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Surgical treatment of large incisional hernias with an intraperitoneal Parietex Composite mesh: Our preliminary experience on 26 cases

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Abstract Background: The authors analyse the results of a prospective study on the use of a new type of composite mesh, Parietex Composite (PC) (Sofradim, France), positioned intraperitoneally in incisional hernias. **Methods:** Twenty-six patients (9 men, 17 women), aged 51 on average (range 33–79), were treated with this mesh. Twenty-four patients underwent open surgery. Indications were: ventral hernias that were big, on the border, multirecurrent, or larger than 10 cm with important associated pathologies. Only two patients with small hernias were treated laparoscopically. **Results:** The average follow-up of our survey was 15 months (range 6–24). All patients underwent ultrasound scans of the abdomen before surgery and 6 months after the operation, according to the Sigel technique, in order to detect the presence of visceral adhesions to the mesh. In 23 patients (88%), the bowel's motions, both spontaneous and induced, were in a normal range. We had neither intestinal occlusions nor fistulae. No deaths occurred. Postoperative complications were minor: two seromas (8%), one hematoma (4%), two parietal suppurations (8%). No mesh was removed. Only one recurrence occurred (4%). **Conclusions:** Our preliminary experience with PC is so positive that this mesh is currently the one of choice in our department when an intraperitoneal implant is required.

Keywords Incisional hernias · Hernioplasty · Intraperitoneal mesh · Bowel adhesion detection

Introduction

According to scientific literature, there is no actual recommended procedure, nor gold standard, for the treatment of incisional hernias [1, 2].

Different surgical techniques have been reported. These are:

1. aponeurotic muscle plastic surgery
2. onlay, underlay, or inlay mesh implantation
3. laparoscopic techniques
4. plastic surgeries with dermal autografts or vascularised myocutaneous edges

The choice of a technique is often determined by the surgeon's preference, the routine, or even by the hospital's economical situation rather than by the type of incisional hernia.

Due to the low incidence of case histories for this pathology, it is hard to compare the different techniques, and surgeons will use their own preference for this surgical procedure. Furthermore, the different surveys do not perfectly overlap, since the most commonly used classifications are often unsuitable for comparison.

The only indisputable data is the high rate of recurrences of traditional hernioplasties without mesh, which can sometimes reach 55% [2, 3, 4, 5].

The real issue in the treatment of ventral hernias is whether or not it is possible to close the peritoneal wall to avoid any contact between the mesh and the bowel. When it is possible, the technique we mainly use is Rives.

There are cases, such as giant ventral hernias, where it is impossible to separate the mesh from the bowel without creating tension. Here, the solution is to position the mesh intraperitoneally. In these cases, the direct contact between the mesh and the bowel can be the cause of adhesion formation. ePTFE has provided the first solution to this problem but has been reported to produce low fibroblast incorporation.

Composite meshes were designed to join the characteristics of traditional meshes (polyester, polypropylene)

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to those of other materials able to prevent adhesion formation when in contact with the bowel.

In this article, the authors analyse the results of a prospective study on the use of a new kind of intraperitoneal composite mesh.

Materials and methods

Between September 1999 and 2002, 161 patients underwent prosthetic surgery (Fig. 1) to strengthen or substitute large parietal defects. The mesh was positioned in the retromuscular-fascial area according to the Rives technique in 120 patients and in the premuscular-fascial area in 11 patients. In 33 cases, we chose the intraperitoneal approach; in the first seven patients we used an ePTFE mesh, while in the next 26 patients, we preferred to implant a composite mesh (Parietex Composite). The 26 cases treated with the Parietex Composite (9 men, 17 women), with an average age of 51 years (age range 33–79), referred to:

1. two cases of small incisional hernias (< 5 cm) treated laparoscopically
2. 24 cases of big incisional hernias with a defect > 15 cm, border ventral hernias, multirecurrent, or ventral hernias larger than 10 cm with associated abdominal diseases.

The parietal defect was median in 15 cases, paramedian in seven, and on the border in four cases. Seven patients, presenting with signs of respiratory insufficiency, required traditional and/or instrumental respiratory physiotherapy associated with antibioticotherapy. Five patients were obese (with a BMI between 25 and 40), and three suffered from diabetes. Eight patients had undergone more than one surgical operation, and two patients more than three. Before the operation, all patients were given short-term antibiotic prophylaxis.

