Abdominal gossypiboma: A pictorial review

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Learning objectives

To describe the clinical and radiologic spectrum of abdominal and pelvic gossypibomas.

Background

Introduction

The term gossypiboma is used to describe a mass within the body that is composed of cotton matrix and most commonly refers to a retained surgical sponge. It is derived from the Latin "gossypium" (cotton) and the Swahili "boma" (place of concealment). A synonym for this word is textiloma, which combines the word "textile" (until recently most surgical sponges were made of cloth) and the suffix "oma", meaning a tumor or growth. These retained sponges were first referred to as "textilomas", but were renamed "gossypiboma" in 1978. The first case was reported by Wilson in 1884.

Gossypibomas may present at any time, from immediately postoperatively to several decades after initial surgery. Around 50% are discovered after at least four years of the surgery.

Detection of the radiopaque markers incorporated into the sponge and the meticulous 'sponge counts' in the operating room are not foolproof, with studies showing a 10% false-negative rate.

Pathophysiological Aspects

Pathologically two types of reactions are described against gossypibomas.

One is an exudative type leading to abscess formation with or without bacterial superinfection. This type of reaction may present in the immediate post-operative period and simulate abscess or haematoma.

The other is an aseptic fibrinous response around the retained sponge that results in adhesion or encapsulation and eventually in the development of a foreign-body granuloma. This type of reaction does not usually present any clinical symptoms although a palpable mass may be felt.

Sometimes, the gossypiboma may remain unnoticed for years till the time that they result in a complication or be incidentally picked up. During the period that the gossypiboma remains in the body extrusion of the gauze can occur externally through a fistulous tract or internally into the rectum, vagina, bladder or intestinal lumen. By either fistulizing to a lumen or through direct migration, it can cause intestinal obstruction, malabsorption,
and gastrointestinal hemorrhage. The low index of suspicion due to the rarity of the condition and the long latency in the manifestation of the symptoms frequently result in misdiagnosis (or even missed diagnosis) leading to inordinate delay in proper management.

The longer the retention time, the higher is the fistulization risk.

**Clinical Manifestations**

Symptoms of gossypibomas are variable and can be exhibited for several years or even for decades after surgery. Patients can present with nonspecific abdominal pain, nausea, vomiting, abdominal distension, intestinal obstruction and a palpable mass.

Acute presentations generally follow a septic course with abscess and granulomatous and fistula formation. The differential diagnosis in such cases includes post-operative collection, hematoma, and non-foreign body abscess.

Delayed presentation may follow years after original surgery, with adhesion formation and encapsulation by a granulation tissue, and the lesion may present as a mass or subacute intestinal obstruction. In these cases, the differential diagnosis typically includes tumor.

Eventually, it may produce various complications leading to its discovery, such as peritonitis, fistulas and erosion into the gastrointestinal tract.

The only remedy for clinical symptoms associated with gossypiboma is surgical removal of the mass. If the gossypiboma remains asymptomatic, the therapeutic approach must balance the potential risk of evolution of the foreign body and the risk of surgical removal. The clinical history can help to differentiate these 2 alternatives because the onset of complaints is usually much earlier in patients with postoperative scar formation compared with those with gossypiboma. However, although all patients presented with newly developed symptoms at the site of the mass, just because the gossypiboma is there does not necessarily mean that it is the cause of the patient's new symptoms. The careful clinical evaluation for the cause of the symptoms is needed.

**Differential Diagnosis**

The differential diagnosis of gossypiboma includes faecaloma, hematoma, abscess formation and tumour.

Faecaloma may have a spotted appearance on CT but has a recognizable colonic wall and lacks thick well-defined capsule.

Hematoma is seen in the early postoperative period and shows resorption in the following examination.

Abscess is visualized as a mass of fluid density and a well-defined enhancing wall with a wavy, striped, or spotted internal high-density areas within the mass.
Gossypiboma mimicking tumour is usually seen a palpable abdominal mass in a patient who is asymptomatic or has nonspecific abdominal complaints with a past history of laparotomy. This condition must be kept in mind for correct diagnosis to be made.

Prevention

Gossypibomas can be prevented by careful scrutiny of the operative wound at the time of surgery, meticulous count of materials sponge during surgery and the use of radio-opaque markers in the sponges. A poor postoperative recovery with non-specific symptomatology should alert the clinician to the possible diagnosis. Most reported cases of gossypibomas occur in the presence of a normal pack count.

Imaging findings OR Procedure details

Gossypibomas typically have an inconsistent radiologic appearance, which depends on the amount of time that the foreign body has been in situ, the type of material, and the anatomic location. Although certain characteristic features of gossypiboma have been described on plain-films, CT, ultrasound and even magnetic resonance the imaging features of retained sponges may be variable with any technique, and the diagnosis can be especially difficult if a radiopaque marker is not present.

