Gossypibomas of the Abdomen and Pelvis: a review and update

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Retained Foreign Objects (RFO) after surgery represent a devastating error affecting both patients and healthcare professionals. They are associated with significant morbidity and mortality for the patient and with malpractice risk for the healthcare professional.
Gossypibomas

Gossypibomas (Retained Surgical Sponges or Swabs) from gossypium (Latin: cotton) and boma (Swahili: Place of concealment) are the most common retained foreign bodies inadvertently left after surgery.

Also known as textilomas, gauzomas and cottonoids.

Incidence is difficult to ascertain because of a low reporting rate. Estimated occurrence: 1 in 5500 operations.

Goal of this presentation is to increase awareness of this rare but important entity in the general diagnostic radiology audience.
Retained Foreign Objects (RFO)

2nd most common: Retained surgical instruments or other devices

Standard counting protocols of surgical items in the OR have limitations.
**Incidence**

In a review of the literature by Wan, et al, 254 gossypibomas were identified:

- Most commonly in the abdomen (56%), pelvis (18%) and thorax (11%)
- Most often detected by CT (61%), followed by radiographs (35%) and US (34%)
- Other imaging techniques include MRI, barium enema and PET-CT
Risk Factors

• Emergency surgery
• Unexpected change in the type of surgical procedure
• Obesity:
  – Large intraperitoneal space where sponge can be left behind
  – Increased technical difficulty
Case 1

29 y old man, 7 days following emergency laparotomy due to multiple liver lacerations caused by blunt abdominal trauma.

Fig 1. A: CT scanogram demonstrates 5 retained laparotomy sponges, easily identified by their radiopaque marker (blue arrows).
Radiologist Role is Essential

• Key is to be familiar with the scope of appearances in different imaging modalities

• Radiopaque markers on sponges or surgical towels may become obscured by twist or folds, artifacts or suboptimal image quality in plain radiographs

Photograph of a laparotomy sponge with its radiopaque marker (blue arrow).
Gossypiboma / Textiloma
CT: Typical “spongiform” pattern

- Small foci of gas trapped in the fiber mesh
- Can be seen in plain films, but better at CT scans: well-circumscribed mass with soft-tissue attenuation / whorled texture

Fig. 1 B,C,D: three laparotomy sponges, in axial CT images demonstrating their radiopaque markers and their spongiform pattern (arrows). Note small foci of gas trapped in the fiber mesh.
Case 2: Pelvic Gossypiboma

Portable supine radiograph of the abdomen is submitted from the ICU. A foreign body representing a radiopaque marker is seen overlying the right hemipelvis. Surgical staples are seen across the right hemiabdomen/hemipelvis.
Case 2: Pelvic Gossypiboma

Within the lower abdomen, there is a 9.8 cm x 7.4 cm well-defined collection of soft tissue density with mottled gas and a serpiginous radiopaque surgical sponge marker. Findings are consistent with gossypiboma immediate post-surgical.
Subacute Gossypiboma w/o Radiopaque Marker

63 y.o. female with increasing abdominal pain, swelling, and warmth to palpation with low grade fevers

Courtesy of Prakash Masand
Gossypibomas can elicit two types of foreign body responses:

1. Exudative type reaction: usually occurs in the early post-op period, often leads to acute abscess formation from secondary bacterial contamination.

2. Aseptic fibrous tissue reaction: with fibroblast proliferation, slow adhesion formation with partial or complete encapsulation, and granuloma or pseudo-tumor formation. This can remain asymptomatic for a long-time.
US Findings

- Wavy, echogenic, well-defined central mass with a hypoechoic rim
- Intense and sharply delineated acoustic shadow
- Hypoechoic masses with highly echogenic foci caused by the retained material, pockets of air or calcified regions in the gossypiboma
- Poor sensitivity in the early post-op period due to gas distention (postop ileus), incisional pain and dressings of the surgical wound
A) On scanning his abdomen, in the mid-epigastric region the technologist saw a well-defined large ovoid complex solid and cystic abdominal mass which obscured complete visualization of the aorta anteriorly. B) Multiple nodular echogenic areas with posterior acoustic shadowing in the mass.
CT Findings