In both open and laparoscopic approaches, the surgical technique has required the use of a nonresorbable suture to fix the mesh 5 cm beyond the parietal defect edge and a scrupulous asepsis with a “no-touching technique”.

In all patients, two drains were left in the upper aponeurosis plan or in direct contact with the mesh when the aponeurosis could not be closed. A bandage was always applied at the end of the operations.

Preoperatively and at 6 months after the operation, all patients underwent an ultrasound scan of the anterior abdominal wall according to the Sigel technique [6] to assess the incidence of bowel adhesions to the mesh. This technique locates the presence of adhesions between the anterior wall of the abdomen and the underlying bowel by the movement of the intestinal loops. Both spontaneous (breathing) and induced (through manual ballotement) movements are analysed; the author of the technique calls these movements “viscera slide”. Normally, the intestinal loops movement range is between 2 and 5 cm.

The ultrasound scan is normally performed by the radiologist, who is not necessarily aware of the aim of the study nor the type of operation. The ultrasound scan is made on the patient in supine position and with a 5- and 7.5-MHz probe. Restricted viscera slides < 1 cm in horizontal motion were considered to be bowel adhesions.

The postoperative pain of the 24 open patients was evaluated with the Visual Analogic Scale (VAS) at 12, 24, 48, and 72 h after the operation and compared to the pain of 30 patients operated on in the same period with the Rives technique for smaller incisional hernias.

In our study, we also analysed recurrences, postoperative early complications (seromas/haematomas, parietal suppurations, etc.), late complications (bowel occlusions, fistulae, chronic pain, foreign-body sensation), length of the operation, mean hospital stay, and return to work.

Results

The average follow-up of our study was 15 months (range 6–24 months). All patients were included.

The postoperative complications were minor: two seromas (8.3%) diagnosed by ultrasound scan and treated by echoguided evacuative puncture, one haematoma (4%), and two parietal suppurations (8.3%) (Table 1). There was no postimplant mortality.

According to the Sigel ultrasound scan, the motions of the bowel, both spontaneous and induced, were in the normal range in 23 patients (88%). No occlusion, bowel subocclusion, or fistula occurred.

Only a partial recurrence (4%) in a multirecurrent large incisional hernia was found 11 months after the operation. The mesh never had to be removed. Mean time of the operation was 90 min (range 55–120 min).

Fig. 1 Positioning of the mesh in 169 cases (1999–2002)

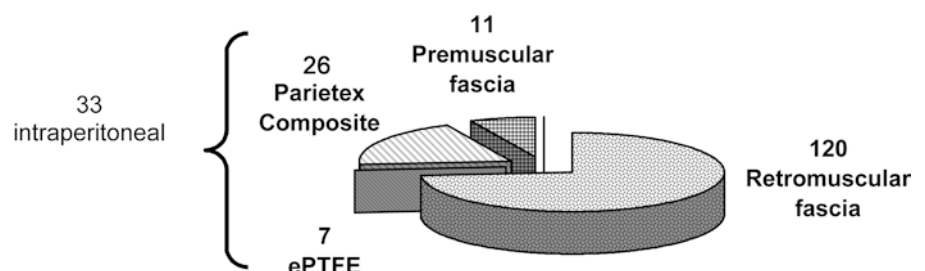


Table 1 Complications in 26 patients (2000–2002) treated with an intraperitoneal Parietex Composite (24 open surgery, two laparoscopy)

Seromas	2
Haematomas	1
Wound suppurations	2
Cutaneous necrosis	–
Peritoneal sepsis	–
Fistulae	–
Bowel occlusions	–
Foreign-body sensation	–
Chronic postoperative pain	–
Recurrences	1

Postoperative pain, evaluated at 12, 24, 48, and 72 h after the operation by the VAS was particularly low at 12 h, totally absent at 48 h in all patients (Fig. 2), and quite strong in the Rives patients (Fig. 3).

Mean hospital stay was 7 days (range 5–13 days), and the return to work was after 13 days (9–27 days).

