Intrathoracic Gossypiboma: An Overlooked Entity

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Conflict of interest: None declared

Patient: Male, 48-year-old
Final Diagnosis: Gossypiboma
Symptoms: Chest pain • dyspnea • empyema • fever • pleural effusion
Medication: —
Clinical Procedure: Thoracotomy
Specialty: Surgery

Objective: Rare disease

Background: During any surgical procedure, there are several factors that may lead to morbidity and mortality. One of those factors is a retained cotton or gauze surgical sponge inadvertently left in the body during an operation, known as gossypiboma. This clinical oversight may cause serious postoperative complications and increase the risk of mortality, particularly if left undiscovered. Furthermore, this issue adds to the economic burden on healthcare systems by increasing the rate of reoperation and rehospitalization. The length of postoperative gossypiboma diagnosis varies greatly, as patients may either present acutely with symptoms such as a palpable mass, pain, nausea, and vomiting, or remain asymptomatic for several years.

Case Report: We report the case of a 48-year-old man who underwent a thoracotomy after a road traffic accident. The resulting empyema led to the intraoperative discovery of an intrathoracic gossypiboma, which was initially interpreted radiologically as a part of the previous surgical staple line. The causative agent was discovered by the team’s nurses during the postsurgical count of instruments and sponges, and who were alerted to a recovered sponge differing in appearance from the sponges used for that procedure.

Conclusions: In general, proper counting and adherence to the World Health Organization ‘Surgical Safety Checklist’ can greatly improve the outcome of any surgery. The diagnosis of gossypiboma is often late or missed entirely and leads to additional interventions that can be avoided or detected early when the material contains a radiopaque marker. In cases under suspicion of any mistakenly left object, the use of intraoperative radiology before skin closure is highly recommended to prevent postoperative complications for the patient and organization.

MeSH Keywords: Empyema • Gossypium • Thoracotomy

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Background

During surgery, several factors lead to patient morbidity and mortality. One of these is retained cotton or gauze (surgical sponge), leading to what is known as a gossypiboma [1]. Gossypiboma may be present in any body cavity but most commonly in the abdomen, pelvis, and thorax [1]. They often lead to serious complications resulting in rehospitalization, reoperation, and even mortality in unresolved cases. A differential diagnosis of gossypiboma should always be considered in the case of an intrapleural opacity after surgery, and a complete history including mass timing can provide a clue to its origin, which in turn would help guide a management pathway [2].

Incidence ranges from 1 per 1000 to 1 per 10 000 cases. Unfortunately, the actual incidence of gossypiboma is difficult to assess, as underreporting is prevalent because of the potential for medicolegal consequences. In general, reported occurrences of thoracic gossypiboma are few, as cited in a 2014 review that noted not more than 40 cases documented in the English literature [1]. The time taken to diagnosis may vary from a few hours postoperatively to years from the incident, as patients may either remain asymptomatic for a long time, or present more acutely with pain, nausea, and vomiting, or a palpable mass [1]. Here, we report a case of intrathoracic gossypiboma that was missed in radiological interpretation as it was initially identified as part of the surgical staple line.

Case Report

A 48-year-old man with no underlying health issues was admitted to our institute after sustaining trauma in a road traffic accident 2 months previously. He presented with multiple rib fractures, bilateral lung contusions, a left hemothorax resulting from the lung injury, multiple facial and skull fractures, a T-11 compression fracture, a T2–T4 spinous process fracture, and a left T9 transverse process fracture. Thoracotomy had been performed during his initial presentation for repair of the lung injury and an aortic-dissecting injury, which was managed by the interventional vascular team applying thoracic endovascular aortic repair.

Postoperatively, his course was difficult. He was treated for ventilator-associated pneumonia and a tracheostomy was subsequently inserted for prolonged intubation. Approximately 6 weeks after the accident, his condition began to deteriorate as a result of what was suspected at that time to be empyema. A thoracotomy tube was inserted in an unsuccessful attempt to drain the effusion, and he was transferred to our institution during that period. Upon admission, he looked ill and was experiencing borderline hypotension and tachycardia secondary to sepsis. A chest examination revealed diminished air entry throughout the left lung. His initial chest X-ray showed an opacity occupying the left hemithorax, which was likely the empyema (Figure 1). His chest computed tomography (CT) scan showed marked left-side pleural effusion with loculations and thickening of the pleura. Additionally, it showed multiple comminuted fractures of the proximal end of the left clavicle and multiple fractured ribs on the left side, more toward the posterior portion, with varying degrees of displacement. There was a radiopaque line around the fissure, which

Figure 1. Chest X-ray demonstrated an opacity occupying the left hemithorax.

Figure 2. Coronal computed tomography chest showing: a) the radiopaque line of the gauze in preoperative chest, and b) disappearance of the radiopaque line postoperatively.
was interpreted as a possible staple line, as no operative report was available for confirmation (Figure 2). Moreover, one of the fractured ribs was displaced and a bone fragment was seen interparenchymally. Because of the condition of the patient and his sepsis, a decision was made to explore operatively through the left posterolateral thoracotomy. Extensive adhesions were discovered on the left upper side of the thoracic cavity, and through adhesiolysis it was possible to reach the collection, which was evacuated and followed with formal de- cortication. The fractured ribs were also repaired. Backing with surgical sponge was continuously performed and all sponges were removed with thorough irrigation. At this time, because of the extensive adhesions and heavy bleeding, the presence of the retained sponge went undetected. At the end of the procedure, however, the nurses’ count of surgical instruments and sponges revealed an extra surgical sponge, which differed in appearance from our hospital’s sponges, having a different string length and a radiopaque line as shown in Figure 3. Additionally, a postoperative chest CT lacked the previous radiopaque line seen in the preoperative chest CT (Figure 4). The patient tolerated the operation well, and he was followed up with rehabilitative management.

