

Case Report

Chemical Peritonitis Induced by an Anti-adhesion Bioresorbable Membrane : A Case Report and Review of the Literatures

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ABSTRACT

Postoperative abdominal adhesion is inevitable in any abdominal surgical procedures. An anti-adhesion bioresorbable membrane (AABM) is used frequently in abdominal surgery. Such a membrane was found to be effective and safe in four prospective randomized control trials. Recently, we treated a 23-year-old woman with postoperative peritonitis due to AABM application. We herein demonstrate and discuss a rare complication by AABM with a review in the English literature. (Jikeikai Med J 2006 ; 53 : 171-5)

Key words : peritonitis, adhesion, small bowel obstruction

INTRODUCTION

The incidence of post operative intraperitoneal adhesion ranges from 67 to 93 percent, which is the most frequent cause of small bowel obstruction¹⁻⁴. Peritoneal adhesion is a significant problem for surgeons because of high incidence of small bowel obstruction and difficulty with subsequent abdominal operations. In order to prevent such sequelae of abdominal operations, anti-adhesion bioresorbable membrane (AABM), composed of sodium hyaluronate and carboxymethylcellulose, have been developed and become available for clinical use^{5,6}. We report a rare but serious complication which was thought to be induced by the use of this adhesion protective material.

CASE REPORT

A 23-year-old female was brought to the emergency room of our hospital with acute abdomen. She had had a prior episode of hematochezia and undergone gastrointestinal examination at another hospital two years previously, which failed to demonstrate any significant findings. On admission, her vital signs were stable. Physical examination revealed lower abdominal tenderness with maximum rebound tenderness at the left lower quadrant of the abdomen. Neither laboratory data nor chest-abdominal films demonstrated any abnormal findings. Computed tomography (CT) and magnetic resonance imaging (MRI) revealed an abscess in the Douglas'pouch with moderate amount of ascites. Several types of bacteria were identified from the ascites. An exploratory laparotomy was performed with a tentative diagnosis of acute peritonitis due to bowel perforation.

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Fig 1. Abdominal CT indicated a capsulized fluid under midline incision (arrows).

At operation, perforation of the Meckel's diverticulum was identified. Wedge resection of the perforated diverticulum was performed followed by extensive lavage with 15L of warm saline. A drain was placed in the Douglas pouch and two sheets of AABM (Seprafilm*, Genzyme Corp., Cambridge, MA) were placed below the midline abdominal incision just before abdominal wall closure. The patient had an uneventful course until the 6th postoperative day when she developed fever (38.6°C) and increased white blood cell count (14,000/ μ L) without any physical signs which suggest an abdominal catastrophe. Since abdominal CT revealed no significant findings, she was treated nonsurgically one more week, during which her fever did not disappear and leukocytosis persisted. Abdominal CT was repeated on the 11th postoperative day, which suggested a localized fluid collection under the midline wound (Fig. 1). We attempted drainage through a lower incision and collected a small amount of cloudy grayish ascitic fluid, from which neither bacteria nor fungi were cultured. Blood cultures were repeatedly negative for aerobic and anaerobic bacteria. She started complaining of abdominal pain with rebound tenderness 4

days later. High fever (38.6°C) and abnormal laboratory data (WBC : 10,300/ μ L, CRP : 15.18 mg/dL) were consistent with peritonitis. An emergency exploratory laparotomy was performed, which did not demonstrate leakage at anastomosis or abscess in the abdominal cavity. Intriguingly, extensive miliary nodules were found on the surface of the small intestine, which cross-linked and made a dense adhesion of the intestines (Fig. 2). Careful lysis of adhesion was performed, and biopsies were taken from several nodules for histopathological examination, which indicated that these nodules were foreign body granuloma (Fig. 3). The abdominal cavity was lavaged copiously and four penrose drains were placed in the right subphrenic fossa, bilateral iliac fossa and Douglas' pouch, respectively. Two sheets of AABM were placed below the incision again. Postoperative culture of ascites was negative. Also, ascites and the nodules for specific cultures including tubercle bacillus or acid-fast bacteria were negative. Her postoperative course thereafter was uneventful, and she recovered well. The patient was discharged 34 days after the first surgery, and she remains well at 3 months postoperatively.

*Seprafilm is the registered trade name of Genzyme Corp., USA.

