ($n = 12$), and biologic mesh ($n = 8$). Indications for laparoscopic re-exploration were recurrent ventral hernia ($n = 58$), chronic pain ($n = 3$), cholecystectomy ($n = 3$), parastomal hernia ($n = 2$), small bowel obstruction ($n = 1$), nephrectomy ($n = 1$), and Nissen fundoplication ($n = 1$). Adhesions to DualMesh were less tenacious ($P < 0.05$) compared to all other meshes. Surface area of adhesions to DualMesh were less ($P < 0.05$) than to Composix and to uncoated polypropylene mesh, but not to absorbable-barrier-coated and biologic meshes. Adhesiolysis time:mesh surface area was less ($P < 0.05$) for DualMesh compared to Composix, uncoated polypropylene, and biologic mesh, but not to absorbable-barrier-coated mesh. Adhesiolysis-related complications occurred in two (16.7%) (P = ns) patients with uncoated polypropylene mesh, one cystotomy and one enterotomy; both were repaired laparoscopically. There were two (16.7%) (P = ns) conversions to an open procedure: one converted patient had Composix (6.7%) and one had absorbable-barrier-coated mesh (5.9%). There were no adhesiolysis-related complications with these meshes. There were no adhesiolysis-related complications or conversions to open in the DualMesh or biologic mesh groups.
Conclusions Adhesion characteristics of mesh placed intraperitoneally and adhesiolysis-related complications during laparoscopic re-exploration after ventral hernia repair are associated with unique properties of the mesh and/or barrier.

Keywords Ventral hernia repair · Adhesions · Mesh · Laparoscopy

2009 SAGES Oral and 2009 SAGES Video manuscript types: Presented at the SAGES 2009 Annual Meeting, April 22–24, 2009, Phoenix, AZ.

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The placement of a prosthetic biomaterial in the retrorectus, preperitoneal space, as popularized by Rives et al. [1] and Stoppa [2], has reduced the recurrence rates for ventral incisional hernia repair. A prospective randomized trial comparing retrofascial, preperitoneal polypropylene mesh repair to primary repair for ventral incisional hernias

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Mémoire de Maîtrise en médecine No 24

Adverse effects of intraperitoneal onlay mesh used for incisional hernia repair

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Expert
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Lausanne, décembre 2011

Outcome of patients following their previous cure of incisional hernia

Patients #	Hernia recurrence	Mesh brand	Mesh position	Mesh fixation	Mesh migration	Mesh shrinkage	Mesh adhesion	Intraoperative findings: S, F, A, NE, O
1	yes	Ultrapro®	Onlay	Prolene™	no	yes	yes	S
2	yes	Mersilene®, Titanium Metals UK Ltd®	Sublay	Prolene™	yes	no	no	F
3	yes	Parietex Composite®	IPOM	AbsobaTack™	no	no	yes	NE
4	yes	Proceed®	IPOM	ProTack™	no	no	yes	O
5	yes	Proceed®	IPOM	EasyTack™	yes	no	yes	O
6	no	Mersilene®	IPOM	Prolene™	no	no	yes	F, A
7	yes	Proceed®, DynaMesh®	IPOM	Prolene™	no	yes	yes	O
8	yes	DynaMesh®	Sublay	Prolene™	no	yes	yes	S
9	yes	Proceed®	Onlay	ProTack™	yes	yes	yes	S
10	no	Ultrapro®	IPOM	ProTack™	no	no	yes	O
11	yes	Parietex Composite®	IPOM	ProTack™	no	no	yes	O
12	no	Ultrapro®, Parietex Composite®	IPOM	Prolene™	no	no	yes	O
13	no	Proceed®	IPOM	ProTack™	no	no	yes	NE
14	no	Parietex Composite®	IPOM	ProTack™	no	no	yes	O
15	no	Ultrapro®	Sublay	ProTack™	no	no	yes	NE
16	no	Parietex Composite®	IPOM	Prolene™	no	no	yes	NE
17	yes	Gore® DualMesh®	IPOM	Prolene™	no	no	yes	O
18	yes	Permacol®	IPOM	Prolene™	no	yes	yes	O
19	yes	Proceed®	IPOM	ProTack™	yes	no	yes	O
20	yes	Parietex Composite®	IPOM	AbsorbaTack™	no	no	yes	F, A
21	yes	Parietex Composite®, Mersilene®	IPOM	Prolene™	no	no	yes	F, A
22	yes	Permacol®	IPOM	Prolene™	yes	yes	yes	O

Table 3: Patients after cure of incisional hernia.

S: Seroma, F: Fistula, A: Abscess, NE: Nerve entrapment, O: Other

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Lausanne, décembre 2011

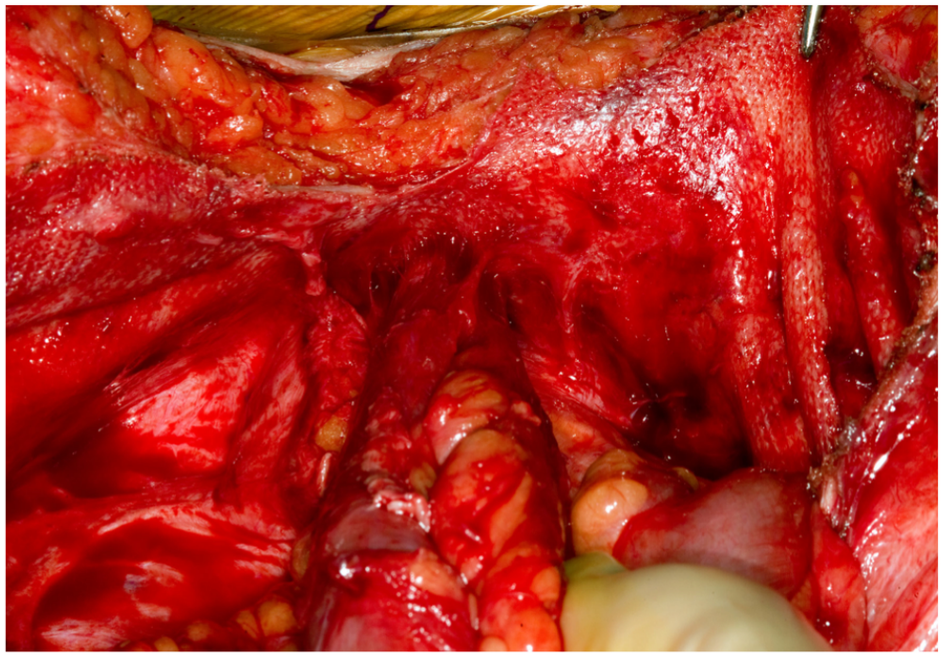

Figure 8: severe adhesions with the mesh embedded into the small bowel, fistula formation and hernia recurrence.

Discussion

This retrospective study shows that placement of an intraperitoneal mesh was associated with complications which are numerous, various, frequent and severe. The most common was mesh adhesion, present in 21/22 (96%) of patients reoperated in this study. The problem of adhesion and related effects is a high morbidity with increase of medical costs[11]. The second common complication was hernia recurrence, present in 15/22 (68%) of patients. This complication strongly correlates with the presence of adhesions except with the Ultrapro® mesh brand. Hernia recurrence is a major problem after a primary incisional hernia repair. This carries a high morbidity and high risk of resulting severe complications such as bowel incarceration leading to ischemia, necrosis and perforation. Mesh shrinkage was present in 6/22 (27%). Mesh migration was present in 5/22 (23%). This problem can lead to further complications such as intestinal perforation and more severe adhesions[4]. There was less migration if the incorporation of the mesh is considerable[3] . Abscess and seroma were each observed in 3/22 (14%), fistula and nerve entrapment were each observed in 4/22 (18%).

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Lausanne, décembre 2011

Limitations of the study

This work is an observational study with a small sample of individuals. Only patients with objectifiable complications during surgical reoperation were recruited, giving a selection bias. Thus no assumption concerning the frequency of complications, symptomatic or asymptomatic, associated with intraperitoneal mesh, can be made in this study.

Data were recorded in medical records written by different persons and some information have been may forgotten or interpreted differently. However, operations and data collections were always achieved by the same surgical team.

Conclusion

The majority of articles deal with complications induced by intraperitoneal prosthetic mesh, but the effectiveness of mesh has been studied mostly on experimental models. Actually and as shown in the present study, intraperitoneal mesh placement was associated with severe complications witch may potentially be life threatening. Therefore the Department of the Visceral Surgery of CHUV avoids the IPOM technique.

Randomized controlled trials comparing effectiveness of different meshes, placed intraperitoneally or beneath the muscle would be the best way to answer these questions but may be difficult or impossible to conduct. Above all, the follow up of patients for such a study would generate terrible costs.

The most important thing to remember is to be extremely careful with the use of prosthetic mesh and to inform patients about the risks of adhesions and other complications with the use of onlay mesh.

In our opinion, intraperitoneal mesh placement should only be reserved in exceptional situations, when the modified Rives-Stoppa could not be achieved and when tissues covering the mesh are insufficient.

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CASE REPORT

Complications of mesh devices for intraperitoneal umbilical hernia repair: a word of caution

F. E. Muysoms · J. Bontinck · P. Pletinckx

Received: 5 May 2010 / Accepted: 30 May 2010 / Published online: 17 June 2010

Abstract Several mesh devices for the treatment of umbilical and other small ventral hernias have become available in recent years. These meshes have a dual layer consisting of a permanent or temporary barrier against adhesion formation between the viscera and the intraperitoneally exposed part of the mesh. We have seen several patients with serious late complications of these meshes placed intraperitoneally. Some of these patients needed small bowel resection and mesh removal. Others developed a recurrence because of improper deployment of the mesh in the intraperitoneal position. We think that, if preperitoneal deployment of such mesh devices is possible, this should be the preferred position, notwithstanding the fact that these meshes have a dual layer. There is a complete lack of convincing data on these mesh devices in the medical literature. No long-term data have been published, and, for three of the four mesh devices available, no publications on their use in humans were found. We think that surgeons adopting innovative mesh devices should register and follow their patients prospectively, at least until there are enough published studies with sufficiently large patient samples, acceptable follow up times, and favourable outcomes.