Discussion

Modern prostheses have surely represented a milestone in the treatment of abdominal parietal defects, but the

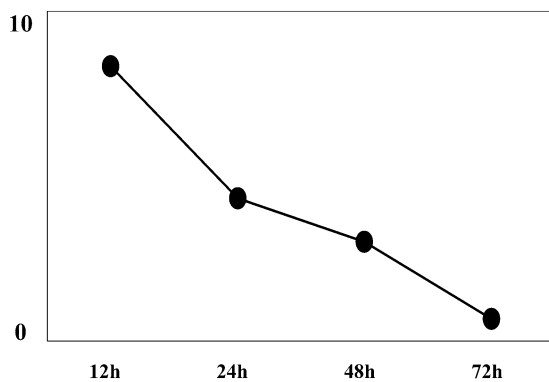


Fig. 2 Evaluation of postoperative pain by the Visual Analogue Scale (VAS) at 12, 24, 48, and 72 h from the operation in 24 patients operated on with an intraperitoneal Parietex Composite

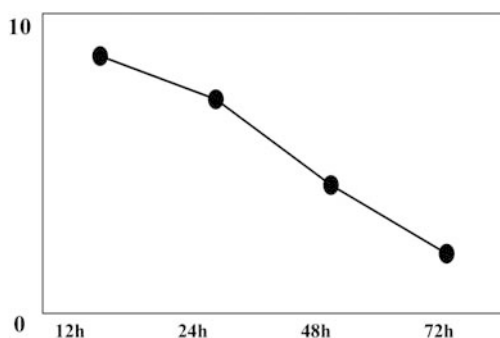


Fig. 3 Evaluation of postoperative pain by the Visual Analogue Scale (VAS) at 12, 24, 48, and 72 h from the operation in 30 patients operated on with the Rives technique

surgeons' doubts remain the same: implantation, choice, and location of the mesh.

Regarding the first point, except when a bowel injury occurs during surgery, there is no clear contraindication, and the majority of surgeons always prefers to use a mesh because of the high rate of recurrences with traditional hernioplasties [2, 3, 4, 5, 7, 8]. Concerning the type of mesh, there are still many doubts due to the ever-increasing number of more reliable and innovative products coming onto the market.

Concerning the positioning of the mesh, three options have been evaluated: the premuscular-fascial site, according to Chevrel [9] (“onlay technique”), the retromuscular fascial site, widely used by Rives and Flament (“underlay technique”) [10, 11, 12], and the intraperitoneal approach (“inlay technique”), used by several other surgeons [13, 14, 15, 16].

During the last 3 years, we have used an intraperitoneal PC, a tridimensional polyester mesh with a resorbable, nonstick, collagen-polyethylene glycol and glycerol membrane, which prevents adhesions (Sofradim, France).

According to our experience, the indications to this mesh in open surgery are:

1. big ventral hernias
2. border ventral hernias
3. multirecurrent ventral hernias
4. ventral hernias with associated pathologies

In our survey, the intraperitoneal positioning of the mesh is indicated not only in big median ventral hernias with loss of abdominal tissue and in multirecurrent large ventral hernias but also in border ventral hernias where the proximity of bone and cartilaginous structures or the presence of associated pathologies (noncontaminating) make the operation long and hard. The intraperitoneal approach shortens the time of the operation, as it reduces the dissections required by the retromuscular positioning of the mesh.

In the first 26 patients treated with this mesh, we noted that the complication rate was very low and the compliance reasonably good (Table 1). The smaller dissections required by the intraperitoneal positioning of the mesh make the operation easier even to less experienced surgeons.

The Rives technique, although the one of choice, has some drawbacks: as it requires huge blunt dissections of the muscular-aponeurotic structures, it is the cause of high morbidity due to seromas and/or haematomas (one patient in our survey required a blood transfusion). The average time of a Rives-technique operation is significantly longer than any other technique requiring the positioning of the mesh in different sites (intraperitoneally or outside the fascia); this can determine a respiratory insufficiency in predisposed patients because of the inevitable tensions affecting the patient's breathing in the postoperative period, when the hernia defect is very large.

Another problem with both Rives and Chevrel techniques is that the sensation of a foreign body leads to continuous ambulatory checkups in the postoperative period. None of the patients treated with this mesh in our study has ever reported this complication.

However, the main problems with intraperitoneal meshes are their intraperitoneal positioning, which may involve the potential risk of visceral lesions and higher costs in comparison with traditional polypropylene or polyester meshes.

