

Imaging Diagnosis of the Retained Surgical Sponge

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Abstract

Background: As long as non-absorbable and radiolucent sponges are used, the preoperative diagnosis of this condition will continue to be a problem. The purpose of this study is to report the imaging findings of retained surgical sponges in 4 patients. The diagnosis was confirmed by operation in all cases.

Materials and Methods: The data collected between 1985 and 2001, included the patients' age, sex, type of operation, interval from previous operation, symptomatology and imaging finding.

Results: Three patients presented with abdominal mass and one patient with intestinal obstruction. The plain abdominal radiography showed whorl-like shadow in 2 cases. Ultrasonography demonstrated low echoic mass with echoic component and posterior acoustic shadow in 2 cases. One computed tomography examination was performed and showed well-defined outline of a mixed density mass with multiple air bubble inside.

Conclusion: Imaging diagnosis of the retained surgical sponge has rarely been reported. We wish to present the imaging approach and findings which may be beneficial to the patient. These may help radiologist and surgeon to establish an early diagnosis of this condition.

Retained surgical foreign body following abdominal surgery is an infrequent event.¹ As long as non-absorbable materials without radiopaque marker are used, the diagnosis of this condition will continue to be a problem. Pre-operative detection of this condition is difficult, requiring skill and experience.

Radiopaque material can be demonstrated with plain abdominal radiograph. Most metallic objects are minimally symptomatic. Frequently they were discovered months or years after surgery, when abdominal radiography were taken for other indication.¹

Surgical sponge is different. Most of them are without radiopaque marker. The natural behaviour of retained surgical sponge is to cause foreign body tissue reaction. Two types of foreign body tissue reaction may occur. The first one is an aseptic fibrinous type that produces adhesion and encapsulation. The second one is exudative in nature with abscess formation.² They can create adhesion, encapsulated granuloma,

and intestinal fistula.^{2,3} It may also produce an abdominal mass that composed of a cotton component called gossypiboma.^{4,5}

In rare instance, calcification of the mass can occur and may be demonstrated on radiological examination.³ The imaging diagnosis of the retained surgical sponge has rarely been reported.

The purpose of this study is to describe the imaging findings of retained surgical sponges in 4 cases during 18 years experience of practice in radiology.

MATERIALS AND METHODS

Between 1985 and 2001, 4 patients (all women) ranging in age from 21 to 41 years seen in the Department of Radiology, Srinakarin Hospital were included in this series. The diagnosis of retained surgical sponge was confirmed by operation in all cases. All of surgical sponges were without radiopaque markers. The

Table 1 Patient data and symptomatology

Case	Age	Sex	Interval from Previous Operation	Symptomatology
1	21	F	7 months	Abdominal mass with abdominal pain
2	41	F	1 year	Movable abdominal mass
3	37	F	5 months	Pelvic mass with diarrhea
4	32	F	2 days	Abdominal pain

Table 2 Imaging procedure and findings

Case	Plain Abdominal Radiograph	Ultrasonography	Contrast Study of Gastrointestinal Tract	Computed Tomography
1	Soft tissue mass at mid part lower abdomen	-	Pressure effect, coil spring appearance in ileum	-
2	Soft tissue mass at mid part abdomen	Low echoic mass with high echoic component and posterior acoustic shadow	Soft tissue mass, pressure effect on bowel loop	-
3	Whorl-like shadow at left lower abdomen	Low echoic mass with high echoic component and posterior acoustic shadow	Sigmoid fistula	-
4	Whorl-like shadow at mid part abdomen with intestinal obstruction	-	-	Well defined mixed density mass with multiple air bubbles

previous type of surgery were all obstetrics and gynecological procedures (2 cases of Cesarean section, one case of ectopic pregnancy and one case of tubal re-anastomosis). The interval between the operation and diagnosis ranged from 2 days to 1 year. (Table I)

The imaging procedures (table II) included plain film (4 cases), contrast study of gastrointestinal tract (3 cases), ultrasonography (2 cases), and computed tomography (1 case).