Radiography

In most countries, surgical sponges contain radiopaque material that facilitates detection by standard abdominal radiography (Fig. 1 and 2). Such sponges can also be identified readily in CT images. However, surgical sponges without radiopaque markers are still used in many institutions, and this type of sponge is very difficult to identify by using standard radiographic and CT imaging. Therefore, retained surgical foreign bodies often make diagnosis intractable.

The typical appearance of gossypiboma often includes a whirllike pattern of radiopaque thread on radiographs. This finding may be due to gas of an intestinal origin trapped between the fibers of the sponges. However, this finding is not always present. The diagnosis is easily made by plain abdominal radiography, when a radiopaque marker is seen (Fig. 3 and 4). However, this imaging method is not helpful when these markers are disintegrated or fragmented over time. In cases complicated by fistula formation, radiographic contrast material instillation may be helpful to define the anatomy and extent of the abnormality.

Ultrasound

Ultrasound may be useful, but often non-diagnostic in the diagnosis of abdominal retained gauze.
The ultrasound features of abdominal gossypiboma are divided into three types: an echogenic area with intense posterior shadow (Fig. 5 - A and B), a well-defined cystic mass containing distinct internal hyperechogenic wavy, striped structures, and non-specific pattern with a hypoechogenic mass or a complex mass (Fig. 6 - A and B). Acoustic shadowing is observed in all cases. This is due to the attenuation of beam by foreign body as well as presence of gas and sometimes calcification.

**Computed Tomography**

Computed tomography (CT) is the method of choice for detecting gossypibomas and possible complications. The reported CT appearances of gossypiboma are often not pathognomonic and most of the times they are nonspecific.

The CT findings of gossypiboma are described as well circumscribed masses with a thick wall, with or without gas, calcification or enhancement of the wall after administration of contrast medium (Fig. 7 - A, B, C and D). The internal structure may appear whirllike or spongiform due to the presence of gas trapped within the mesh of sponges. It may be low density or complex with both low density and wavy, striped or spotted high density areas that represent the sponge itself (Fig. 8 - A, B, C and D).

The spongiform pattern is characteristic but rare (Fig. 9 - A, B, C, D, E and F and Fig. 10 - A, B, C, D, E and F).

CT findings of gossypiboma, particularly in long standing cases, may be indistinguishable from intraabdominal abscess, since air bubbles and calcification of the cavity wall as well as contrast enhancement of the rim may be seen in both conditions.

As with conventional radiography, a hyperdense marker is not a reliable sign (Fig. 11 - A, B, C and D).

**Magnetic Resonance Imaging**

There are few reports in which the magnetic resonance imaging (MRI) features of gossypiboma have been described, but these lesions appear to have a variable MR signal intensity that depends on the amount of fluid and protein associated with the lesion.

On MR imaging, a gossypiboma is typically seen as a soft-tissue density mass with a thick well-circumscribed mass and as a whorled internal configuration on T2-weighted imaging (T2WI). Most lesions are hypointense on T1-weighted images(T1WI) and hyperintense on T2WI. The capsule is typically dark on T1- and T2WI. The whorled stripes within the central portion were characteristically shown as low signal on T2WI which represented gauze fibers.

MR images can be difficult to interpret because radiopaque filaments contains very few free protons and, therefore, does not provide a strong MR signal intensity.
Images for this section:

**Fig. 1:** Photograph of surgical sponge that interwoven radiopaque marker (arrow) is visible.
Fig. 2: Radiograph of surgical sponge shown in Fig. 1 reveals that the body of sponge isn't radiopaque, but marker (arrow) is easily seen.
Fig. 3: Abdominal radiograph. Radiopaque marker (circle) of laparotomy sponge is visible in left middle quadrant.
Fig. 4: Abdominal radiograph. Radiopaque marker (circle) of laparotomy sponge is visible in left lower quadrant.
Fig. 5: Transverse ultrasound of left lower abdomen shows an echogenic area with strong and extensive acoustic shadowing.
Fig. 6: Transverse ultrasound of left lower abdomen shows an echogenic area with strong and extensive acoustic shadowing.
Fig. 7: Transverse ultrasound of lower abdomen shows a complex mass with hyper- and hypoechogenic regions.
Fig. 8: Transverse ultrasound of lower abdomen shows a complex mass with hyper- and hypoechogenic regions.
Fig. 9: Non-enhanced CT scan of the abdomen demonstrates the radiopaque marker (arrow) of the surgical sponge with a surrounding abscess.
**Fig. 10:** Non-enhanced CT scan of the abdomen demonstrates the radiopaque marker (arrow) of the surgical sponge with a surrounding abscess.
**Fig. 11:** Contrast enhanced CT scan of the abdomen demonstrates the radiopaque marker (arrow) of the surgical sponge with a surrounding abscess, which shows enhancement of the wall after administration of contrast medium.
Fig. 12: Contrast enhanced CT scan of the abdomen demonstrates the radiopaque marker of the surgical sponge with a surrounding abscess, which shows enhancement of the wall after administration of contrast medium.
Fig. 13: Non-enhanced CT scan of the abdomen demonstrates a low density mass with wavy and striped high density areas that represent the radiopaque marker (arrow).
Fig. 14: Non-enhanced CT scan of the abdomen demonstrates a low density mass with wavy and striped high density areas that represent the radiopaque marker (arrow).
Fig. 15: Contrast enhanced CT scan of the abdomen demonstrates a low density mass with wavy and striped high density areas that represent the radiopaque marker (arrow).
**Fig. 16:** Contrast enhanced CT scan of the abdomen demonstrates a low density mass with wavy and striped high density areas that represent the radiopaque marker (arrow).
**Fig. 17:** Non-enhanced CT scan of the abdomen demonstrates in the left pararenal space a thick-walled, well-encapsulated mass containing mixed high and low-attenuation contents with gas bubbles in the centre, having the so-called spongiform appearance (arrow).
Fig. 18: Non-enhanced CT scan of the abdomen demonstrates in the left pararenal space a thick-walled, well-encapsulated mass containing mixed high and low-attenuation contents with gas bubbles in the centre, having the so-called spongiform appearance (arrow).
**Fig. 19:** Contrast enhanced CT scan of the abdomen demonstrates in the left pararenal space a thick-walled, well-encapsulated mass containing mixed high and low-attenuation contents with gas bubbles in the centre, having the so-called spongiform appearance (arrow).
Fig. 20: Contrast enhanced CT scan of the abdomen demonstrates in the left pararenal space a thick-walled, well-encapsulated mass containing mixed high and low-attenuation contents with gas bubbles in the centre, having the so-called spongiform appearance (arrow).
Fig. 21: Sagittal reformation of the abdomen demonstrates in the left pararenal space a thick-walled, well-encapsulated mass containing mixed high- and low-attenuation contents with gas bubbles in the centre, having the so-called spongiform appearance (arrow).
**Fig. 23:** Scout radiograph of the abdomen. Radiopaque marker (circle) of laparotomy sponge is visible in left lower abdomen.
Fig. 24: Sagital reformation of the abdomen demonstrates the in left lower abdomen a thick-walled mass, containing mixed high- and low-attenuation contents with gas bubbles in the centre (spongiform appearance).

Fig. 25: Contrast enhanced CT scan of the abdomen demonstrates the in left lower abdomen a thick-walled mass, containing mixed high- and low-attenuation contents with gas bubbles in the centre (spongiform appearance). There is enhancement of the wall after administration of contrast medium.
Fig. 26: Contrast enhanced CT scan of the abdomen demonstrates the in left lower abdomen a thick-walled mass, containing mixed high- and low-attenuation contents with gas bubbles in the centre (spongiform appearance). There is enhancement of the wall after administration of contrast medium.
**Fig. 27:** Contrast enhanced CT scan of the abdomen demonstrates the in left lower abdomen a thick-walled mass, containing mixed high- and low-attenuation contents with gas bubbles in the centre (spongiform appearance). There is enhancement of the wall after administration of contrast medium.
Fig. 28: Contrast enhanced CT scan of the abdomen demonstrates the in left lower abdomen a thick-walled mass, containing mixed high- and low-attenuation contents with gas bubbles in the centre (spongiform appearance). There is enhancement of the wall after administration of contrast medium.
Fig. 29: Non-enhanced CT scan of the abdomen demonstrates a large abdominal mass containing mixed high- and low-attenuation contents. No radiopaque marker is seen.
**Fig. 30:** Contrast enhanced CT scan of the abdomen demonstrates a large abdominal mass containing mixed high- and low-attenuation contents. No radiopaque marker is seen.
Fig. 31: Coronal reformation of the abdomen demonstrates a large abdominal mass containing mixed high and low-attenuation contents. No radiopaque marker is seen.
Fig. 32: Sagital reformation of the abdomen demonstrates a large abdominal mass containing mixed high and low-attenuation contents. No radiopaque marker is seen.
Conclusion

In conclusion, gossypiboma has to be considered as a strong diagnostic possibility in postoperative patients presenting with unexplained symptoms such as pain and intestinal obstruction. Awareness of the typical radiologic appearances is critical to the diagnosis of retained surgical sponges or swabs. A high index of suspicion is required because a history of an incorrect sponge count is frequently lacking and because a radiopaque marker is not always visible. Early recognition of this entity will assist in prompt institution of appropriate treatment, reducing morbidity and mortality in these patients.

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