Keywords Hernia repair · Mesh · Complications · Umbilical hernia · Ventral hernia · Epigastric hernia

Introduction

The idea that primary ventral hernias, like umbilical and epigastric hernias, are best repaired with abdominal wall reinforcement by mesh implantation is supported by several studies [1–4]. Other studies indicate that suture repair remains a valid option in many patients [5, 6]. If a mesh is used, it can be positioned above the fascia as an onlay repair, underneath the rectus muscles as a sublay repair, in a preperitoneal position or in an intraperitoneal position. The intraperitoneal positioning of a mesh can be performed by laparoscopy or by open surgery. Meshes with a dual layer have been developed to inhibit the formation of adhesions of the viscera to the mesh when positioned inside the peritoneum. Mesh devices using this dual-sided mesh technology have been developed for the specific indication of small ventral hernias. The design of these meshes allows introduction, through a small incision, of a mesh of appropriate size to cover the hernia defect. This technique is very attractive for the surgeon and the patient alike because the mesh usually can be introduced through a nearly invisible scar in the umbilicus. The avoidance of fixation sutures avoids pain related to these sutures. Short-term results and patient satisfaction are very favourable, encouraging surgeons to continue using this technique, although there is a lack of long-term results relating to the use of such meshes in good quality studies.

We report some serious complications related to the use of these intraperitoneal mesh devices, requiring a word of caution for the widespread use of these meshes outside of studies, prospective registries or follow-up programs.

The content of this paper was presented during the 32nd International Congress of the European Hernia Society, in Istanbul, 6–8 October 2010.

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Materials and methods

We report three cases of late complications we observed in patients where a dual layer mesh device was used to repair an umbilical hernia. We searched the websites of mesh-manufacturing companies for information on their products, and performed a literature research through Pubmed® on these mesh devices.

Case reports

Case 1

A 47-year-old woman was seen in the emergency department with acute abdominal pain. At clinical investigation the abdomen had all signs of peritonitis, and a CT scan of the abdomen showed signs of small bowel perforation. Ten months prior to the present admission, an umbilical hernia was repaired using a Ventralex™ Hernia Patch (Davol, Bard, Cranston, RI), with a diameter of 8 cm. Reviewing the previous surgical report revealed that this mesh was used to repair an incarcerated recurrent umbilical hernia of 2.5 cm, after suture repair of a primary hernia 2 years before. The mesh was placed intraperitoneally through the hernia defect and was fixated centrally with stitches to the margins of the defect. No further fixation of the mesh was performed.

Firstly, a laparoscopy was performed to localise the perforation. Adhesions of the omentum and the small bowel to the mesh were removed. At one side the mesh had curled up, exposing part of the parietal layer of the mesh (Fig. 1). The perforation was observed about 2 cm proximal to the densest adhesions, spilling faecaloid bowel content in the peritoneum. A juxta-umbilical incision on the midline was performed, the mesh was removed, and a small bowel resection of the perforated area was performed. The pathology report revealed a sharp piece of animal bone, probably ingested without noticing, as the cause of the perforation. The postoperative course was uneventful and the patient was discharged on the 5th day postoperatively. At the last clinical control visit 17 months postoperatively, the laparotomy incision had healed well and was free from incisional hernia.

Case 2

A 70-year-old male was seen in the outpatient clinic because of a recurrent umbilical hernia. An umbilical hernia repair had been performed 24 months previously. The patient could not tell which surgical technique had been performed. He did not know if the previous surgeon had used a mesh or not to repair his hernia. After that operation the patient was seen once for a postoperative control at 3 weeks, but no further appointments had been scheduled. Reviewing of the previous operation report revealed that his umbilical hernia had been repaired using a Ventralex™ Hernia Patch with a diameter of 8 cm, in an intraperitoneal position.

A laparoscopy was performed. At the umbilicus, very dense adhesions between the abdominal wall and a loop of small bowel were noted (Fig. 2). Initially, the intra-peritoneal mesh could not be seen but, after further dissection between the small bowel and the abdominal wall, a small bowel lesion occurred. The mesh was found in the lumen of

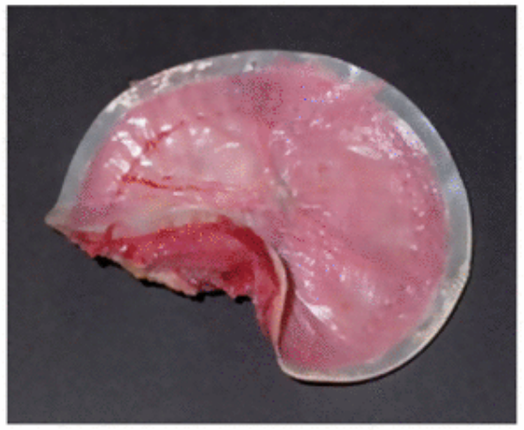

Fig. 1 Case 1: a Ventralex™ Hernia Patch, removed 10 months after implantation during laparotomy for a small bowel perforation, showing "potato chip like" curling, with exposure of the parietal side of the mesh to the abdominal cavity and the viscera

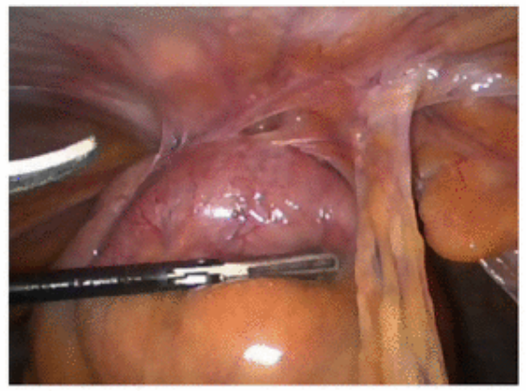

Fig. 2 Case 2: laparoscopic view of small bowel adhesions to the anterior abdominal wall after umbilical hernia repair with a Ventralex™ Hernia Patch of 8 cm diameter. The whole mesh, except the positioning straps, had migrated into the lumen of the small bowel

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CASE REPORT

An unusual cause of chronic anemia and abdominal pain caused by transmural mesh migration in the small bowel after laparoscopic incisional hernia repair

G. Voisard · L. S. Feldman

Received: 20 January 2013 / Accepted: 11 June 2013 / Published online: 21 June 2013

Abstract Mesh repair of incisional hernia is recommended to reduce recurrence. Recognized complications include mesh infection and fistula. Composite meshes with antiadhesive barriers were designed for intraperitoneal placement to reduce adhesion formation and fistulization to the viscera. Transmural mesh migration is a rare complication of hernia repair with composite mesh and can be present with a variety of symptoms. We report an interesting case of transmural mesh migration into the small bowel presenting with chronic microcytic anemia and abdominal pain 5 years after laparoscopic incisional hernia repair with a composite polypropylene/ePTFE mesh.

Introduction

Incisional hernia is a complication of abdominal surgery with a reported incidence of 2–11 % [1]. The use of synthetic mesh allows for a tension-free repair [2] while providing a scaffold on which scarring can occur [3] and reduces the risk of recurrence [4]. Multiple synthetic meshes are available and differ in material, weight and density, porosity and the presence of an antiadhesion barrier to reduce adhesion formation and allow for intraperitoneal placement. However, mesh repair increases the risk of infection [4] and can result in mesh erosion, fistula formation [5] and rarely, mesh migration [6]. We present an interesting case of a patient with complete transmural mesh migration into the small bowel who presented with persistent iron-deficiency anemia.

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Case summary

A 73-year-old man was referred to general surgery by his family doctor in July 2008 with a 3-month history of vague abdominal pain and low-grade fever. He had a several year history of chronic microcytic anemia but was otherwise well. In the previous 3 months, however, he reported the onset of postprandial pain and bloating, without nausea, vomiting or obstipation. He reported anorexia and 5 kg weight loss. On physical exam, he was in no distress and looked well. There was a well-healed midline laparotomy incision with no evidence of hernia, no sign of infection and no tenderness.

The patient had a past medical history significant for a stage III sigmoid cancer for which he underwent open resection with primary anastomosis in January 2002. He developed a periumbilical incisional hernia and underwent multiple attempts at repair. An open repair of a 4 cm defect in the upper part of the wound was done with polypropylene in March 2003. In October 2003, he underwent laparoscopic repair for recurrence using a 10 × 15 cm Composix mesh (Bard) fixed with interrupted prolene 2–0 sutures and 5 mm tacks. In July 2005, recurrence of the hernia below the mesh led to a repeat attempt at repair. When the hernia sac was opened, the report states "the abdominal wall was palpated and found to be free of adhesions apart from the superior aspect where the lower edge of the previously placed Composix mesh was

Hernia (2002) 6: 144–147
DOI 10.1007/s10029-002-0067-z

CASE REPORT

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Entero-colocutaneous fistula: a late consequence of polypropylene mesh abdominal wall repair: case report and review of the literature

Received: 11 March 2002 / Accepted: 3 June 2002 / Published online: 20 July 2002

Abstract *Background*. The underlying risk associated with visceral mesh erosion is the close opposition of adjacent intestines to the prosthetic graft. This highly morbid condition has been described with most types and techniques of abdominal wall mesh repair.
Patient. We report the case of a 52-year-old man who presented with an entero-colocutaneous fistula 10 years after prosthetic mesh repair of an incisional hernia. The fistula was excised and the abdominal wall defect repaired with a tissue-impervious composite.
Conclusions. The use of a tissue-impervious barrier avoids development of enteric fistula when a prosthesis is placed directly over the viscera.

Keywords Intestinal fistula · Colocutaneous fistula · Enterocutaneous fistula · Surgical mesh · Laparostomy · Open abdomen · Abdominal closure

Introduction

Reliable primary closure of large abdominal wall defects is compromised by major tissue loss or muscular retraction, which preclude aponeurotic opposition. Tension-free prosthetic repair is known to improve the closure's durability. On the other hand, mesh can cause significant complications, including wound infection, chronically draining sinuses, enterocutaneous fistulas, intestinal obstruction, and hernia recurrence [20]. A rare long-term complication associated with polypropylene mesh is reported here.

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Case report

A 52-year-old man presented with a fluctuating painful mass in the left anterior abdominal wall. The patient's past medical history was significant for appendicitis resulting in delayed generalized peritonitis 12 years earlier. Appendectomy and excision of the greater omentum were performed and the abdomen was closed primarily. A xyphopubic incisional hernia developed 2 years later. It was managed by a primary repair reinforced with a Marlex onlay (Bard Implants, Billerica, Mass., USA). The patient had no complaints since his last surgery.

On physical examination the patient appeared septic and had a surface temperature of 39°C. Laboratory workup disclosed a peripheral leukocytosis of 22.4×10^9/l.

There was a xyphopubic scar from the previous operation. The mass was located at the left scar border and measured 8×5 cm. The overlying skin was inflamed, with a fluctuating center. An abdominal wall abscess was diagnosed; it was incised under venous sedation and found to contain 20 cc thick greenish pus. The postoperative treatment included broad-spectrum antibiotic coverage and led to a smooth recovery with complete healing of the wound within 10 days. A culture of the pus grew *Escherichia coli* and *Bacteroides*. Two weeks after discharge from the hospital the patient returned with a fistula at the incision site draining feculent material. A contrast fistulography revealed that the fistula tract communicated with both the colon and jejunum (Fig. 1). An elective closure of the fistula tract was planned.

