A 61-year-old woman who had undergone a hysterectomy 15 years before this presentation had suffered from intermittent abdominal pain and a palpable lower abdominal mass for 3 months. Plain roentgenography revealed a radiopaque mass with serpiginous density in the pelvic region. Sonography showed curvilinear hyperechogenicity with an acoustic shadow. A small-bowel series revealed a huge amorphous filling defect inside the ileum. Computed tomography showed that the mass was a spongiform object with a whirl-like appearance mixed with air and with peripheral calcification.

Key Words: transmural migration, surgical gauze

Gossypiboma is the term used to describe a mass of cotton matrix that causes a foreign-body reaction inside the body [1–8]. Surgical sponge is most frequently retained inside the body after laparotomy, although other foreign bodies such as forceps or rubber tubes can occasionally be found [1–16]. Transmural migration of the surgical sponge is rare and is due to the inflammatory process, which causes pressure necrosis of the bowel wall and finally extrusion of the sponge into the bowel lumen [2–5,9–11]. We present a case of a retained surgical sponge with transmural migration to the small bowel loop, demonstrated by a series of imaging studies.

CASE PRESENTATION

A 61-year-old female patient had suffered from intermittent abdominal pain with a palpable lower abdominal mass for 3 months. No vomiting or diarrhea was noted. She had undergone a hysterectomy for uterine leiomyoma 15 years prior to this presentation. She had had iron deficiency anemia for many years, as shown by laboratory blood data (hemoglobin, 9.5 g/dL; hematocrit, 32%; iron, 25 µg/dL; ferritin, 4.8 ng/mL). The complete blood count and other biochemical blood analyses were within normal limits. Vital signs were stable and there was no fever.

A series of imaging studies was obtained. Plain roentgenography showed a radiopaque mass with serpiginous density in the lower abdominal and pelvic regions (Figure 1A). Abdominal sonography revealed curvilinear hyperechogenicity with an acoustic shadow in the left lower quadrant (Figure 1B). A small-bowel series revealed a huge intraluminal and amorphous filling defect in the proximal ileum with mild dilatation of the proximal bowel loop and superior displacement of the terminal ileum (Figure 1C). Abdominal computed tomography (CT) showed that the mass was a spongiform object with a whirl-like appearance mixed with air and with peripheral calcification of about 300 HU (Figure 1D). Associated dilatation and wall thickening of the involved ileum were identified.

The patient underwent surgical intervention for a suspected small-bowel bezoar. At operation, severe adhesion of an ileal loop to the peritoneal cavity was noted with a huge intraluminal mass inside the ileum (Figure 2). After resection of a 60 cm segment of ileum, an end-to-end ileoileostomy was performed. On opening the resected ileum,
Figure 1. (A) Plain roentgenogram shows a radiopaque mass with serpiginous density (arrow) in the lower abdominal and pelvic regions. (B) Sonography of the left lower abdomen reveals an intra-abdominal mass lesion of curvilinear echogenicity with an acoustic shadow. (C) Small-bowel series displaying an intraluminal and amorphous filling defect inside the dilated ileal loop with proximal small-bowel loop dilatation and superior displacement of the terminal ileum (arrow). (D) Contrast-enhanced abdominal computed tomography scan shows that the mass is a spongiform object with a whirl-like appearance mixed with air and with peripheral calcification (density of about 300 HU; arrow). There is also associated thickening of the ileum wall (white arrowhead). The calcification is denser than the intraluminal oral contrast medium.

A laparotomy gauze was found. The string of the gauze explained the serpiginous density on the plain roentgenograph. The patient was discharged 8 days after the operation with an uneventful course.

The 4 × 6 cm² laparotomy gauze had a foul odor. It was associated with intestinal wall perforation and dense infiltration of neutrophils into the serosal layer, marked adhesion of the intestinal loop, and peritonitis.

