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**Colonic perforation by a transmural and transvalvolar migrated retained sponge: Multi-detector computed tomography findings**

Camera L *et al.*Colonic perforation by a retained sponge

Luigi Camera, Marco Sagnelli, Paolo Guadagno, Pier Paolo Mainenti, Teresa Marra, Maria Scotto di Santolo, Landino Fei, Marco Salvatore

**Luigi Camera, Marco Sagnelli, Maria Scotto di Santolo, Marco Salvatore,** Department of Radiology, University “Federico II”, 58013 Naples, Italy

**Luigi Camera, Pier Paolo Mainenti,** Institute of Biostructures and Bioimaging, 58013 Naples, Italy

**Paolo Guadagno, Teresa Marra, Landino Fei,** Gastrointestinal Surgery Unit-Second University School, 58013 Naples, Italy

**Author contributions:** Camera L designed the report and revised the manuscript; Sagnelli M performed manuscript draft; Guadagno P and Marra T performed laparotomy; Mainenti PP and di Santolo MS performed literature search; Fei L and Salvatore M performed manuscript editing.

**Correspondence to: Luigi Camera, MD,** Department of Radiology, University “Federico II”, Via S. Pansini, 580131Naples, Italy. camera@unina.it

**Telephone:** +39-81-7463560 **Fax:** +39-81-5457081

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**Abstract**

Transmural migrated retained sponges usually impact at the level of the ileo-cecal valve leading to a small bowel obstruction. Once passed through the ileo-cecal valve, a retained sponge can be propelled forward by peristaltic activity and eliminated with feces. We report a case of a 52-year-old female with a past surgical hystory and recurrent episodes of abdominal pain and constipation. At physical examination, a generalized resistance could be appreciated with tenderness in the right flank. At contrast-enhanced multi-detector computed tomography findings consistent with a perforated right colonic diverticulitis could be appreciated with several out-pouchings at the level of the ascending colon and evidence of free air in the right parieto-colic gutter along with an air-fluid collection within the mesentery. In addition, a ring-shaped hyperdense intraluminal material could also be appreciated. At surgery, the ascending colon appeared irregularly thickened and folded with a focal wall interruption and a peri-visceral abscess at the level of the hepatic flexure, but no diverticula could be found. A right hemi-colectomy had to be performed and at the opening of the surgical specimen a retained laparotomy sponge was found in the bowel lumen.

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**Key words:** Retained sponge; Transmural migration; Multi-detector computed tomography; Colonic perforation; Acute abdomen

**Core tip:** Transmural migrated retained sponges usually impact at the level of the ileo-cecal valve leading to a small bowel obstruction.We report a case of a 52-year-old female with a past surgical hystory and recurrent episodes of abdominal pain. At contrast-enhanced multi-detector computed tomography, findings consistent with a perforated right colonic diverticulitis could be appreciated along with a hyperdense intra-luminal material.At surgery, a right hemi-colectomy had to be performed and at the opening of the surgical specimen a retained laparotomy sponge was found in the bowel lumen.

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**INTRODUCTION**

Retained foreign bodies represent a relatively uncommon complication of abdominal or pelvic surgery with a reported incidence of 1 every 1000-1500 operations. However, its real frequency may be higher because of underreporting due to medico-legal concerns[1].

The commonest retained foreign bodies are surgical sponges left behind during abdominal or pelvic surgery, mostly after emergency or gynaecological interventions[2]. Clinical manifestation of retained surgical sponges may be extremely variable and often non-specific with patients being either asymptomatic or complaining of recurrent and/or intermittent abdominal pain episodes occurring from the immediate post-operative period to several years after surgery[3].

This is largely based upon the type of reaction, either fibrinous or exudative, induced by the retained sponge in the surrounded tissues. In the former case the retained sponge is also referred to as gossypiboma [2]. Imaging characteristics of gossypibomas have been well described on both abdominal plain film [4] and cross-sectional imaging[5,6].

More rarely, the retained sponge may migrate into the gut lumen as a result of an exudative reaction leading to a fistula with the bowel wall[7-9]. In these instances the patient will manifest signs and symptoms of small bowel obstruction as the retained sponge impacts at the level of the ileo-cecal valve[10].

Herein, we report multi-detector computed tomography (CT) findings of a 52-year-old woman with radiological findings consistent with a perforated right colonic diverticulitis who was found at surgery to have a retained sponge migrated into both the ascending and proximal transverse colon through the ileo-cecal valve.