Surgery was performed through a left pararectus incision encompassing the fistula. A 5×5 cm conglomerate of colon and jejunum was found to incorporate a complex fistula tract and a part of the polypropylene mesh that had been used to repair the abdominal wall. The affected intestine was resected with anastomosis. A 4×4 cm oval piece of the mesh containing the tract was removed. The intestinal loops that adhered to the inside of the defect borders were dissected and multiple #2 Prolene sutures (Ethicon) were passed 2 cm lateral to the defect and left untied. The corresponding wound was packed and left to heal secondarily. Broad-spectrum parenteral antibiotics were prescribed. Histology of the resected specimen revealed a fistulous tract with acute and chronic inflammatory changes.

When infection was controlled and the wound began to granulate, the defect was closed under general anesthesia. An onlay composite polytetrafluoroethylene/polypropylene patch (Composix, Davol, Cranston, R.I., USA), through which the previously placed sutures were passed and tied (Fig. 2). The patch overlapped the defect margins by 3 cm; the skin was closed primarily. The postoperative course was smooth and the patient was discharged on postoperative day 5. At 6-month follow-up the repair was sound.

OUR EXPERIENCE

27 reoperation after intraperitoneal mesh repair

In the last 5 years

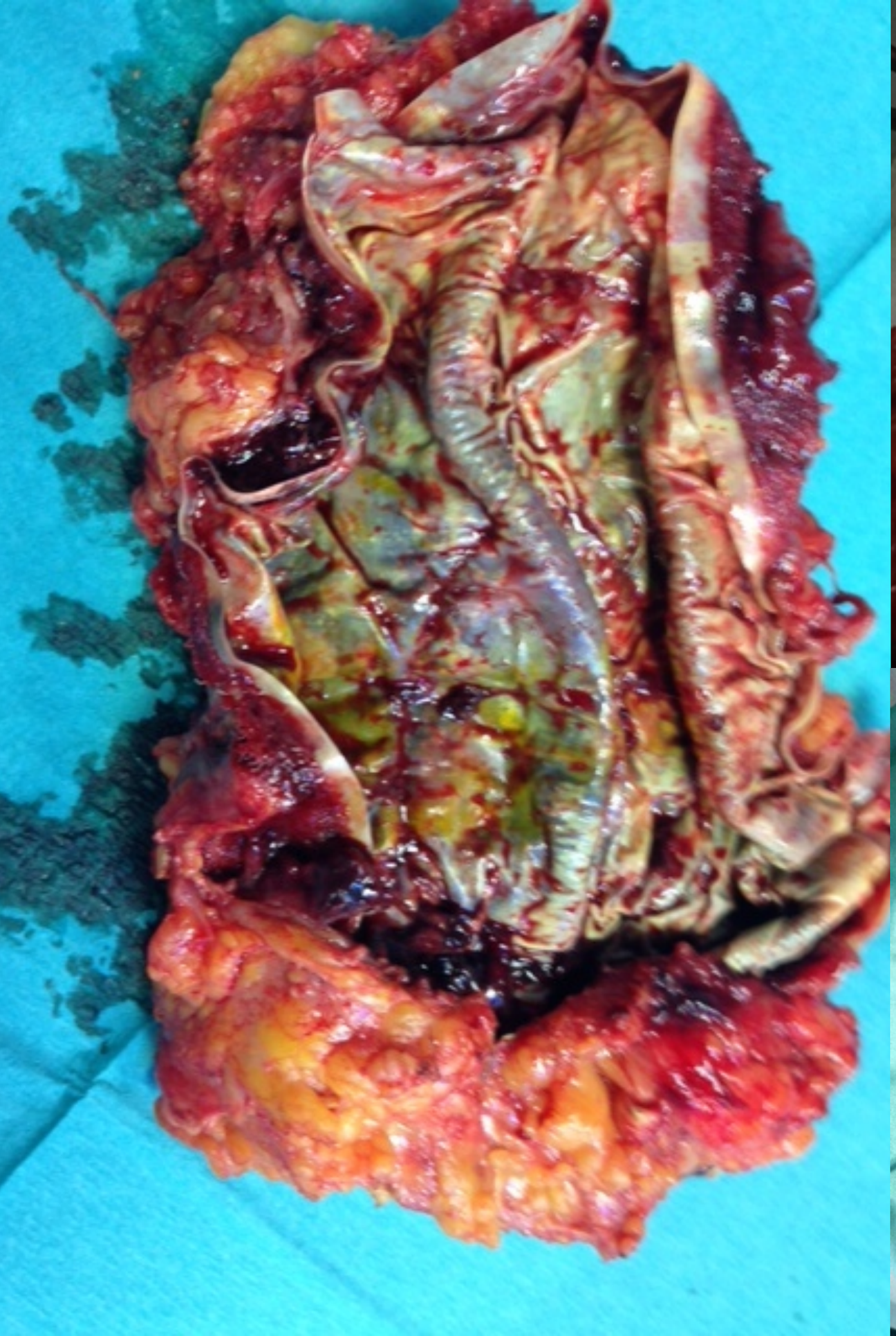
- Mesh adhesion 27/27 (100%)
- Recurrence 11/27 (40,8%)
- Bowel occlusion(secondary to recurrence) 3/27 (11%)
- Infection 14/27 (52%)
- Entero- cutaneus fistula 5/27 (18,5%)
- Seroma 3/27 (11%)
- Mesh migration 2/27 (7,4%)
- Mesh shrinkage 26/27 (96%)