RESULTS

All patients were symptomatic (Table I). In two patients, plain abdominal radiographs were helpful with a whorl-like pattern of gas loculation. (Cases no. 3, no. 4, Figure 1). The contrast study of gastrointestinal tract in 3 cases demonstrated soft tissue mass with pressure effect on bowel loop (Case no. 2, Figure 2), intraluminal coil-spring appearance (Case no. 1, Figure 3), and colonic fistula (Case no. 3, Figure 4). The two sonographic studies showed a folded appearance of

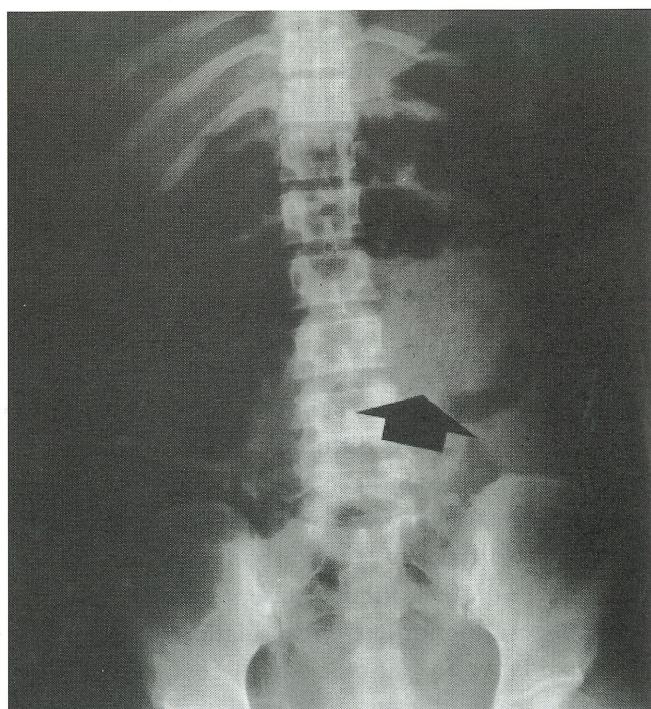


Fig. 1 Plain abdominal radiograph showed whorl-like shadow in mid-part abdomen. (arrow)

well-defined, mixed echoic mass, with low echoic and high echoic component and typical posterior acoustic shadow behind the high echoic component in a cystic mass (Case no. 2, no. 3, Figure 5): One abdominal computed tomography illustrated a mass with, well-

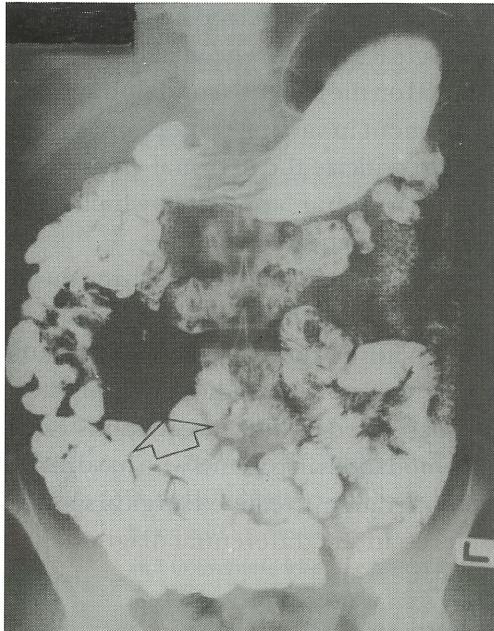


Fig. 2 Contrast study of gastrointestinal tract showed soft tissue mass in right lower quadrant abdomen with pressure effect on bowel loop. (open arrow)

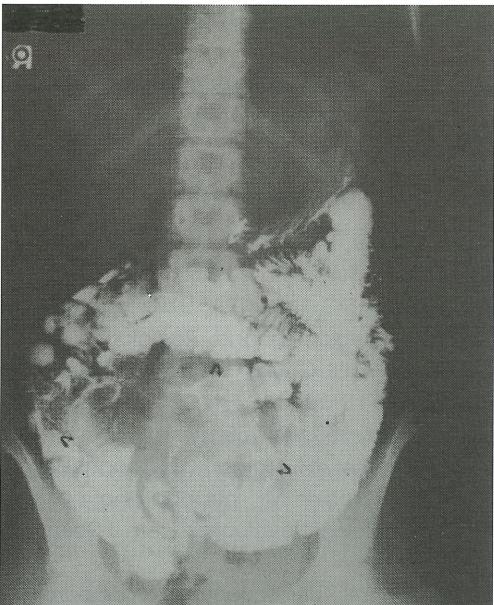


Fig. 3 Contrast study of gastrointestinal tract showed soft tissue mass in right lower quadrant of the abdomen with pressure effect on bowel loop and coil spring appearance in ileum. (curve arrows)