**CASE REPORT**

A 52-year-old female was admitted to our hospital with a 5-d history of abdominal pain and constipation with tenderness in the right flank.

Her past medical history included a hysterectomy performed 5 years before for a uterine fibromatosis with several episodes of intermittent abdominal pain and alternate alvus referred thereafter. An abdominal ultrasonography showed a concentric wall thickening at the level of both the terminal ileum and the ascending colon. Based on these clinical and instrumental findings a presumed diagnosis of inflammatory bowel disease had been formulated and the patient was currently under treatment with mesalazine (500 mg × 3/die). An abdominal MR report was also exhibited and showed no remarkable findings.

At physical examination, a pale abdomen was found with a generalized resistance, more evident in the right flank, with no rebound. Laboratory tests were unremarkable except for a mild leucocytosis (WBC 15.8 103/mL) and increased levels (17.2 mg/dl; n.v. < 1.0 mg/dL) of the C-reactive protein. At this time, a contrast-enhanced CT was performed after oral administration of 1 L of 2% diluted Diatrizoate-Dimeglumine (Gastrografin, Bayer - Berlin, Germany).

Multi-detector row CT (Aquilion 64, Toshiba, Japan) was performed using a detector configuration of 2 mm × 16 mm, section thickness 5 mm, table speed of 36 mm/s and a gantry rotation time of 0.75 (pitch factor = 0.844), 120 kVp and automatic dose modulation. A mono-phasic caudo-cranial acquisition was performed 80 s. after *iv* bolus injection of 150 cc of non-ionic iodinated contrast media (Ultravist 370; Bayer- Berlin, Germany) at a rate of 2 cc/s.

At contrast-enhanced CT concentric wall thickening could be appreciated at the level of both the ascending and proximal transverse colon with several out-pouchings consistent with colonic diverticula (Figure 1A) and associated hyperplasic ileo-colic lymph nodes (Figure 1B). A small air-fluid collection could also be appreciated within the mesentery with associated fat-stranding (Figure 1B). Extra-luminal air was also evident at a more caudal level (Figure 1C) as best shown on pulmonary window setting (Figure 1D). CT findings were considered consistent with a perforated right colonic diverticulitis. However, a ring-shaped hyperdense intra-luminal material could also be appreciated in both the ascending colon and in the proximal transverse colon (Figure 1A-D).

The patient underwent urgent laparotomy. At surgery, there was free air discharge at the opening of peritoneum with evidence of multiple adhesions between the terminal ileum, the adjacent small bowel loops and the right colon. This latter appeared irregularly thickened and folded with evidence of a focal wall interruption and a peri-visceral abscess at the level of the hepatic flexure. A right hemi-colectomy had to be performed and at the opening of the surgical specimen a retained laparotomy sponge was found within the bowel lumen (Figure 2).

Retrospective Maximum Intensity Projection reconstructed image clearly showed the transmural and transvalvolar migrated sponge extending from the ileo-cecal valve to the proximal transverse colon (Figure 3).

The post-operative period was uneventful and the patient was discharged the week after.

**DISCUSSION**

Surgical sponges are the commonest foreign bodies left behind after abdominal or pelvic operations. However, while a retained sponge certainly represents an unusual complication, its reported incidence is somewhat underestimated because of medico-legal concerns[1].

Since the cotton matrix is inert the fate of a retained surgical sponge is largely dependent on the type of reaction induced by the foreign material in the surrounding tissues [3]. The first type of reaction is an aseptic fibrinous one that generates adhesions and encapsulation of the cotton matrix. This usually results in a foreign body granuloma often referred to as gossypiboma, from the Latin word *Gossypium*, meaning cotton, and the Swahili word *boma*, meaning place of concealment[6]. Such reaction is the most common and often clinically asymptomatic. As a result, gossypibomas are usually incidentally detected on both abdominal plain films as well as cross-sectional imaging and exhibit characteristic features[4-6].

More rarely, a surgical sponge may induce an exudative reaction leading to a phlegmon or abscess formation resulting in the erosion and perforation of an hollow viscus followed by migration of the foreign body into the gut lumen[7]. This process can take several years in which the patient most often manifests unspecific symptoms like intermittent abdominal pain, weight loss, nausea, anorexia and even mild fever[7-9].

Most commonly the sponge migrates into the small bowel lumen where it is pushed forward by the peristaltic activity and, as long as it does not encounter adhesions or strictures, it reaches the ileo-cecal valve where it usually becomes impacted leading to a small bowel obstruction[10]. Once the sponge passes through the ileo-cecal valve it can be propelled forward and eliminated with feces[11]. To the best of our knowledge, there is no reported case in which a transmural and transvalvolar migrated surgical sponge had manifested clinically with a colonic perforation.