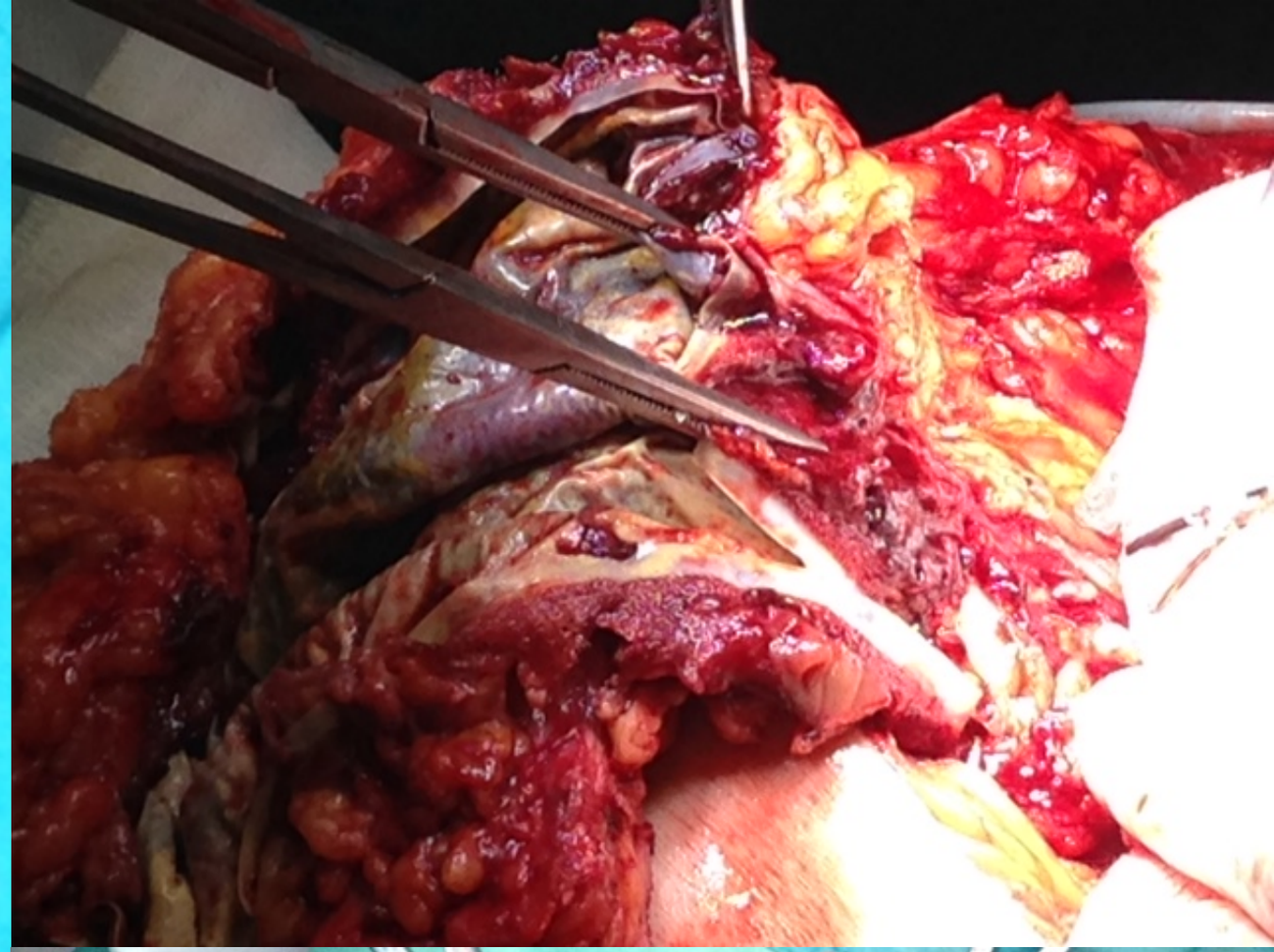
PATIENT FZ

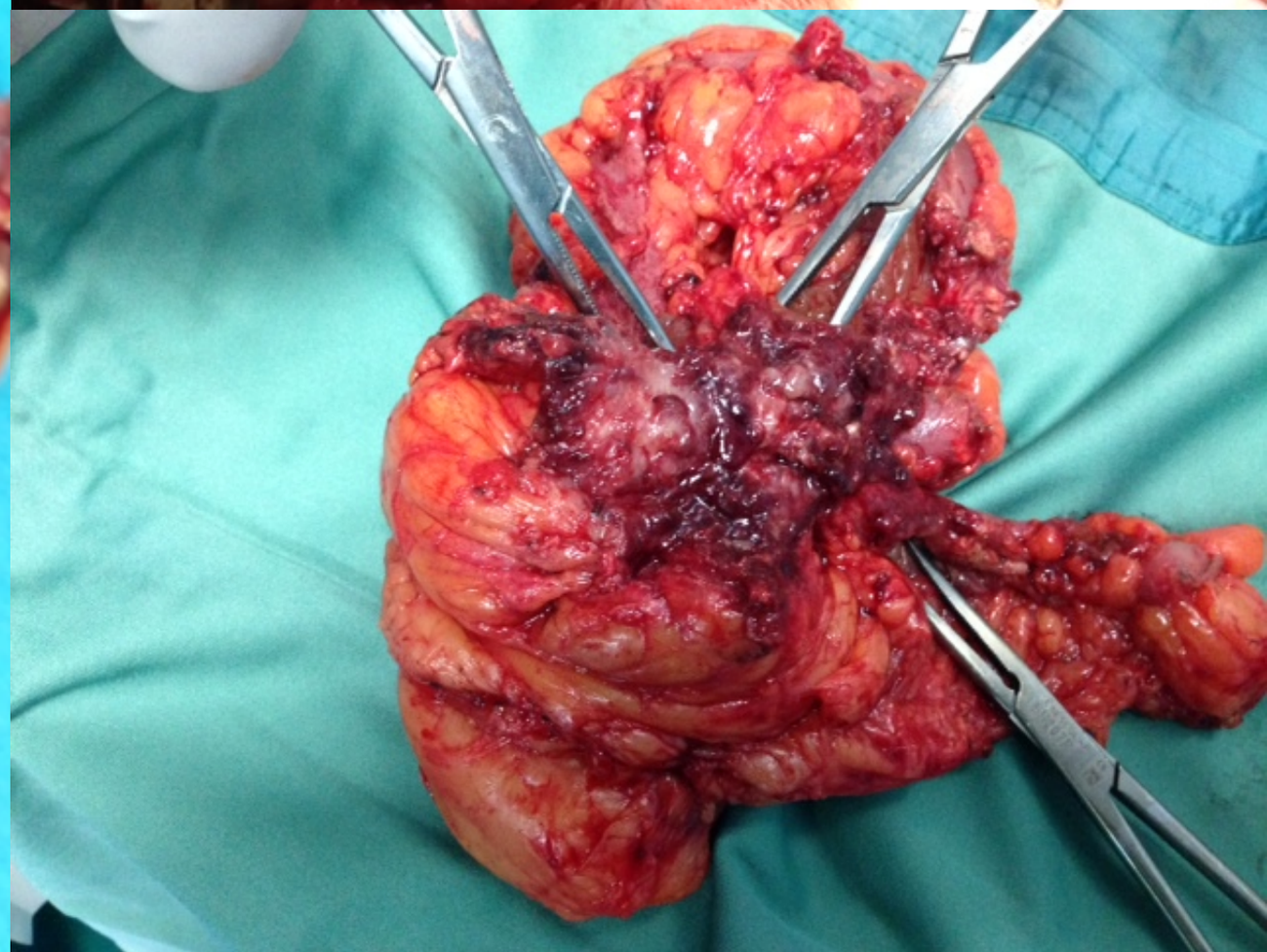
- AGE 62
- BMI 37
- COMORBIDITES Hypertension

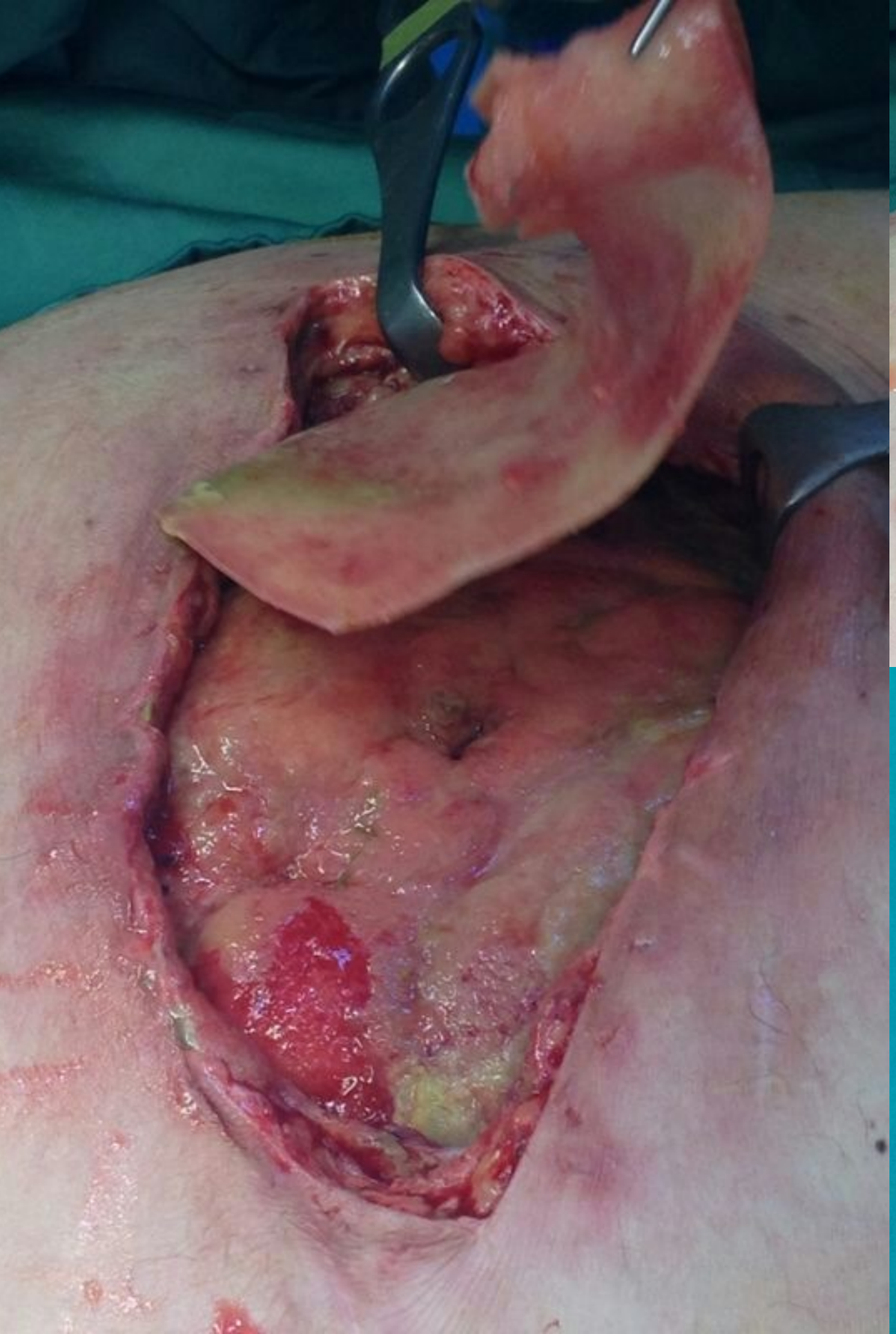
CLINICAL HISTORY

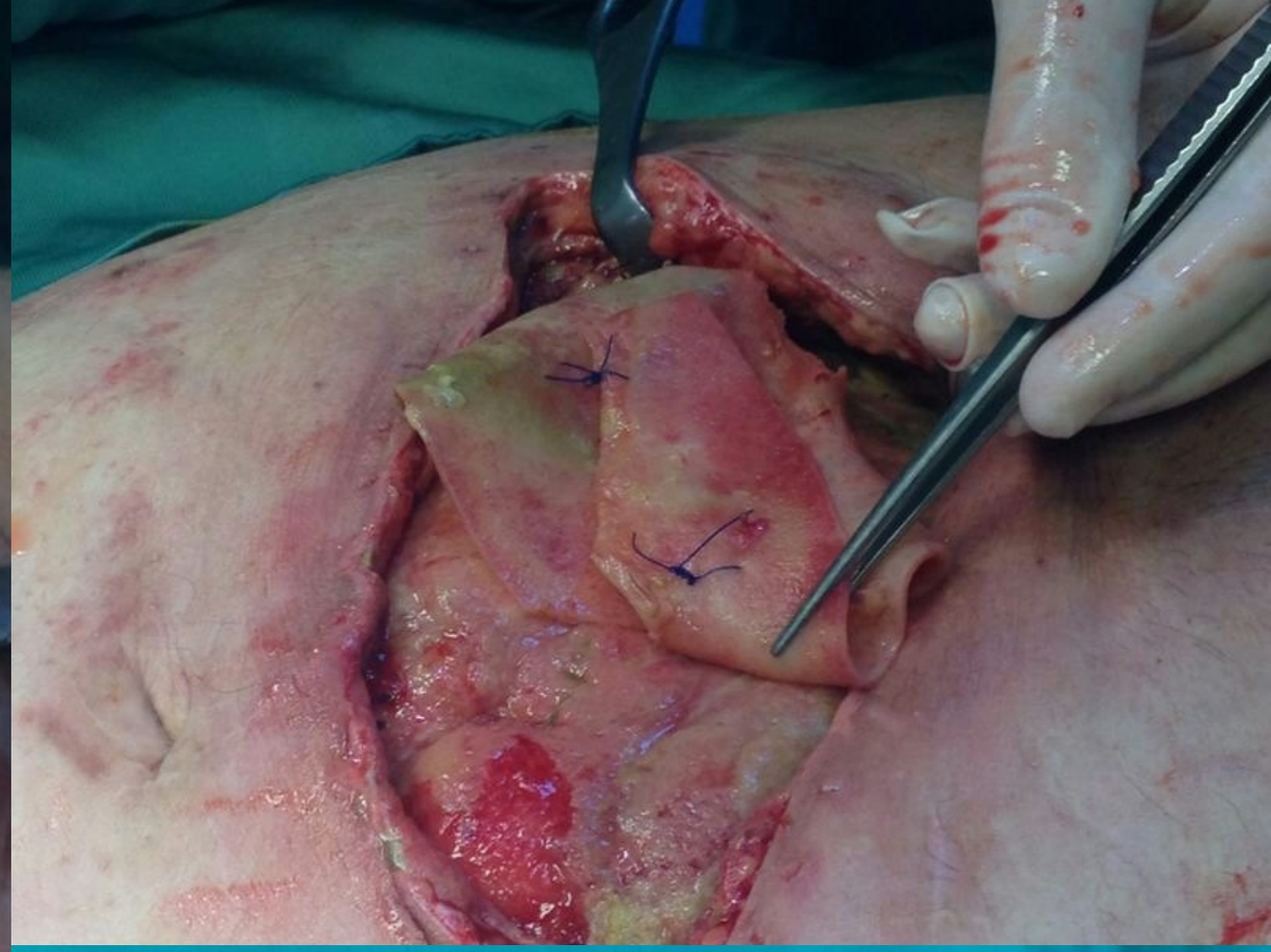
- 1995 Laparoscopic cholecystectomy
- 2000 Incisional hernia on umbilical hernia
- 2005 Recurrence of incisional hernia
- 2009 Mechanical bowel occlusion caused by incisional hernia recurrence
- 2013 Abdominal wall and prostheses infection caused by entero- cutaneus fistula