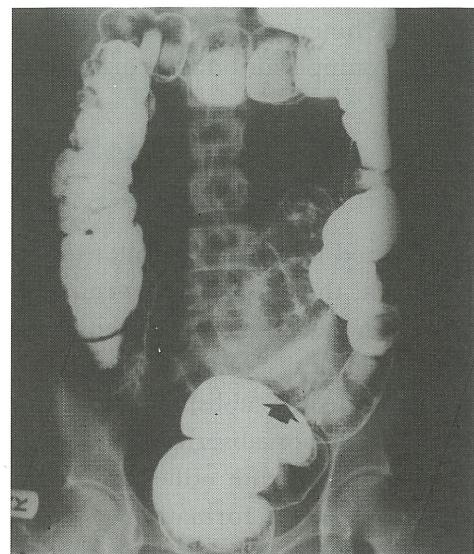


Fig. 4 The study of barium enema showed sigmoid fistula. (arrow)



Fig. 5 Ultrasonography showed mixed echoic mass (open arrow) with posterior acoustic shadow from echoic component of the mass. (curve arrow)

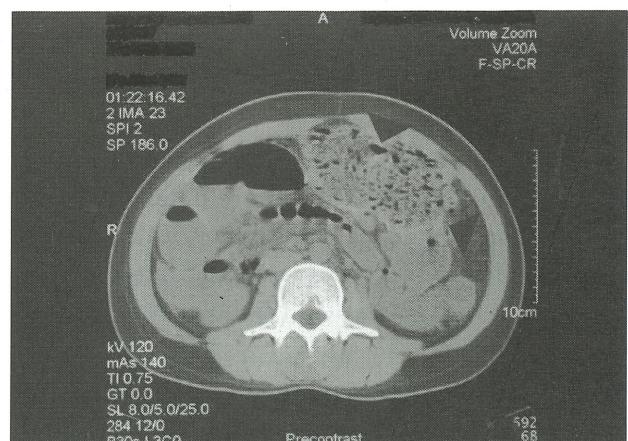


Fig. 6 Computed tomography of abdomen showed well-defined outline of a mixed density mass with multiple air bubble in mid part of abdomen (arrow).

defined internal heterogeneous densities in mid part abdomen with multiple air bubbles inside (Case no.4, Figure 6)

DISCUSSION

Even retained foreign body following surgery is infrequent event, the actual incidence is difficult to estimate. The most common retained foreign body after surgery is surgical sponge.⁵ Imaging procedure have important role in establishing the diagnosis pre-operatively.^{2,3,6} For non-absorbable and radiolucent materials, they may create adhesion, encapsulated granuloma, and fistula formation. The imaging findings can mimic other diseases such as intra-abdominal cyst⁴ and abscesses, varies with the duration of retained materials.^{7,8} It may also cause ileus, intestinal obstruction due to adhesion or even with gastro-intestinal fistula.

On plain abdominal radiography, the surgical sponges without radiopaque markers may show a whorl-like appearance. This is considered to be due to gas bubbles from the intestine being trapped in the fiber of the sponge.⁶ In this report whorl-like appearance was demonstrated in 2 cases.

Contrast study of the gastrointestinal tract may show soft tissue mass with pressure effect on bowel loop with coil spring appearance in small bowel loop and extravasation of barium from colon to coat over the retained sponge.

Ultrasonography has added findings for imaging diagnosis by characteristic folded appearance of a well-outline mixed echoic mass, with echoic component and posterior acoustic shadow, which may represent the retained sponge that strongly attenuate the sound wave.⁶ This can be differentiated from calcified mass by abdominal radiograph.

The advent of computed tomography provides more definite diagnosis and more detail anatomical analysis. The sponge may locate near or far away from surgical bed. In this report it showed heterogeneous density mass with multiple air bubbles trapped in the surgical sponges.

CONCLUSION

The purpose of this study is to report imaging findings of retained surgical sponges. However this

condition is infrequent. As long as non-absorbable and radiolucent sponges are used, the spectrum of the retained sponge will continue to be a nightmare to the surgeons. A retained sponge always occurred in cases with apparent correct sponge count.^{1,9} The radiologist usually is the first person encountered with the problem of retained sponge.

Our series shows variety of imaging modalities of retained surgical sponge. The imaging procedure was selected based on the patient's condition and availability of the instrument in varying centers and times. We do not intend to criticize the personal errors, but wish to present the imaging approach which should be beneficial to the patient.

Prevention remains the key in solving the problem. A routine sponge count should be carried out before surgery and before wound closure. A precaution is to use surgical sponge with radiopaque marker. When one of the described findings are demonstrated by any of imaging modalities in patients who have had previous abdominal operation, a retained surgical sponge should be considered in the differential diagnosis.

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