Our patient had been long complaining of recurrent abdominal pain episodes which had been erroneously thought to be consistent with an inflammatory bowel disease. As we do not have any explanation as to how such a diagnosis could only be based on clinical and ultrasonographic findings, the patient was indeed under treatment with mesalazine (500 mg × 3/die) and had been also submitted to an abdominal MR 3 months prior to the admission at our Institution. As the MR report did not mention any pathological signal alteration within the peritoneal cavity, we can reasonably assume that the perforative event found at surgery had recently occurred.

As far as the missed MR diagnosis of an intraluminal foreign body is concerned, it is well known that retained surgical sponges may be difficult to detect on MR images because of diamagnetic properties of the radiopaque filaments and the very few free protons contained in the cotton matrix[12]. In our case, we can reasonably argue that the surgical sponge had been likely mistaken for normal feacal content given its intraluminal localization whereas intra-abdominal gossypibomas may appear as a well-defined mass of mixed signal intensities on MR images[13] .

Surgical findings well accounted for the concentric wall thickening observed at the level of both the ascending and proximal transverse colon (Figure 1A) as well as for the fluid collection and the nearby fat stranding depicted within the mesentery (Figure 1B). At surgery, however, no diverticula could be found. As later shown after opening the surgical specimen (Figure 2), it had been the retained sponge itself to have eroded the colonic wall from the inside. As we don’t know why the perforative event occurred at the level of the proximal transverse rather than the ascending colon, it can only be argued that it involved the more distal portion of the retained intraluminal sponge likely because it had been laying there for a longer period of time.

As far as the oral administration of the water-soluble iodinated contrast media is concerned, this is still a controversial practice in the clinical setting of an adhesive small bowel obstruction. As the patient referred a past surgical history with recurrent episodes of abdominal pain and constipation, it was wrongly assumed that this could be likely the case by the on call radiologist. Indeed, a recent meta-analysis has shown a beneficial effect of orally administered Gastrografin in terms of both reducing the need of operation and shortening the hospital stay of patients with adhesive small bowel obstruction[14].

In the present case, however, the presence of the intraluminal contrast agent did not affect the correct interpretation of CT images as it had not reached the ileo-cecal valve as also shown by the coronal Maximum Intensity Projection (MIP) reconstructed image (Figure 3).

As this latter was not obtained in the prospective image analysis, the present case underscores the added diagnostic value of the coronal reformatted or reconstructed MDCT images in the setting of acute abdomen[15]. If it had been performed prospectively, the coronal MIP image (Figure 3) would have pointed to the correct diagnosis of a iatrogenic perforation as assessed by laparotomy (Figure 2).

We have herein reported a case of a transmural and transvalvolar migration of a retained surgical sponge which manifested with a colonic perforation.

To the best of our knowledge such a case has never been reported in the literature.

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**Figure 1 Multi-detector contrast-enhanced computed tomography.** A: Transverse images of the lower abdomen are shown; Concentric thickening of the bowel wall can be appreciated at the level of both the ascending and proximaltransverse colon (arrow-heads) with evidence of several out-pouchings; B: associated hyperplasic ileo-colic lymph-nodes; In B a small air-fluid collection is also depicted within the mesenteric fat with associated fat-stranding (arrow); C: At a more caudal level, extra-luminal air can also be appreciated, retrospectively, a cluster of small bowel loops (arrow) can be recognized proximal to the cecum; D: As best shown with pulmonary window settings. In all images there is evidence of a hyperdense ring-shaped intra-luminal material; Orally administrated iodinated contrast media (Gastrografin) can be appreciated in the small bowel loops which appear mildly dilated.

**Figure 2 Right hemi-colectomy.** A huge laparotomy sponge (arrow-heads) could be appreciated at the opening of the surgical specimen which included a cluster of small bowel loops (sb) and the appendix (arrow).

**Figure 3** **Multi-detector contrast-enhanced computed tomography.** An 80 mm thick maximum intensity projection (MIP) reconstructed image is shown; The laparotomy sponge (arrow-heads) is clearly depicted in the right flank extending from the ileo-cecal valve to the proximal transverse colon where the perforative event took place; Stomach (\*) and jejunal loops (°) appear opacified by orally administered iodinated contrast media (*Gastrografin*).