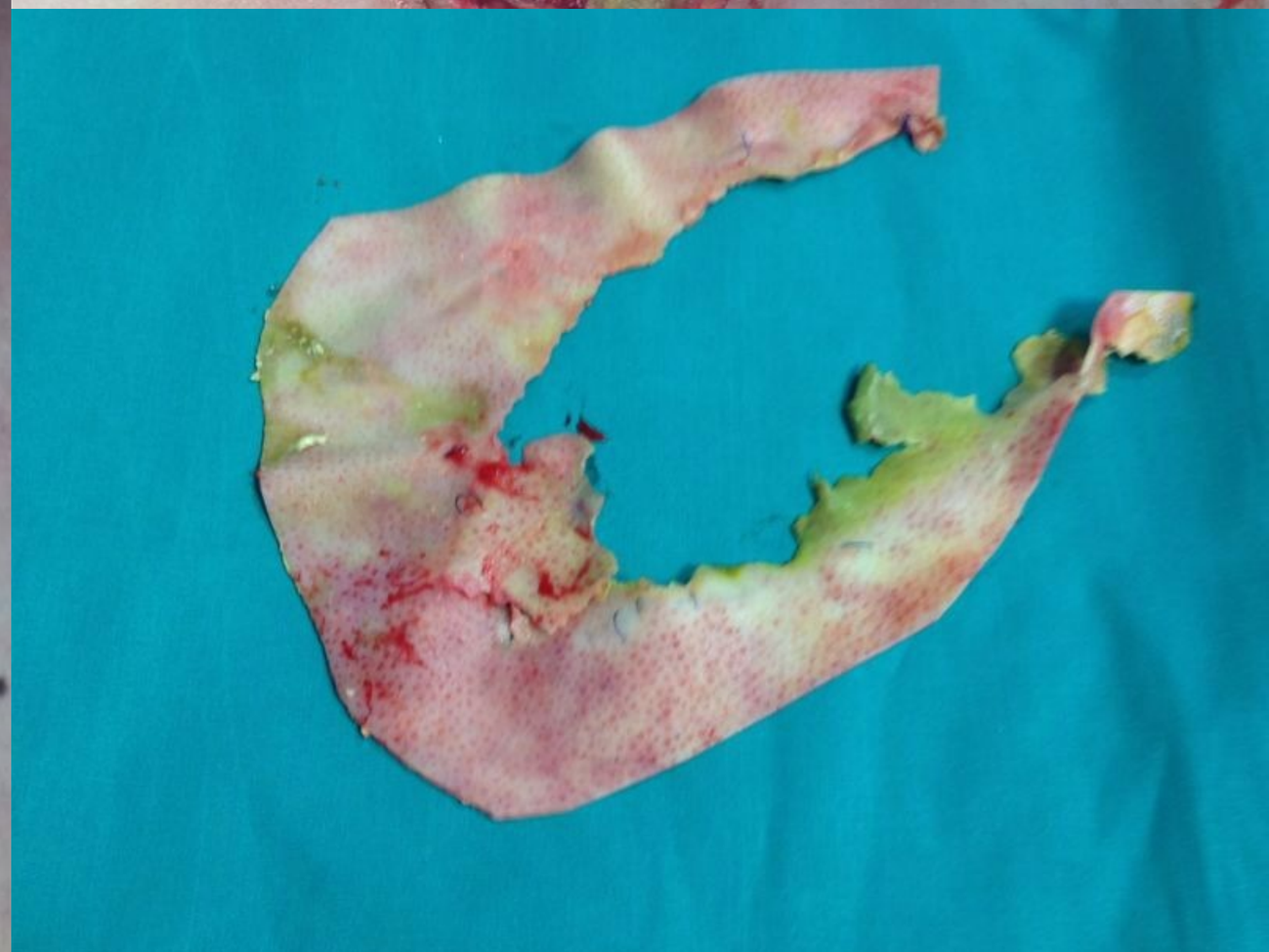












Hernia
DOI 10.1007/s10029-012-0969-3

ORIGINAL ARTICLE

Infected large pore meshes may be salvaged by topical negative pressure therapy

F. Berrevoet · A. Vanlander · M. Sainz-Barriga · X. Rogiers · R. Troisi

Received: 16 September 2011 / Accepted: 12 July 2012

Abstract
Purpose To evaluate the efficacy of negative pressure therapy for superficial and deep mesh infections after ventral and incisional hernia repair by a prospective monocentric observational study.
Methods During a 6-year period, 724 consecutive open ventral and incisional hernia repairs were performed. Pre- and intraoperative data as well as postoperative complications were prospectively recorded. In case of wound infection, negative pressure therapy (NPT) was our primary treatment.
Results Sixty-three patients (8.7 %) were treated using negative pressure therapy after primary ventral and incisional hernia repair. Infectious complications needing NPT occurred in 54 patients in the retromuscular group (54/523; 10.3 %), none when laparoscopically treated and in 9 patients (9/143; 6.3 %) treated by an open intraperitoneal mesh technique. Considering outcome, all meshes were completely salvaged in the retromuscular mesh group after a median of 5 dressing changes (range, 2–9), while in the intraperitoneal mesh, group 3 meshes needed complete ($n = 2$) or partial ($n = 1$) excision. Mean duration to complete wound closure was 44 days (range, 26–63 days).
Conclusion NPT is a useful adjunct for salvage of deep infected meshes, particularly when large pore monofilament mesh is used.

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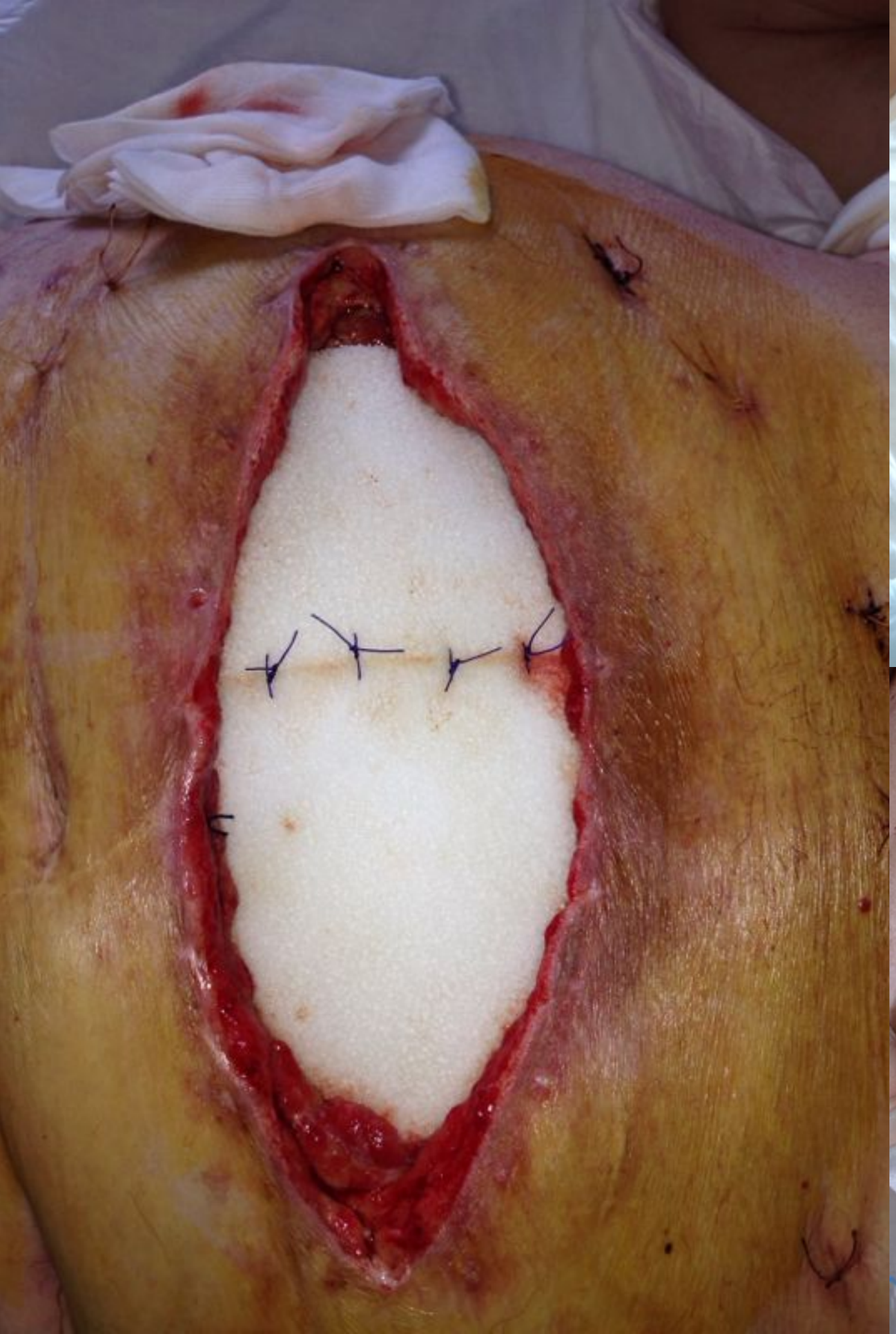
Keywords Mesh · Infection · Ventral hernia · Negative pressure therapy · Vacuum assisted therapy · Large pore

