Conservative Approach for Salvaging Infected Prosthetic Mesh after Hernia Repair

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Abstract

The possibility of a mesh-related infection occurring weeks or even years after hernia repair, should be considered in any patient with fever of unknown origin, or symptoms and/or signs of inflammation of the abdominal wall following hernia repair. An approach that combines medical and surgical management is necessary for cases of mesh infection. Thirty-two patients with mesh related infection were managed conservatively with intention not to remove the mesh unless failure to gain healing, analysis of causes of mesh removal was done. Our results shows a positive relationship between the medical condition of the patients and the occurrence of mesh site infection and causes of mesh removal includes Floating mesh, general septicemia and discharging sinus.

Key Words: Hernia – Infection – Mesh.

Introduction

THE placement of permanent prosthetic meshes during hernia repair has resulted in a significant reduction in recurrence rates [1]. However, prosthetic infection remains a significant clinical problem. While the exact incidence of mesh sepsis is unknown, when it occurs, it is typically devastating for both the patient and the surgeon [2,3]. In a randomized clinical trial involving 289 patients in which non-mesh vs. mesh repair of primary inguinal hernia was compared, it was found that recurrence rates were 7% for the non-mesh technique vs. 1% for mesh repair.

However, mesh-related complications have become increasingly important. Such complications include seromas, adhesions, chronic severe pain, migration and rejection of the mesh, and mesh-related infections, unfortunately, these same patients are also likely to have a recurrent hernia if prosthetic mesh is not utilized in their repair. Certain patients have been identified as having a higher incidence of mesh infections, including those with a recurrent hernia, a previous infection of the surgical site, and routine tobacco use, high BMI and diabetes. Therefore, despite the previously mentioned risk factors, most surgeons use prosthetic material in all ventral hernia repairs [4].

With the utilization of laparoscopic ventral hernia repair techniques, mesh sepsis is less common, but it has been reported to occur in up to 1-2% of cases [5]. To prevent this mesh infection, antibiotic prophylaxis is often indicated and recommended. Most surgeons have used prophylactic antibiotics for hernia repair. The true incidence of mesh infection is not exactly known because in some series infection rates of 1.9% to 7.5% has been reported [6].

Mechanical and biological properties of mesh has an influence on the incidence of infection, these properties of meshes are associated with the type of tissue structure (woven or knitted) and the type of fibre used (mono- or multifilament) [9]. The pore size of the mesh also plays a role in the safety and tolerability of surgical meshes [10]. The use of multifilament polyester mesh resulted in a higher incidence of infection, than the use of other types of mesh (knitted monofilament polypropylene polytetrafluoroethylene or woven polypropylene [7]. Given the fact that mesh made of absorbable polymers are associated less frequently with foreign body reactions and adhesion [8]. Once a prosthetic mesh becomes infected, most cases demand a major operation with eventual prosthetic explanation. This typically leaves the patient with few reconstructive options and a high re-herniation rate. Alternative methods of treating infected prosthetic material are needed to address this complex clinical situation. When a mesh-related infection occurs, a combined medical and surgical approaches involving intravenous antimicrobial agents and complete surgical removal of the mesh is the preferred
management strategy. For a variety of reasons, monotherapy with intravenous antibiotics generally has a poor outcome. The most important of these reasons relates to the fibroblastic response of the organism to the polymer of the implanted mesh, which results in the development of a thick fibrous capsule surrounding the mesh. Consequently, when an infection is established, this capsule restricts the penetration of antimicrobial agents into the infected mesh. In addition, it is well known that Staphylococcus spp., which are the most common causative organisms in mesh infections, produce a biofilm on the prosthesis, with the result that the microorganisms are protected simultaneously from antibiotics and the immune responses of the host organism [11]. Removal of the mesh should be suspected in any case with persistent or recurrent symptoms and/or signs of mesh infection. However, the results of the study done by Petersen S. et al., suggested that the management of infected mesh might differ according to the type of mesh used. Specifically, it was suggested that infection of polyester or polypropylene mesh might be managed with drainage and antimicrobial agents only, whereas the infected mesh should be surgically removed in cases of infection involving expanded polytetrafluoroethylene mesh [12].

In this study, application of conservative approach was done as a first priority in the management of infected meshes in order to have an experience in which condition of infected mesh necessitates removal.

