



Adhesive complications in a patient after ventral hernia IPOM repair – a case report for Videoforum

Piotr Gierej, Marcin Kotulski, Sebastian Piotrowicz, Tadeusz M. Wróblewski

Department of General, Transplant and Liver Surgery, Warsaw Medical University, Poland

Videosurgery and other miniinvasive techniques 2010; 5 (4): 166-170

DOI: 10.5114/wiitm.2010.18832

Abstract

We present two similar case reports of patients who, due to formation of adhesions, were reoperated on following IPOM procedures. The first case is a 21-year-old woman after primary operation: WTP fundoplication and IPOM ventral (linea alba) hernia repair. Chronic pain was the reason for two second-look laparoscopies. There were massive adhesions between the Dynamesh® and the greater omentum as well as the left lobe of the liver. The second case was a male patient after the same primary procedure, reoperated on because of pain and recurrent subileus caused by adhesions between the Dynamesh® and the stomach. Although laparoscopic IPOM hernia repairs are nowadays becoming very popular, one should remember their disadvantages and limitations: anti-adhesive properties of IPOM meshes can still be insufficient in some cases in the long term; further studies and technical progress are needed.

Key words: IPOM, adhesion, complication

Introduction

The number of patients with incisional, umbilical or linea alba hernias is about 13 000 per year in Poland [1]. These are potential patients for laparoscopic procedures. Laparoscopic intraperitoneal only mesh (IPOM) hernia repair is becoming widely performed in ventral hernias [2], offering a shorter post-operative hospital stay and lower complication rate in most of the studies [2-4] in comparison to open primary sutured repair and open prosthetic mesh repair. However, late complication rates are not well characterized.

Development of the IPOM procedure was possible due to the technical progress, associated mainly with innovations in materials used for intraperitoneal implantations. To avoid serious complications, e.g. occlusions, fistulas, or chronic pain associated with adhesions of viscera, IPOM meshes should be anti-adhesive. Resistance against adhesion formation,

beside mesh incorporation, tensile strength and shrinkage, is one of the most important characteristics of meshes used in IPOM procedures. In general, treated meshes are superior to untreated meshes [5]. Different substances are used to achieve opposite effects on each side of the mesh. On the abdominal wall side the influx of inflammatory tissue and, consequently, fibrosis is needed. On the other side, from the peritoneal cavity, they are expected to produce the exact opposite effect, usually by creation of a thin layer to keep the mesh from adhering to intra-abdominal organs [6]. For example, in Dynamesh® the polyvinylidene fluoride (PVDF) monofilament used along the polypropylene (PP) monofilaments is supposed to reduce adhesion between the intestine and mesh without an additional chemical coating. In Parietex Composite, three-dimensional polyester with resorbable collagen barrier on one side is supposed to limit visceral adhesion. Other examples are: ePTFE

Address for correspondence:

Prof. Tadeusz M. Wróblewski MD, PhD, Department of General, Transplant and Liver Surgery, Warsaw Medical University, Banacha 1a, 02-097 Warsaw, phone +48 22 599 25 45, fax +48 22 599 15 45, e-mail: t.wroblewski@videosurgeryjournal.com

(Dualmesh), a composite mesh of smooth ePTFE for the visceral side and textured polypropylene for the parietal side, polypropylene-polyglycol-caprone composite (Ultrapro), titanium-polypropylene composite (Timesh), polypropylene with carboxymethyl cellulose-sodium hyaluronate coating (Sepramesh), polyester with collagen-polyethylene glycol-glycerol coating (Parietex Composite), polypropylene-polydioxanone composite with oxidized cellulose coating (Proceed), and bovine pericardium (Tutomesh) [7]. Some of them show benefits, but most studies are based on animal (usually rat) models [5, 7, 8], with short follow-ups. In many studies the rate of adhesions reported after this laparoscopic procedure is extremely low or even omitted [9]. In contrast, in this study we present two patients reoperated on due to massive adhesions. What is the truth – are they really rare, or are they just asymptomatic in most cases?

