Case Report

Mesh Migration into the Neobladder and Ileum with Complicated Fistula Formation following Incisional Hernia Repair

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1. Background

Surgery remains the only treatment for incisional hernias. Due to its low recurrence rate, the tension-free technique using a mesh has become the standard treatment for incisional hernias. However, as the surgical procedure becomes more common, mesh-related complications such as adhesion, migration, infection, and fistula formation are being reported. Cases of mesh migration into the intestinal tract reportedly cannot be treated with antibiotics and requires resection [1, 2]. Here, we report a case of mesh migration into the neobladder and ileum with fistula formation following incisional hernia repair.

2. Case Presentation

An 80-year-old man had a surgical history of open radical cystectomy with ileal neobladder reconstruction for bladder cancer (pTisN0M0 Stage0is) 5 years prior and an incisional hernia repair using a Ventrio™ Hernia Patch (C.R. Bard; Davol Inc., Warwick, RI) with intraperitoneal implantation technique 3 years prior. He had no other medical history and no family history to mention. He presented to a medical institution with fever and abdominal pain. Computed tomography (CT) scan showed that the mesh that had been used to repair the abdominal wall hernia migrated into the neobladder and ileum. He was diagnosed with enter-
neobladder fistula caused by the mesh migration, and conservative treatment with antibiotics (TAZ/PIPC) was started. However, this conservative treatment did not improve the patient’s condition, and he was referred to our hospital one month later. A fistula was found on the skin of the lower abdomen (Figure 1). Urine drainage from the fistula was also observed. Urinalysis was positive for occult blood and bacterial contamination, and the urine culture showed enteric bacteria. Hematological examination revealed a white blood cell count of 8530/µL, which was within the normal range, but C-reactive protein was elevated at 3.81 mg/dL. Cystography showed the neobladder without fistula formation, and cystoscopy showed fecal matter and calcified mesh in the bladder. Abdominal CT scan showed a migrated mesh into the neobladder and ileum (Figure 2). The patient was therefore diagnosed with mesh migration into the neobladder and ileum with entero-neobladder and entero-cutaneous fistulas related to mesh infection. Mesh removal and partial resection of the neobladder and small intestine were performed (Figures 3(a) and 3(b)). The mesh was tightly adherent to the neobladder and ileum, with fistula formation. The mesh was completely removed, and the neobladder and ileum were partially resected. The defect in the neobladder wall was closed in a straightforward manner, and the resected ileum was only about 20 cm (Figure 3(c)). The incisional hernia of the abdominal wall was repaired by simple suturing of the fascia (Figure 3(d)). On the 13th postoperative day, the patient complained of mild lower abdominal pain, and a transurethral (neobladder) cystography was performed, suspecting leakage from the closed site of the neobladder. And it was confirmed that there was no leakage (Figure 4(a)). On postoperative day 14, the CT scan showed subcutaneous fluid accumulation in the abdomen (Figure 4(b)). Drainage was required for 10 days, and antibiotics (PIPC) were administered, but after drain removal, the patient was discharged without any complications on postoperative day 40 (Figure 4(c)). The patient was almost incontinent before surgery and required diapers. Postoperatively, the patient was completely incontinent, and blood tests showed renal dysfunction with an elevated serum creatinine level of 1.5. Since he was unable to perform intermittent catheter drainage by himself, we decided to introduce an indwelling urethral catheter postoperatively. This case was a postradical cystectomy with neobladder reconstruction in an elderly patient, and urinary function could not be preserved. One year has passed since the surgery and he has not had any recurrence, but his urinary catheter is now permanently in place.

3. Discussion and Conclusions

In this study, we reported a case of an entero-neobladder and neobladder-cutaneous fistula caused by the migration of the Ventrio™ Hernia Patch.

Surgery remains the only treatment for incisional hernia of the abdominal wall. Burger et al. reported that the recurrence rate of surgery for abdominal scar hernias was 63% and 32% for simple and mesh closures, respectively, over a 10-year period; moreover, the tension-free technique using artificial materials is currently the standard technique [3]. Surgical methods for incisional hernia of the abdominal wall are classified into four categories according to the location of the mesh: anterior rectus abdominis, posterior rectus abdominis, anterior peritoneum, and intraperitoneal. Of these, intra-peritoneal implantation has the advantage of shortening the operative and fixation time and reducing the dissection area; however, it is associated with the risk of complications such as adhesion to intra-abdominal organs, intestinal fistula formation, and intestinal obstruction [4]. COMPOSIX® MESH (C.R. Bard; Davol Inc., Warwick, RI) is designed for intra-abdominal use, and expanded polytetrafluoroethylene (ePTFE) sheets are used on the visceral side to reduce adhesion. The ePTFE sheet has a small pore size (1 µm) and can minimize adhesions to the organ. However, up to 1.2-13.6% of abdominal incisional hernia surgeries using mesh can reportedly result in mesh infection [3–7] (Table 1), and the infected mesh can form fistulas between the intestine, bladder, and other organs, resulting in mesh straying into other organs [1, 2, 6, 8, 9] (Table 2).