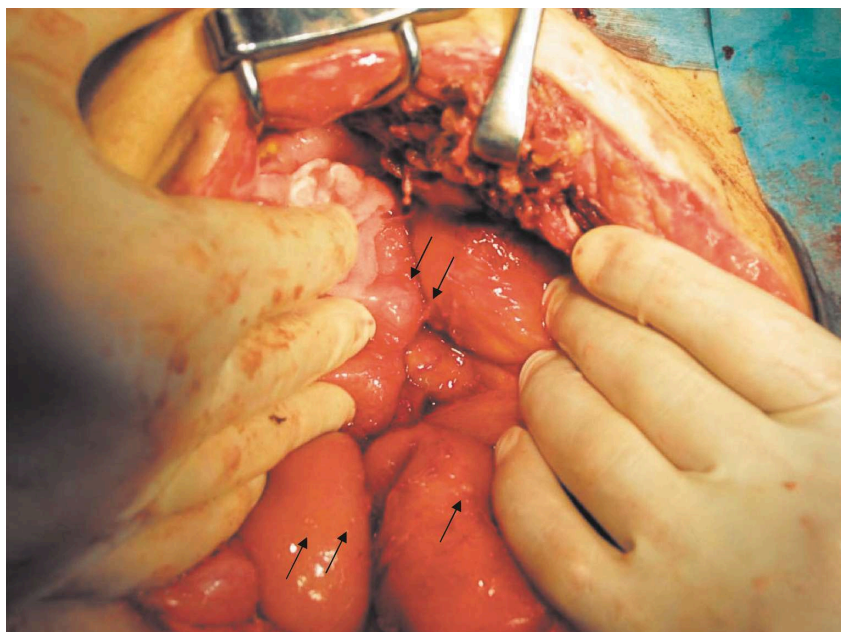


Fig. 2. Operative finding at the second laparotomy showed an intense intra-abdominal inflammatory reaction and dense adhesions among intestines. Numerous small miliary nodules were also observed (arrows).

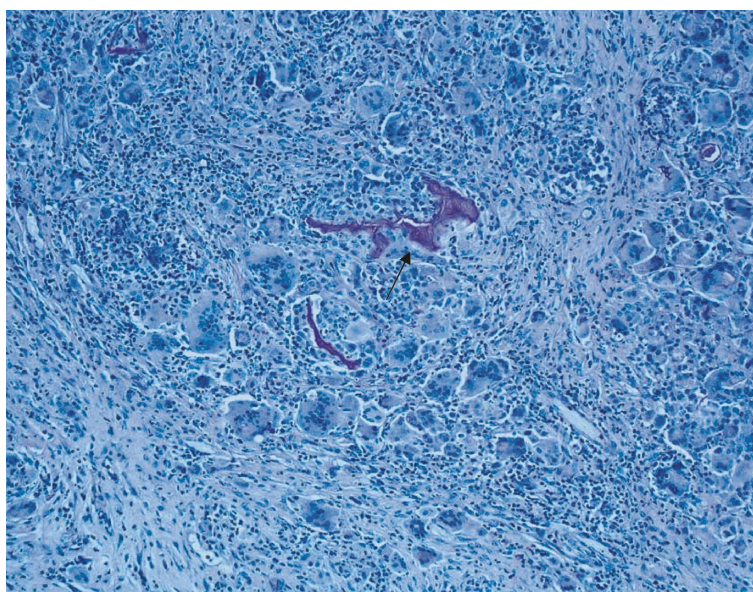


Fig. 3. X30 PAS staining. Histopathological examination of the biopsies taken from several nodules turned out to be foreign body granuloma. Phagocytosis of a foreign body, possibly iatrogenic membrane-like material, was also observed (arrow).

DISCUSSION

Postoperative abdominal adhesion occurs in the majority of patients after abdominal surgery¹. Adhesion can result in serious clinical complications such as small bowel obstruction, inadvertent enterotomy at

reoperation and secondary infertility in women, which are accompanied by considerable health care expenditures²⁻⁴. Recently, AABM has been shown to reduce postoperative adhesion formation by mechanically separating serosal tissues temporarily during the postoperative healing phase^{5,6}.

To date, four prospective randomized clinical studies have been reported. Diamond et al. reported that AABM reduced the incidence, severity, extent and area of postoperative uterine adhesions without any complications⁷. Becker et al. also reported that the extent of postoperative adhesions to the midline incision was reduced by 50% using AABM, although the patients with AABM experienced a slightly greater frequency of abdominal abscess and pulmonary embolism than those without⁸. However, Vrijland and colleagues presented that the incidence of complications related to adhesion did not decrease by the use of AABM, although adhesion itself was severer in patients without AABM⁹. Beck and co-workers attempted to confirm the safety of AABM in 1,791 patients¹⁰ and reported that foreign body reaction did not occur in any patients and concluded that AABM was safe with respect to the development of abdominal or pelvic abscess formation. These reports suggested that the AABM was safe and effective in reducing postoperative adhesion.

However, 4 cases of complications after AABM application were reported recently^{11,12}. Clinical findings, such as no abscess identified, cloudy exudates fluid and intense intra-abdominal inflammatory reaction, were identical among those four cases which were observed in the similar postoperative periods, *i.e.*, 4 to 7 days after the operation. These clinical features were compatible with those of our patient, which suggests that the peritonitis was induced by AABM at the time of the first surgery. It is also believed that an acute inflammatory reaction to a cellulose component in AABM caused the complicated clinical course in our patient, since two successive cultures of ascites were negative for any bacteria or fungi, and histopathological findings were consistent with an intense foreign body reaction which was identified at the site of the AABM application.

There are two intriguing experiment data which suggest that the hyaluronate-based membrane is associated with an increased adhesion in an animal model of bacterial peritonitis^{13,14}. When the peritoneum is infected or inflamed, macrophages and polymorphonuclear leukocytes play a significant role in the process of clearance, phagocytosis and seques-

tration of bacteria for host defenses. Thus, excessive influx of these inflammatory cells might have caused the intense foreign body reaction in our patient. However, the application of AABM at the second laparotomy for non-bacterial peritonitis did not induce postoperative peritonitis. Retrospectively, the difference of postoperative course in the same patient clearly shows that the second peritonitis arose from the AABM application at the site of bacterial contamination. Surgeons should be cautious of using the adhesion-reduction device in patients with bacterial peritonitis, even if abdominal lavage was extensively performed.

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