As far as the first point is concerned, the clinical practice shows that with ePTFE, the tendency toward adhesion formation is low. Due to its hydrophobicity and low porosity, this material may form dead spaces and consequent seromas and haematomas. In addition, the scarce tissular integration of this material is deemed to be responsible for a more minor resistance to traction than macroporous meshes; this could lead to a recurrence.

These are the reasons why after the initial period, where we had mainly used ePTFE meshes, we started to implant a new composite mesh (Parietex Composite) 3 years ago.

Composite meshes were introduced to join both macroporous and any other mesh characteristics to prevent the formation of adhesions to the bowel.

Clinical and experimental studies reported in the literature show that the PC mesh, in comparison with other materials, prevents adhesions, as it promotes the formation of a new peritoneum [16, 17, 18, 19] and integrates into the abdominal wall both rapidly and completely.

The ultrasound scan, according to Sigel [6], showed a low rate of adhesions in our patients, as other authors have already stated.

The present literature reports successful results achieved with conventional meshes (noncomposite) used intraperitoneally [1, 2, 13, 14, 15, 20, 21], but a longer follow-up is necessary, since occlusions may occur several years after the mesh implantation [22, 23, 24].

Concerning costs, a correct and less superficial analysis should not include the mesh only. It is known that an operation requiring the positioning of an inlay mesh is faster, easier, and requires only minimal involvement of the operating room staff. The hospital stay is shorter, the bed turnover is increased, and this provides greater efficiency within the hospital department.

Finally, a very important point: the compliance is excellent; patients with inlay meshes have a more favourable postoperative course, a lower rate of complications, and a lower risk of infections, as the mesh is positioned deeper and is drained by the peritoneum.

A deep mesh shows a higher resistance to the abdominal pressure, as the repair is not beyond but beneath the parietal defect, where the endoabdominal pressure forces the mesh against the wall.

Analysing the results on 26 cases treated with PC, we can state that the complications rate was low and the compliance was excellent (Table 1).

Postoperative pain was lower than in the patients treated with the Rives technique.

Even though the literature reports cases of postoperative chronic pain following incisional hernia repair with other composite meshes [25], none of our patients has reported this complication. This is probably due to the fact that polyester is softer than polypropylene.

The only recurrence out of 26 cases treated with PC (4%) occurred in a patient with a multirecurrent ventral hernia and big loss of parietal tissue, who underwent open surgery.

The only two cases treated laparoscopically with this mesh were small ventral hernias. We think that the laparoscopic approach for big and multisac ventral hernias must be used carefully because it is difficult to position the mesh, and the large lysis of the bowel could lengthen the operation and form big seromas (This can occur even in small ventral hernias when the sac is not removed) [7].

This type of surgery must be done by surgeons with excellent experience in laparoscopy, as it requires good training, which may be difficult to find in all hospitals, and higher costs than open surgery, due to both instruments and mesh.

Contrary to other kind of operations (cholecystectomy, hemicolecotomy, splenectomy) in which the same gestures are repeated and the times of traditional surgery are respected, we believe that the laparoscopic treatment of the abdominal wall defects subverts the basic principles of open surgery.

Actually, this approach does not re-create the anatomical wall integrity and the correct intra-abdominal pressure and requires the positioning of an intraperitoneal mesh, which, in our experience, must be used only under the right indications. At present, even though the products available on the market are reliable, the risk of complications, due to the direct contact of the mesh material to the bowel, can't be excluded even years after surgery.

Conclusions

In our experience, the technique of choice remains the Rives technique, but there are cases where it is impossible to separate the bowel from the mesh without creating wall tensions. In these cases, the solution can be an intraperitoneal mesh.

Composite meshes are the result of studies made by companies to obtain a double-face material able to join the characteristics of macroporous meshes on one side and the advantages of other materials able to prevent adhesion formation when in contact with the bowel.

We believe that their use should not concern parietal "disasters" only; these meshes are also indicated for other types of incisional hernias that, due to their size and characteristics, would create strong wall tensions if treated with the Rives technique.

The preliminary results of our prospective study with PC have been encouraging, even though a longer follow-up and a larger number of patients are required.

It is important to stress that the most important aetiological factor of the incisional hernias incidence is the infection of the surgical wound after the first operation.

Furthermore, it is mandatory to avoid excessive wall tensions after an incisional hernia operation to prevent the risk of recurrences.

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