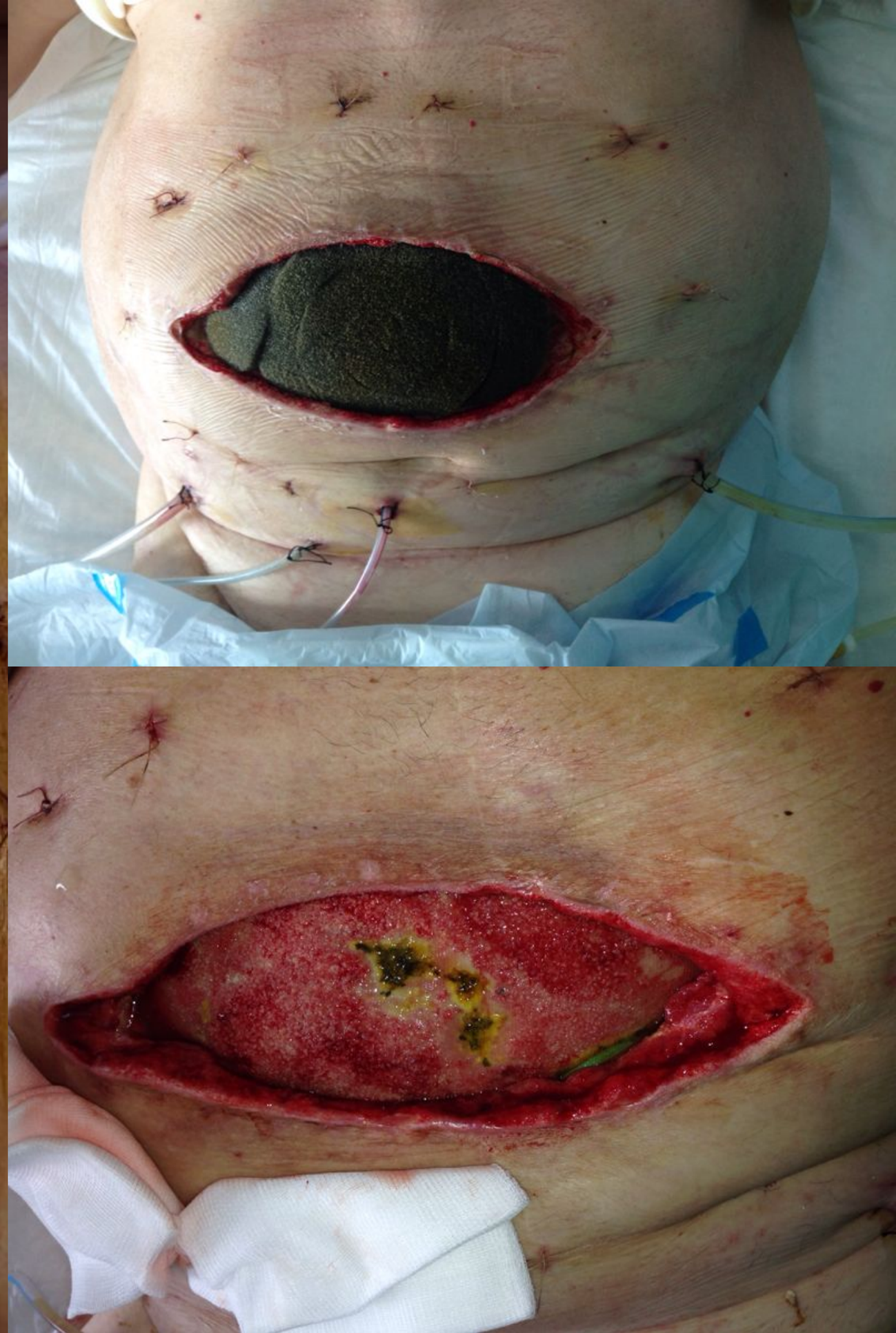
Introduction

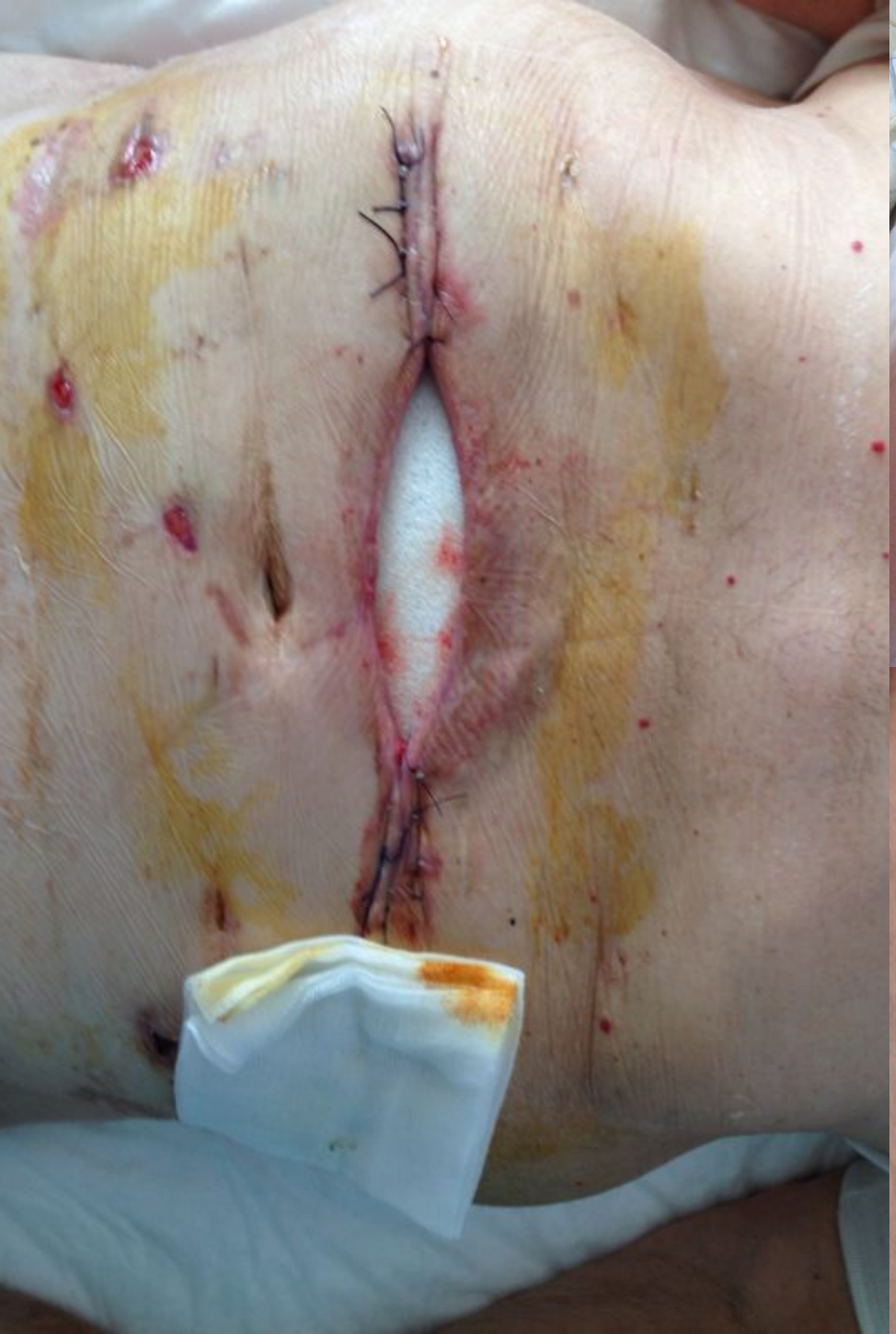
Worldwide, an estimated one million synthetic meshes are used annually in surgery, as the use of prosthetic materials has become standard practice in hernia surgery, providing a durable and lasting repair with a lower rate of recurrence than primary suture repair [1, 2].

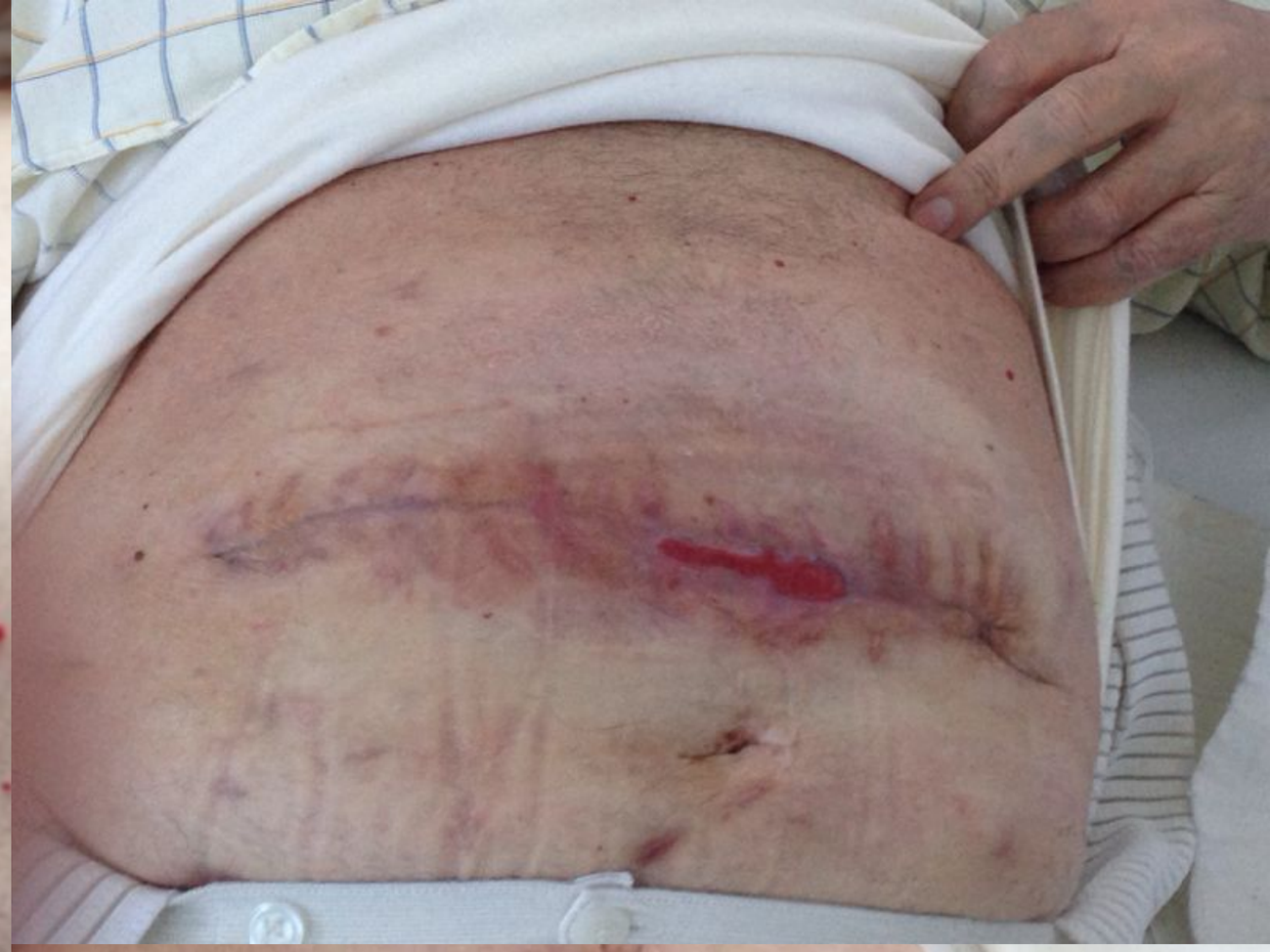
The prevention of infectious complications is one of the most important objectives of successful hernia surgery. In guidelines established by the Centre for Disease Control and Prevention in hernia surgery, it has become clear that both superficial and deep incisional surgical site infection (SSI) are the most common type of infection and, as the implantation of a prosthesis becomes the standard method for the treatment of hernias, that the frequency of infection with deep incisional SSI is commonly referred to in the literature [3, 4]. Despite the use of a sterile technique and prophylactic antibiotics, infections complicate as many as 8 % of hernia repairs with prosthetic materials [5, 6], while the incidence of postoperative mesh infection is 1–2 % of all grafts [7]. Moreover, wound infection on itself has also been identified as a consistent risk factor for recurrence after ventral hernia repair. Luijendijk et al. [2] reported, in their RCT on suture versus mesh repair for ventral hernias, a wound infection incidence of 3.7 % of subjects and was associated with a greater than 80 % risk of recurrence.