The mechanism of mesh adhesion to other organs as well as fistula formation is primarily due to inappropriate fixation or external force and secondarily due to foreign body reaction [10]. In our case, the flat mesh shrunk and
protruded toward the abdominal cavity, migrating to the bladder and the small intestine. We thought that the shrinkage of the mesh suggested incorrect positioning and an insufficient fixing method. The mesh shrinkage and migration into the intestinal tract subsequently developed a mesh infection and led to fistula formation.

Although the incidence of mesh infection after ventral wall scar hernia repair is known to be higher than that after inguinal hernia repair, there are some reports of mesh infection more than 6 months after surgery. Agrawal and Avill summarized three reported cases of postoperative mesh infection, one at 18 months, the second at 6 months, and the third at 5 years [10]. Cobb et al. reported a mesh infection rate of approximately 8% after scar hernia repair of the abdominal wall using COMPOSX® MESH. Moreover, Iannitti et al. reported a 0.9% early infection rate within 30 days after surgery, as well as a 0.4% delayed mesh infection rate 30 days after surgery [4]. In our case, the mesh had migrated into the neobladder about 51 months after mesh placement; hence, it was considered as a delayed mesh infection. The mechanism of delayed mesh infection is thought to be surgery with contamination, sepsis associated with bacterial translocation, and formation of a mesh enterocutaneous fistula or an enterocutaneous fistula [11]. Cobb et al. reported one case out of 95 (1.1%) wherein the COMPOSX® MESH strayed into the small intestine [6], and Li and Cheng reported 23 cases of mesh erosion into the bladder since 1994, two of which were after abdominal wall scar hernia repair and 21 after inguinal hernia repair [8]. Seven of them (7/22, 31.8%) underwent partial cystectomy with mesh removal. However, to the best of our knowledge, there has been no report of mesh migration into the neobladder after radical cystectomy, as well as formation of a complicated fistula with the intestinal tract until now.

The removal of an infected mesh is necessary. Petersen et al. reported three cases of mesh infection from ePTFE sheets and finally performed mesh removal because the infection could not be controlled through drainage techniques and/or antibiotics [7]. When a hernia mesh is placed in close proximity to the reconstructed organ, it is important to keep in mind that displacement of the mesh may lead to damage of the reconstructed organ. In order to avoid organ damage due to mesh displacement, surgical procedure should be chosen to use as little mesh as possible. If mesh is used, the choice of mesh and the method of implantation and fixation should be made more carefully. In addition, if safe mesh repair was not possible, autologous tissue repair such as components separation technique or free fascia grafting should have been performed [12, 13]. Here, we reported a rare case of mesh migration into the neobladder.

Figure 3: Intraoperative findings. The mesh (arrowhead) migrated into the neobladder (arrow) and the small bowel (a, b). Partial resection of the small intestine and partial neobladder resection were performed (c). The neobladder wall was closed in a straightforward manner (d).
Figure 4: Postoperative cystography and computed tomography (CT) scan. Cystography of the neobladder showed no leakage (a). Subcutaneous fluid collection is observed on postoperative day 14 (b). It improved by postoperative day 29 (c).

Table 1: Previous reports on infections of mesh used for abdominal incisional hernias.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Mesh material</th>
<th>Infected cases/all cases</th>
<th>Rate of mesh infection (%)</th>
</tr>
</thead>
</table>

Table 2: Summary of cases in which the mesh used in abdominal incisional hernia migrated to adjacent organs.

<table>
<thead>
<tr>
<th>No.</th>
<th>Author</th>
<th>Year</th>
<th>Age</th>
<th>Sex</th>
<th>Mesh material</th>
<th>Time to event (month)</th>
<th>Migration organs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tomioka K [1]</td>
<td>2020</td>
<td>61</td>
<td>M</td>
<td>ePTPE</td>
<td>60</td>
<td>Colon, small intestine</td>
</tr>
<tr>
<td>5</td>
<td>Li J [8]</td>
<td>2019</td>
<td>57</td>
<td>F</td>
<td>NA</td>
<td>60</td>
<td>Urinary bladder</td>
</tr>
<tr>
<td>6</td>
<td>Li J [8]</td>
<td>2019</td>
<td>77</td>
<td>M</td>
<td>Polypropylene</td>
<td>74</td>
<td>Urinary bladder</td>
</tr>
</tbody>
</table>

NA: not applicable.
and ileum, with complicated fistula formation following the abdominal wall hernia repair.

**Abbreviations**

CT: Computed tomography  
TAZ/PIPC: Tazobactam/piperacillin  
ePTFE: Expanded polytetrafluoroethylene.

**Data Availability**

The dataset supporting the conclusions of this article is included within the article.

**Consent**

The authors certify that written informed consent for publication of patient details was obtained in an appropriate form. The patient consented to publication of his clinical information and images.

**Conflicts of Interest**

The authors declare that they have no competing interests.

**Authors’ Contributions**

MKu reported the case and wrote the manuscript. MKi and YM assisted with the composition of the manuscript. FM, MKo, SN, HT, YY, and YS contributed to the data collection and interpretation and critically reviewed the manuscript. All authors have read and approved the final manuscript.

**References**