Topogram: Round intraabdominal mass which displaces adjacent surrounding loops of bowel and a metallic density (arrow) are noted.
The metallic density consistent with radiopaque marker in a sponge. A wavy stripe in the right aspect of a large mass shows an associated large round heterogeneous fluid and soft tissue mass adherent to the peritoneal surface of the anterior abdominal wall. CT findings are highly suspicious for abdominal gossypiboma.
Case 4: Intraluminal Gossypiboma

Extrusion of the retained sponge can occur externally through a fistulous track or migrate internally into the intestinal lumen causing intestinal obstruction.
Second Gossypiboma: Intraluminal Gossypiboma

Note: gas bubbles (arrow) associated with radiopaque marker, demonstrated on CT-scan to demonstrate a second retained sponge
Second Gossypiboma:
Intraluminal Gossypiboma

CT correlation with previous findings confirming suspected intraluminal gossypiboma
MR findings can be variable according with the composition, type of reaction and time since surgery. Although reports of gossypibomas depicted with MRI are rather sparse, some suggestive findings have been reported. Usually there is a well-defined fluid-filled mass with a capsule, exhibiting low-signal intensity on T1W and T2W and enhancement at contrast-enhanced T1W. A rather characteristic appearance of whorled stripes, in the central portion shown as low-signal on T2W, represents the gauze fibers. Low-signal-intensity foci with blooming artifacts indicative of metallic surgical clips maybe also present. Rarely, a small amount of fat maybe present in the retained sponge.
Case 5: 36 Y/O Female 1 Month S/P C-section

Possible diagnostic considerations:
- Serous cystic ovarian neoplasm
- Tubo-ovarian abscess (PID)
- Endometrioid carcinoma
- Textiloma
Folded-fabric-pattern whorled stripes noted inside the mass (arrows) representing a clue to the diagnosis.
T1W MRI of RSS: Low SI Foci and Blooming Artifacts and Fat

Figure 1

Figure 1: Axial T1-weighted (a) in-phase (repetition time msec/echo time msec, 275/4.5; 90° flip angle) and (b) out-of-phase (275/2.3, 90° flip angle) gradient-echo MR images obtained through the abdomen show a large, intermediate-signal-intensity, well-circumscribed, round right-sided abdominal mass. In a, high-signal-intensity punctate foci of intralıesional lipid (short arrow) are seen. Adjacent surgical clips appear as low-signal-intensity foci relative to b, with blooming artifacts (long arrows in a and b). In b, loss of signal intensity of punctate foci of intralıesional lipid (short arrow) due to chemical shift effects is seen.

With permission from: Kernagis LY, Siegelman ES, Torigian, DA Radiology. 2009;251:608-611
MRI of Retained Sponge: Whorled Texture

Figure 2: Axial heavily T2-weighted single-shot fast spin-echo MR image (77 959/184, 90° flip angle) obtained through the abdomen shows high-signal-intensity fluid with wavy low-signal-intensity structures internally, indicative of a retained sponge.

Figure 3: Axial gadolinium-enhanced fat-suppressed T1-weighted gradient-echo MR image (312/1.5, 90° flip angle) obtained through the abdomen demonstrates smooth thick rim enhancement without internal enhancement.
Gossypiboma: FDG-PET

A, Scout image from a CT scan of the abdomen: note radiopaque marker of a retained surgical sponge (RSS) in the left upper abdomen (white arrow).

B, 2-FDG PET coronal section of the abdomen: area of decreased uptake in the LUQ surrounded by a thin rim of increased 2-FDG activity (black arrow).
Gossypiboma: FDG-PET

(A), Nonenhanced CT 2-FDG PET (B) and fused PET/CT (C) axial images of the upper abdomen and enhanced axial CT image (D) of the upper abdomen from a separately performed CT scan. Note the soft tissue mass representing the retained surgical sponge (RSS) (*) surrounded by a thin capsule, which demonstrates mild enhancement after contrast material administration and increased 2-FDG uptake (solid white arrow) on PET/CT. Embedded within the RSS is a hyper dense focus representing the radiopaque marker (dotted black arrow).
Conclusions

Gossypibomas of the abdomen and pelvis are rare occurrences and difficult to diagnose. In clinical practice, CT is the technique of choice, but familiarity with the imaging findings and different modalities is essential together with a high index of suspicion in patients with history of surgical intervention; even dating back many years.
References / Bibliography

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