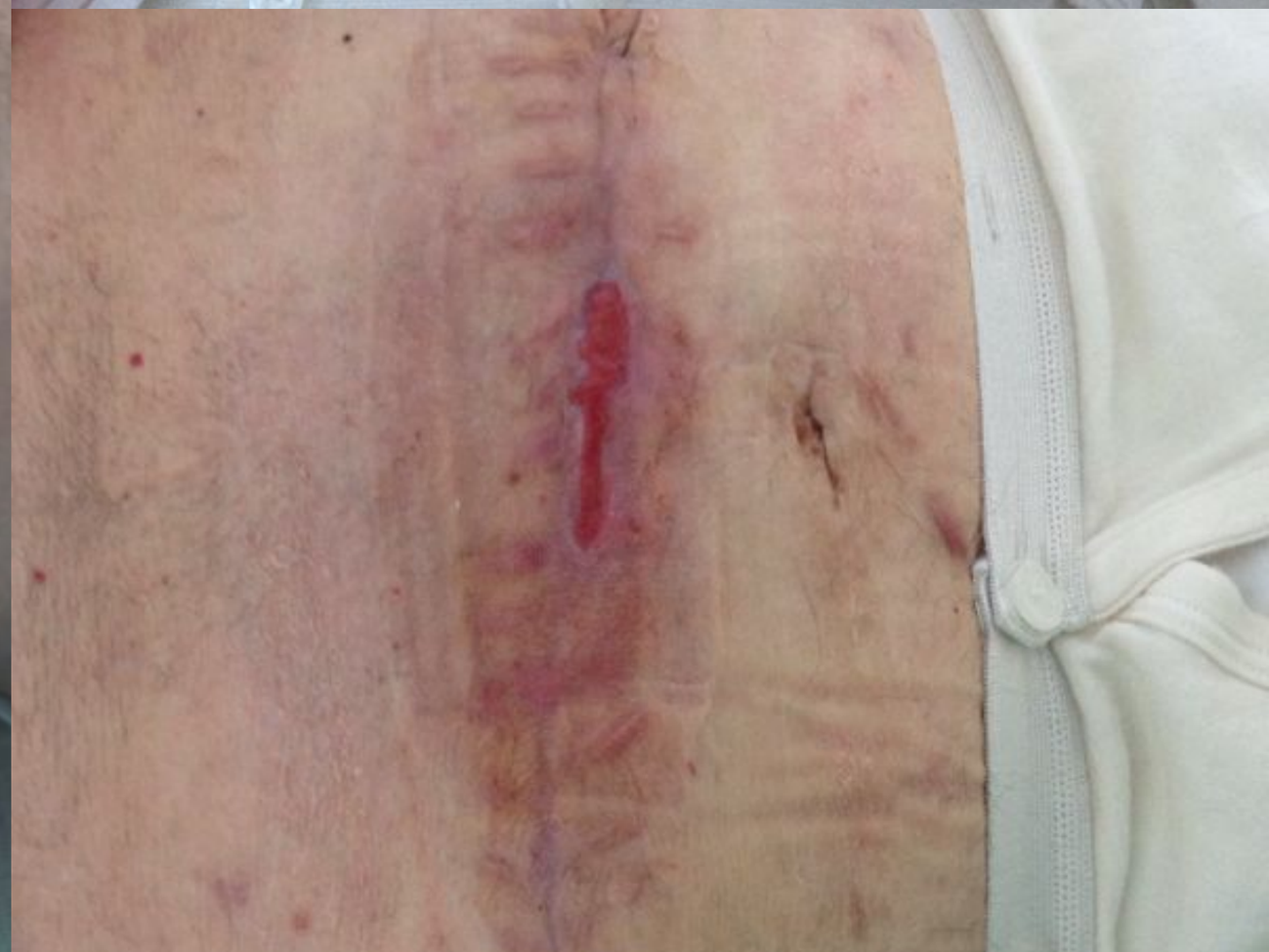
A large number of clinical trials have been published on infectious complication rates after abdominal wall implants, demonstrating that the incidence of infection depends heavily on mesh type and surgical technique applied. Polypropylene meshes show infection rates