Material and Methods

This study was carried out in the Department of Surgery at Fayoum and Beni Suef Teaching and Hospital between January 2008 and January 2011. During this period, all patients with mesh site infection after inguinal, paraumbilical or incisional hernia repair either by open technique or laparoscopically in this unit were enrolled within this study protocol. During this period, 32 cases were diagnosed with mesh site infection after their hernia repair.

In this study, the diagnosis of mesh site infection was defined by the criteria for surgical site infection as established by the Centers for Disease Control and Prevention. A surgical site infection occurs when there is involvement of the muscle and fascial layers within 1 year with an implant in place and the infection seems to be related to the operation. Additionally, one of the following must be present: 1) Purulent drainage from the deep incision but not from the organ/space component of the surgical site, 2) Opening of an incision either spontaneously or intentionally when the patient has at least one of the following signs or symptoms: Fever (>38ºC), localized pain, or tenderness, unless site is culture-negative, 3) An abscess or other evidence of infection involving the deep incision on direct examination, during reoperation, or by histopathologic or radiologic examination [13].

Patients having painless fluctuant swelling were excluded after negative culture reports, and seroma fluid were evacuated. Patients with cellulitis were excluded and were discharged without opening their wounds and with full recovery.

Once diagnosis of infection has been made, the patients were subjected to the following regimen: Full general and local examination and laboratory investigations. Sample of wound discharge was taken before starting the antibiotic treatment and send for Culture and sensitivity of the causative organism. An empirical antibiotic treatment regimen as IV injections mostly as cephalosporin; was started in all cases and continued or changed according to results of sensitivity. If the drain is still present in the wound, the decision of removal of drain was taken as being a foreign body.

Local conservative management included removal of skin sutures if still present, partial opening of the wound to allow free drainage. Twice daily irrigation with povidone iodine together with gentle local debridement of necrotic tissue was started. These measures were repeated until the wound and mesh were clear of pus and necrotic tissue and healthy granulation tissue starts to appear. Closure of the wound was not attempted in any case and the defect was left to heal by secondary intention.

Results

This study included 32 patients the mean age of the patient was 53.1 years (range 20-78). Eighteen of them were females (56.3%) and 14 were males (43.6%). There were 11 (34.4%) inguinal hernias, 14 (43.6%) paraumbilical hernias and 7 (21.9%) incisional hernias, all the patients with inguinal hernias were males. Two (6.3%) of the infected inguinal hernia mesh were laparoscopically repaired by transperitoneal approach (TAPP) and developed pelvic abscess and presented with fever and deep pelvic pain two weeks after the operation. The surgical technique of hernia repair was carried by different surgeons, different materials of sutures either monofilamentous or polyfilamentous. In all of these repairs, the meshes used were of polypropylene type of different brand names. Twenty patients were the mesh was fixed with prolene sutures, nine patients fixed by Vicryl and three patients with Prolene and Vicryl.
Salah S. Soliman & Tamer M. Nabil

Fig. (1): A case of secondary intention healing over a salvaged mesh.

Fig. (2): A case of secondary intention healing over a removed mesh.

Table (1): Patients’ medical conditions.

<table>
<thead>
<tr>
<th>Medical condition</th>
<th>No.</th>
<th>Successful</th>
<th>Failed</th>
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<tbody>
<tr>
<td>Diabetes</td>
<td>13</td>
<td>52.3</td>
<td>51.4</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>2</td>
<td>34</td>
<td>38</td>
</tr>
<tr>
<td>Hypertension and Coronary artery disease</td>
<td>14</td>
<td>40</td>
<td>80%</td>
</tr>
<tr>
<td>Chronic liver disease</td>
<td>6</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>No-associated medical disease</td>
<td>9</td>
<td>90.8</td>
<td>120.7</td>
</tr>
</tbody>
</table>

Table (2): Comparison of Patients with successful conservative approach and those failed conservative approach.

| Age mean (years) | 52.3 | 51.4 | >0.050 NS
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<tbody>
<tr>
<td>Body mass index (kg/m²)</td>
<td>34</td>
<td>38</td>
<td>&lt;0.050</td>
</tr>
<tr>
<td>Diabetes (%)</td>
<td>40</td>
<td>80%</td>
<td>&lt;0.050</td>
</tr>
<tr>
<td>Closed-suction drain (%)</td>
<td>100</td>
<td>100</td>
<td>&gt;0.050 NS</td>
</tr>
<tr>
<td>Operative time (min)</td>
<td>90.8</td>
<td>120.7</td>
<td>&lt;0.050</td>
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Diabetic patients were 13 patients, eight of which were insulin-dependent and five were non-insulin dependent. Six patients were hepatitis-C +ve. Staphylococcus spp. was found in 16 patients Staphylococcus aureus in nine patients, E. coli in four patients and MRSA in three patients.