Case 1

A 21-year-old woman was referred to our department for laparoscopic repair of linea alba hernia and gastroesophageal reflux disease with radiological and clinical symptoms. She had no previous abdominal surgery and no other concomitant disorders. Preoperative imaging studies showed normal chest x-ray and no additional abnormalities on abdominal ultrasound scan. Gastroscopy showed sliding hiatus hernia with acid reflux. The surgery was performed under general anaesthesia. Intraoperatively oesophageal hiatal hernia and hernia of the linea alba above the umbilicus, without adhesions, were seen. WTP anti-reflux operation was performed [10] (with fixation of Prolene mesh, specially cut, about 4 × 4 cm in size, to the diaphragmatic crura and angle of His restoration by suturing the fundus of the stomach to the left side of the abdominal oesophagus). IPOM procedure was performed for linea alba hernia, using Dynamesh® 20 × 12 cm, positioned with four full-thickness PDS sutures in the corners and Endo Hernia stapler with titanium staples in the “double crown” technique [11]. There were no perioperative complications and the patient was discharged on the fifth postoperative day. She was readmitted five months later because of abdominal wall acute pain localized in the midline above the navel. There were no abnormalities on abdominal ultrasound, high-resolution computed tomography (HRCT), or chest X-ray. She was qualified for diagnostic laparoscopy. There

was a small umbilical hernia in the trocar site (outside the mesh) and adhesions between the mesh and greater omentum and the left lobe of the liver. Adhesions were released and the umbilical hernia was fixed by an open approach through a small incision with primary PDS suturing. Oxycel (oxidized cellulose – supposed to have anti-adhesive properties similar to Proceed mesh) was placed on the left lobe of the liver. No other abnormalities were noted. Again the postoperative course was uneventful, with withdrawal of pain. The patient was admitted again on 06.2010 due to acute recurrent abdominal pain localized in a similar location. She had a second-look laparoscopy – intraoperatively two single adhesions between the large bowel and recurrent umbilical hernia (approximately 3 cm in diameter) as well as massive adhesions of the Dynamesh and left lobe of the liver were found. Once more, the adhesions were freed. The umbilical hernia was treated with IPOM technique using Parietex Composite mesh (12 cm in diameter, stitches with Protack staples). The postoperative course was uneventful and the patient was discharged on the third postoperative day. During the five months of follow-up, she had acute abdominal pain twice, the last episode two months ago.

Case 2

A 21-year-old male patient was referred to our department in January 2006 diagnosed with linea alba hernia and gastroesophageal reflux disease. Preoperative imaging studies (chest X-ray, X-ray of the upper alimentary tract, gastroscopy and abdominal ultrasound scan) showed no other abnormalities. Anti-reflux operation and IPOM procedure for ventral hernia were performed with the same technique as in the first case. The postoperative course was uneventful. From September 2008 he suffered similar pain as before the primary operation, but of a decreased intensity. He was readmitted to the hospital several times with subileus symptoms (mainly vomiting) and was treated conservatively. That is why he was qualified for a second-look diagnostic laparoscopy. He underwent the operation on 09.02.2009. Intraoperatively, numerous hard adhesions of the greater omentum and anterior stomach wall to the Dynamesh were seen. These adhesions were especially excessive in contact with Protack staples. Adhesions were released, however, because of the rigid infiltration of the frontal surface of the stom-

ach; a part of the mesh was excised. This place was filled by further, overlapping Dynamesh (15 × 12 cm), positioned with the Endo Hernia stapler. The patient was discharged on the third postoperative day. During one-year follow-up he had four episodes of abdominal pain, lasting less than four hours and subsiding after relaxants.

Discussion

At the beginning the intra-abdominal use of pure polypropylene meshes had restricted indications, since their intraperitoneal placement brings complications associated with the formation of adhesions. Most serious complications observed were enterocutaneous fistulae and intestinal occlusion. Consequently, nowadays there is a ceaseless search for a mesh composition that offers the existing advantages in terms of maintaining tissue resistance and tensile strength, yet without giving rise to its various complications [6].

In studies concerning IPOM procedures using modern meshes the most common consequence is seroma, usually clinically not relevant (rates ranging from 9.7% [6] to 100% when diagnosed by ultrasound scan [12]). There is a low rate of infections of the prosthesis at the level of 1% [2, 9]. Fistulas and leaks are reported mainly as rare iatrogenic intraoperative events and are usually not noted in long-term follow-up [9]. Low incidence of infection, postoperative ileus and pain, and shorter hospital stay, are the most commonly cited advantages in comparison with open techniques. Long-term consequences of adhesion formation are marginally reported. Also, chronic postoperative pain is a rare object of interest.