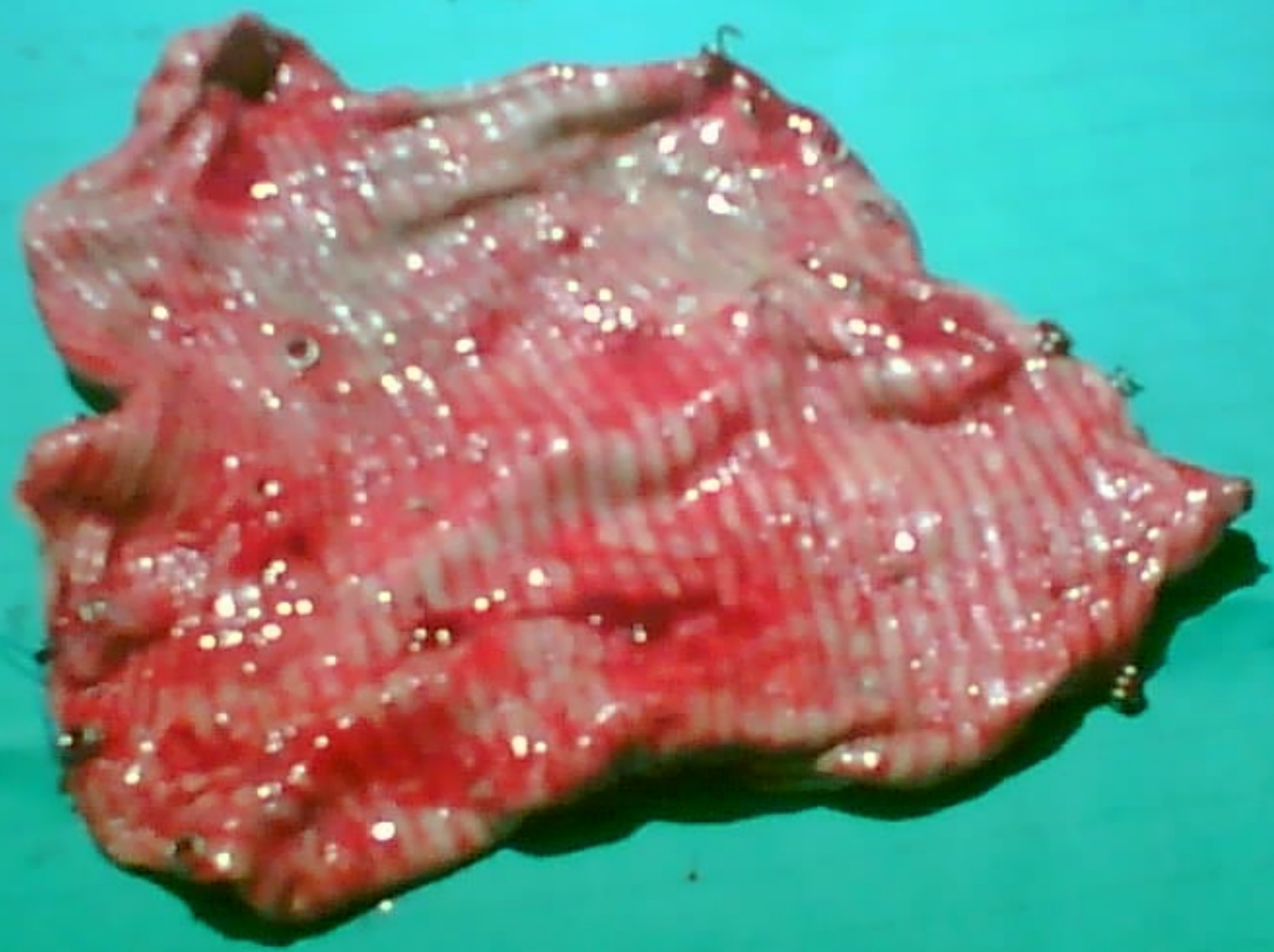


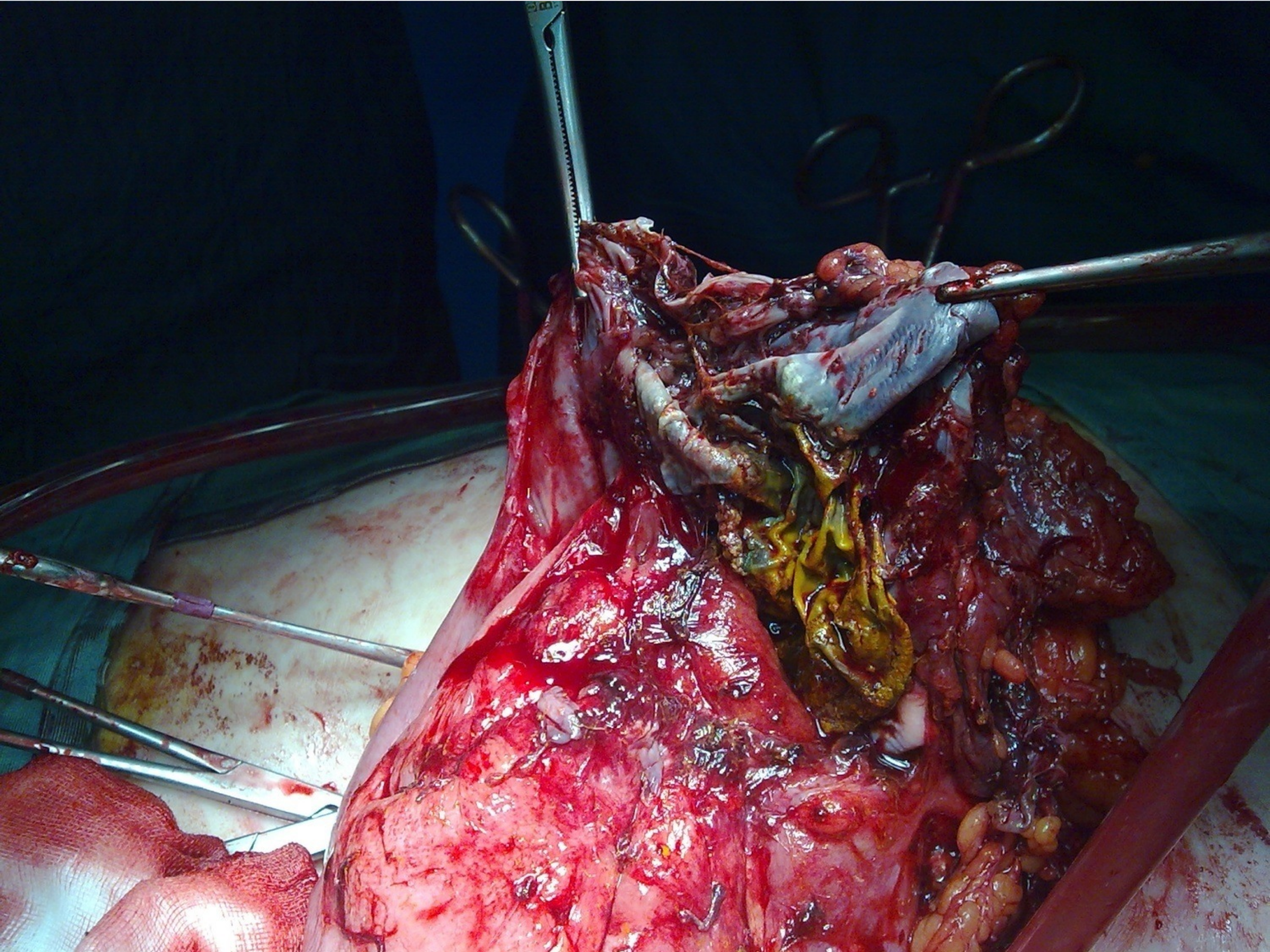


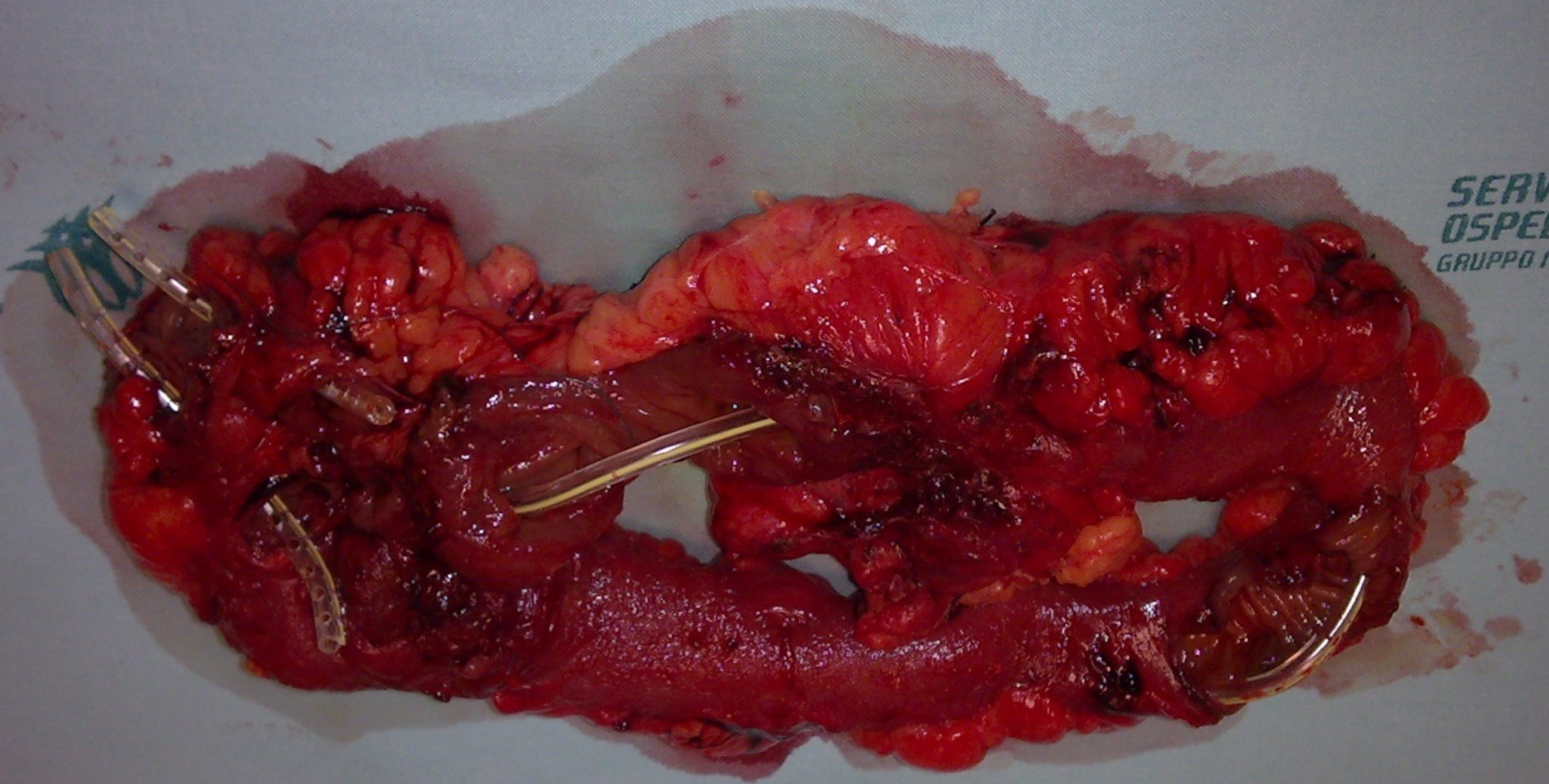


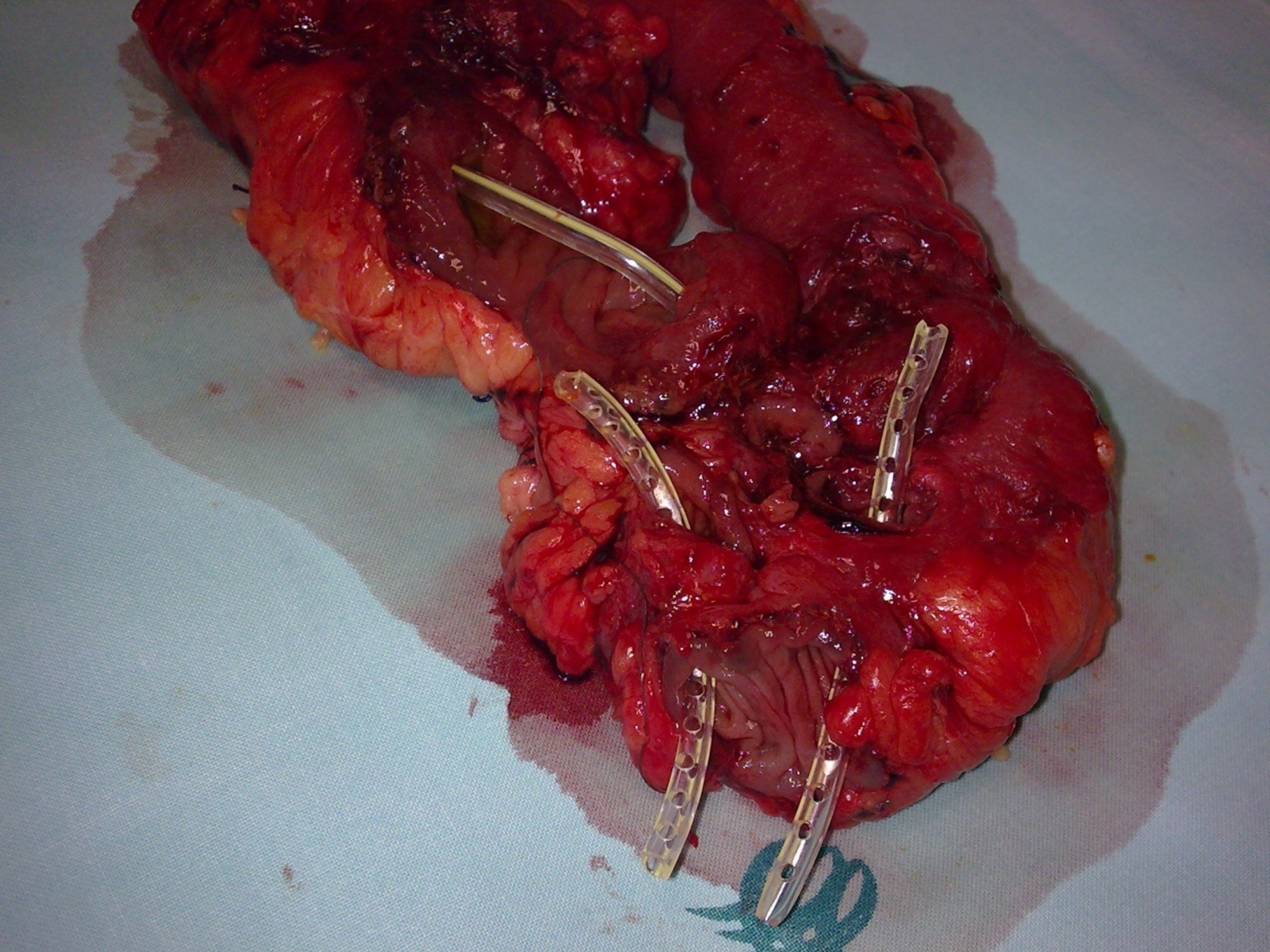












MY PROPOSAL

Prospective registry and histological evaluation of mesh sample taken during subsequent abdominal operations after mesh implantation. Study protocol.

PROJECT: "REDOSURGERY THE DESTINY OF PROSTHESIS"

PROSPECTIVE REGISTRY AND HISTOLOGICAL EVALUATION OF MESH SAMPLE TAKEN DURING SUBSEQUENT ABDOMINAL OPERATIONS AFETR MESH IMPLANTATION. STUDY PROTOCOL.

DURATION: 3 years

ESTIMATED NUMBER OF PATIENTS RECRUITED: 120

CENTERS INVOLVED:20

WHAT IT IS: Laparoscopic re-operations in all patients who have been previously implanted prosthesis by laparoscopy or by open and that does not have secondary problems to this intervention.

AIM OF THE STUDY: documenting the current status of the prosthesis in terms of: settlement and integration into the tissues, a possible switchover, displacement, adhesions to the viscera and omentum, possible relapse.

MATERIALS AND METHODS: documents with video recording of the intervention, description of the type of implant, implant date and type of intervention, and any access difficulties, the degree of bleeding and the current characteristics of the prosthesis as described above. Sampling of prosthetic tissue for histological and / or bacteriological analysis.

Inflammation Level

Fibrosis Level

- Study of M1 And M2 Macrophages (inflammatory macrophages e repair fibrotic marophages)
- Study of Fixation Methods
- Propensity for Adhesion (adhesion assessment-collagen hidroxiproline content)

COORDINATORS OF THE STUDY: Diego Cuccurullo & Vincenzo Mandalà

LIST OF CENTERS INVOLVED:

CONCLUSIONS

Until now in literature there are only works regarding explanted meshes or researches in experimental models, short term observations.

An European Registry could be more valid than a National one, for the presence of more qualified Centers involved, more observed Centers

We expect point of view of all components of the involved Centers

We have to think if an approvment of the Ethical Committee is needed or not

We believe that this Study is more interesting and reliable for the Companies even versus explanted meshes studies

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