**Discussion**

Retained foreign bodies after abdominal or pelvic surgery are rare, with an estimated incidence of 1/1,500 cases [17].
Transmural migration of a surgical sponge is even rarer [2–5,9–11] and can cause enteric fistula formation [3] or even bowel obstruction [2,3]. The time between the surgical removal of the retained foreign body and the original operation varies from 11 days to 20 years [1–14]. Sponges have been found in the abdominal and pelvic cavities as well as in the vagina after abdominal surgery and vaginal delivery [1–16]. Retained sponges may be due to inaccurate sponge counts, no sponge count, or false-negative intraoperative roentgenography [15]. They have led to claims of malpractice and indemnities ranging from thousands to hundreds of thousands of US dollars [15,16].

The clinical presentation of a retained surgical sponge in the abdominal cavity is variable, ranging from an incidental finding on a roentgenograph to a severe inflammatory process causing bowel loop obstruction or even perforation [1–13]. It is estimated that one-third of patients remain asymptomatic, with the foreign body only detected radiographically due to the radiopaque marker on the surgical sponge [3,8].

As cotton sponges are inert, they do not undergo any specific decomposition or biomedical reaction [18]. However, pathologically, two types of foreign-body reactions occur [19]. The first type is an aseptic fibrinous response that causes adhesions and encapsulation, resulting in a foreign body granuloma. The second type is exudative, with formation of an abscess with or without secondary bacterial invasion. Abscess formation represents an attempt by the body to extrude the foreign body, either externally or into a hollow organ, as in our case. The inflammatory process caused by the surgical sponge and the peritoneal reaction led to encapsulation of a segmental bowel loop, and the resulting pressure necrosis on the bowel wall caused transmural migration of the surgical sponge. Small bowel loops, especially the ileum, are most affected [2,10,11], although stomach and colon involvement has also been described [4,9].

Various types of surgical sponges have been observed on plain roentgenographs due to the radiopaque markers [7,8]. Peripheral calcification of the sponges, if present, may also be seen, as in our case [12]. The whirl-like appearance is characteristic of retained surgical sponges, even those without radiopaque markers, and is due to gas trapped in the fibers of the sponge [19]. However, this sign is not frequently observed [13,14].

On sonography, retained surgical sponges are echogenic and frequently produce an intense and sharply delineated acoustic shadow [1,5,13,14]. Less commonly, a cystic mass with highly irregular internal echoes or a hyperechoic mass can be found, but this is nonspecific [14].

Gastrointestinal series show amorphous and intraluminal filling defects compatible with the radiopaque mass seen on the plain radiograph [3,6,11], as in our case. Proximal bowel loop dilatation may be found in cases of bowel obstruction.

On CT, surgical sponges may be seen as well-circumscribed masses [1,3,13,14]. Gas or a calcified wall may be present. The internal structure may have a whirl-like appearance due to the gas trapped in the mesh of sponges. A low-density mass with a dense and enhanced wall may be present.

Our case shows the characteristic imaging appearance...
of an intraluminal surgical sponge on plain roentgenography, sonography, gastrointestinal series, and CT. Other studies have used only one [1,5,8,9], two [4,11–14], or three [3,6,7,17] imaging tools. No images were shown in the remaining six reports [2,10,15,16,18,19].

In conclusion, a retained surgical sponge with transmural migration is rare and should be included in the differential diagnosis for a patient with a history of abdominal or pelvic surgery in combination with the above characteristic imaging appearance.

REFERENCES

手術紗布透壁性移動之影像表現 — 病例報告
楊國雲¹ 張明松² 黃志富³
輔英科技大學附設醫院 ¹ 放射線科 ² 外科 ³ 內科

一位六十一歲女性病患，十五年前接受子宮切除術，最近三個月感到間接性腹痛及一可觸摸的下腹部腫塊。腹部X光片發現於骨盆部位有一爬行狀且不透射線之物體；超音波顯示一曲線狀之強回音，後方伴隨音響音影；小腸攝影術表示於迴腸內有一巨大無定形的填充缺陷；電腦斷層掃描術揭露此物體為一海綿狀的實物，混合空氣且周圍有著鈣化的類似旋轉物體。

關鍵詞：透壁性移動，手術紗布
（高雄醫誌 2004;20:567—71）