Mean hospital stay of all these patients was 22 days (range 18-26 days). All these patients were followed-up for 6-12 months after hospital discharge. There was no recurrence of infection and hernia recurred during this period in the patients where mesh was removed. Operative times averaged 94.6 minutes (range 68-274 minutes). The mean length of stay was 3.25 days (range 0-32 days).

Cases subjected to mesh removal were as follows: Three cases when the patient first examination shows collection at site of operation with general septicemia the decision was for immediate operation with drainage and mesh removal the entire.
three patients admitted for surgical ICU postoperatively and discharged after 24-48 hours. Floating mesh with copious amount of pus was in five cases so keeping of the mesh was inevitable. Two cases after complete coverage with the healthy granulation tissue and healing with secondary intention a discharging sinus developed so the decision of mesh removal was taken.

Discussion

Infection following hernia repair may result in substantial morbidity. Although traditional surgical teaching advocates the removal of prosthetic materials when infections occur, isolated cases of mesh salvage have been reported in the literature. In his personal series of more than 360 ventral hernia repairs using mersilene mesh, Stoppa reported an infection rate of 12%. No prosthesis required removal [14]. Similarly, in a prospective study by Luijendijk et al comparing suture repair with mesh repair of incisional hernias, three out of 84 patients developed a wound infection following placement of polypropylene mesh. All were successfully managed without mesh removal. While animal studies have provided support for the use of PTFE mesh in contaminated abdominal wounds, no clinical reports of salvaging infected PTFE mesh in humans are available [15]. However, the results of a recent study suggested that the management of infected mesh might differ according to the type of mesh used. Specifically, it was suggested that infection of polyester or polypropylene mesh might be managed with drainage and antimicrobial agents only, whereas the infected mesh should be surgically removed in cases of infection involving expanded polytetrafluoroethylene mesh [16].

Our results show a positive relationship between the medical condition of the patients and the occurrence of mesh site infection as only 28% of our patient were free of associated medical condition. Also this affects the outcome of conservative approach as the successful conservation occurs among patients with lower BMI, non diabetic patients and seems to be of significance in our study is the operative time where the longer operative time seems to be related to more contamination with more bacterial load inside the tissue spaces during the operation. The use of antibiotic prophylaxis for the ‘clean’ operation of hernia repairs is currently a controversial issue, and its effectiveness in reducing postoperative wound infection rates has not been proved. Sanchez-Manuel et al., presented a review of eight randomized clinical trials. In patients with antibiotic prophylaxis, the overall infection rates were 2.88% in hernioplasties using prosthetic materials, compared to 3.78% in patients with herniorrhaphies. In patients without antibiotic prophylaxis, the infection rates were 4.3% and 4.87%, respectively [17]. Based on the results of this meta-analysis, there was no clear evidence that routine administration of antibiotic prophylaxis for elective inguinal hernia repair reduced the infection rate, even in patients with mesh insertion. Furthermore, the use of a foreign body for hernia repair does not appear to alter the incidence of superficial wound infection, regardless of the administration of antibiotic prophylaxis or not [18]. This study also shows that conservative management including suitable intravenous antibiotics and local management is successful for mesh site infection in most cases as mesh removal was advocated in some cases this was in contrary to the study by Stoppa that reported no removal of prosthesis. All were successfully treated by intravenous antibiotics and local wound care without removing the mesh. In our study we can advise about the cases where mesh removal is inevitable like general septicemia in a diabetic patient, floating mesh with copious amount of pus and repeated occurrence of discharging sinus.

Conclusion:

Prosthetic mesh infection represents an important source of morbidity following hernia repair. For patients with exposed mesh, a conservative approach that includes local wound care, antimicrobial therapy, and soft tissue coverage may allow for salvage of the infected prosthetic material. Further evaluation of this technique is warranted to define the most appropriate management strategy for these patients as found. In our study we can advise about the cases where mesh removal is inevitable like general septicemia in a diabetic patient, floating mesh with copious amount of pus and repeated occurrence of discharging sinus.

References