Using a mesh with anti-adhesive property of the ventral side is mandatory for intraperitoneal onlay placement in laparoscopic techniques. The parietal side should induce strong tissue incorporation. Are the above reasons for reoperations connected with the chemical structure of this particular mesh? We believe they are not. There are authors using only Dynamesh, e.g. Berger and Bientzle [13]. According to some studies, PVDF seems to be one of the best options among IPOM meshes. Even when compared with the most often applied ePTFE meshes it is supposed to have some additional advantages: better long-term stability and low bending stiffness [14]. PVDF mesh induces low level of inflammation (foreign body reaction), and a minimal cellular response

without onset of an excessive fibrous tissue reaction [8, 14, 15] compared to ePTFE and covered polypropylene meshes. Also, shrinkage data are positive for PVDF – about 20% of PVDF meshes [8] vs. up to 52.4% of ePTFE meshes [8, 16-18]. Data on adhesion formation is surprising [8] – adhesion areas are as high as 26.8% in PP-Col (polypropylene with a collagenoxidized film), 34.6% in PVDF, and up to 57% in ePTFE meshes [8, 19, 20]. This means that, on average, at least one fourth of the implanted mesh surface will develop adhesions. According to Junge *et al.* [8] there was no statistically significant difference when comparing pure polypropylene mesh with ePTFE – 62.0% vs. 52.9%. Of course, when calculating adhesion score according to the Surgical Membrane Study Group [16], where besides the extent of site involvement, type of adhesions and tenacity are assessed, the pure PP mesh showed the highest values of adhesions - 9. Differences between ePTFE, PVDF and PP-Col were minimal (7; 6.5 and 6 respectively). These results seem highly unsatisfactory; however, we can assume that most of these adhesions remain clinically irrelevant. Of course, the biggest disadvantage of these studies is that most of the data are obtained from animal models. Results may differ and thus cannot be simply referred to humans.

Indeed, we do not know how often long lasting postoperative pain after the IPOM procedure is related to adhesions. There is a limited number of studies assessing quality of life; most authors focus on the main complications (recurrences, fistulas, infection of mesh). There is no standard of perioperative and postoperative complication definitions and scales in use, e.g. Berger and Bientzle [13] mentioned no consequences of adhesions among 297 patients with median follow-up of two years; however, he described seven patients with abdominal pain lasting longer than three months. We can only assume that in several cases they were related to adhesions.

We cannot exclude that part of an abdominal wall pain may be associated not with adhesions, but with full-thickness sutures and tacks, applied by most surgeons carrying out IPOM procedures. The main advantage of using full-thickness fixation sutures is the added tensile strength for abdominal wall mesh fixation (2.5 times more than tacks alone [21]) and positioning of the mesh making tack stapling easier. The disadvantage of using transmuscular sutures is a persistent pain at the suture sites. It is estimated

that suture site pain occurs in approximately 1–3% [22, 23]. Most resolves within 6-8 weeks [24]. In the presented cases also resorbable PDS stitches were used – so it should not be a reason for chronic pain lasting over six months in these patients. However, Śmietański *et al.* [25] reported chronic pain lasting longer than 6 months, localized in sites of transabdominal PDS(0) suture placement in 2 of 17 patients. Reported pain had a low magnitude (2 or 3 points on a visual analogue scale), and occurred several times per month with no impact on daily activity.

There are studies finding a correlation between intensity of postoperative pain and the type of mesh, but concerning open inguinal hernia repair. Implantation of lightweight composite meshes (e.g. ePTFE) vs. standard polypropylene meshes results in less postoperative pain [26]. These observations may suggest that postoperative pain can also be connected with tissue ingrowth from the abdominal wall surface, not only from visceral adhesions. In IPOM procedures heavyweight PP meshes are avoided; however we can assume that there can also be slight difference in postoperative convalescence based on the type of lightweight meshes used intraperitoneally, because they differ in substance and structure used on the parietal side. This issue should be investigated in the future.

It is very difficult to interpret data on complications, especially connected with adhesions, because there is no validated standardized complication scoring system. A further multi-centre randomized long-term trial is needed to assess complications and to compare open vs. laparoscopic approaches, using a unified and standardized scoring system.

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