**Discussion**

Gossypiboma is a composite of the Latin word ‘gossypium’, meaning cotton and ‘boma’, a Swahili word for place of concealment. The first noted case was described in 1884 as ‘a cotton sponge left in a patient’s abdomen’, [1] and in one report, a gossypiboma case was diagnosed a full 40 years after surgery was performed [1].

A retained sponge typically causes an abscess in the area because of granulation and exudative reaction, adhesions, and a fibrous response. As it is made of cotton, it does not activate any biochemical reaction, but the risk of secondary bacterial infection progressing to fistulas increases with time. Unfortunately, gossypiboma is often misdiagnosed, leading to unnecessary interventions and surgical procedures. It is important to consider this entity as a diagnosis in any case with an unexplained or unusual presentation during the postoperative period [3]. Patients may present with nonspecific symptoms such as abdominal pain, a palpable mass, nausea, vomiting, or other symptoms of intestinal obstruction depending on the location within the cavity. Pulmonary or thoracic gossypiboma symptoms may include chest pain, shoulder pain, cough, hemoptysis, weight loss, or a low-grade fever [4]. It can also mimic benign or malignant tumors, provoking unnecessary interventions and failed biopsy trials [4]. A retained sponge (or any surgical item) should ultimately be considered a case of negligence [5].

In this case, a retained surgical sponge was found inside the thoracic cavity of the patient after admission to our hospital for left-side empyema. The original thoracotomy exploration had occurred 2 months previously.

Multiple factors may lead to gossypibomas, such as operations involving multiple teams with a lengthy duration, emergency surgeries, and improper counting of materials at the end of
procedures, any of which may result in serious complications and legal issues. In the United States, a hospitalization due to retained medical objects is estimated to cost more than US$ 60 000 [1]. On the basis of clinical evidence and radiological appearance, the location and chronicity of intrathoracic gossypiboma is ascertained, with the most common sites of gossypiboma in the thoracic cavity being the pleural and pericardial cavities. The longer it remains in situ, the greater the risk of developing either internal or external fistulas [4] and the mortality rate of gossypiboma ranges from 11% to 35% [5]. Diagnosis of gossypiboma is often late, but it can be easily detected when the material contains a radiopaque marker. It can also be visualized by ultrasound, where it appears as a well-differentiated mass with internal wavy echo and strong acoustic shadowing posteriorly. However, the best imaging for gossypiboma diagnosis is a CT scan, which characterizes the lesion and surroundings well and demonstrates the presence of the variable complications [1]. With contrast enhancement, it may present either as a thick-walled, round mass containing internal heterogeneous densities, or have a wavy, spotted, or striped appearance with entrapped small gas bubbles. These bubbles signify the difference between gossypiboma and a chronic abscess, as the latter usually contains an air-fluid level [3]. Poncelet et al. described the CT findings of a pulmonary gossypiboma as a “homogeneous mass where the right para-cardiac costophrenic angle was occupied by a large thick-walled mass and central cavitation” [6]. In another report, a pleural cavity gossypiboma was seen on a CT scan as having a spongiform appearance. Magnetic resonance imaging features of intrathoracic gossypiboma were described as a movable body within a pseudocystic mass [7].

Gossypiboma can be prevented by proper counting of material by 2 different personnel, with immediate radiography performed intraoperatively if there are any doubts raised while counting. Of the recent advances to reduce such errors, bar codes are used to prevent double counting of the same sponge, and radiofrequency detectors are utilized to detect marked gauzes [1,7]. Once gossypiboma is diagnosed, surgery is the best option to resolve the problem and avoid further complications.

The World Health Organization (WHO)’s 2007 global challenge ‘Safe Surgery Saves Lives’ called upon the literature and the experiences of clinicians around the world and resulted in a core set of surgical safety standards. The WHO’s Surgical Safety Checklist was designed to improve the safety of surgical care, and a significant reduction in both morbidity and mortality has been noticed since its implementation [7]. Notwithstanding, gossypiboma should be considered when no other differential diagnosis or source of infection is identified in a previously operated-upon patient. This is so even without the presence of a radiopaque line, as in cases reported by Dubois et al. and Bakan et al., where gossypiboma was found although the sponge was lacking a radiopaque line [2,8].

It is important to note that with intrathoracic gossypiboma, a history of previous thoracic surgery is not the only prerequisite, as it can also result from abdominal or spinal surgeries, making those cases unique and a topic for discussion [8].

**Conclusions**

Gossypiboma is a rare entity and an intrathoracic gossypiboma even more so. A high index of suspicion is the key to diagnosis, and surgical removal is the mainstay for treatment. Prevention through strict compliance to operative count is paramount and the potential for overlooking unfamiliar equipment such as sponges must be considered in the case of interfacility transfer of patients.

**Conflicts of interest**

None.

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