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ORIGINAL ARTICLE

Intra-abdominal Gossypiboma Revisited: Various Clinical Presentations and Treatments of this Potential Complication

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Abstract Gossypiboma is the term used to describe a retained non-absorbable surgical material that is composed of cotton matrix which leads to serious surgical complications for both patient and surgeon. Its incidence is not precisely known probably due to medico-legal importance of this potential complication. The condition may manifest either as asymptomatic or severe gastrointestinal complications. The increasing number of recent reports in the literature implies that this issue still remains as an important problem to be solved after intra-abdominal surgery. In this report, we aimed to emphasize this potential complication by presenting the clinical outcomes of our 14 patients who underwent different surgical interventions for gossypiboma. Between February 2009 and October 2014, a total of 14 patients who underwent surgery for gossypiboma were reviewed retrospectively. The patients were analyzed with regard to demographic characteristics, initial diagnosis-prior surgery, clinical presentation, the interval period from the first operation to last definite operation, diagnostic methods, gossypiboma location, definite surgery, and postoperative outcomes. A total of 14 patients including 6 (42.9 %) male and 8 (57.1 %) female with a median age of 41.4± 12 years (22–61 years) enrolled in this study. The prior surgery of 10 (71.4 %) patients was performed by general surgeons, while 4 (28.6 %) patients were operated by gynecologists. The interval period from prior surgery to definite surgery ranged from 14 days to 113 months. Three (21.4 %) patients were asymptomatic, whereas the vast of the patients were complicated (fistula, ileus, wound infection). Gossypiboma was removed by open surgery, laparoscopic surgery, and endoscopic intervention in 10, 2, and 1 patient, respectively. Removal was performed from perineal wound side in one patient. Removal was enough for definitive treatment in 10 (71.4 %) patients whereas bowel resection and primary repair was performed in 4 (28.6 %) patients due to fistula or perforation. One patient died from intra-abdominal sepsis on postoperative 13th day. Gossypiboma should strongly be considered in differential diagnosis of any postoperative patient with mild gastrointestinal symptom or with persistent wound infection. Adequate surgical intervention should be planned as soon as possible either to prevent further complications or to overcome medico-legal problems, when gossypiboma is detected.

Keywords Gossypiboma · Intraluminal migration · Retained surgical sponge · Surgery

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Introduction

Gossypiboma is the term used to describe a retained non-absorbable surgical material that is composed of cotton matrix which leads to serious surgical complications for both patient and surgeon [1, 2]. Its incidence is not precisely known probably due to medico-legal importance of this potential complication. Gossypiboma induces two types of tissue reaction which consisted of aseptic fibrinous response and exudative response [1–3]. Clinical presentation is strongly associated with the type of foreign body reaction which may manifest itself in various clinical presentations ranging from mild abdominal pain to major surgical complications including bowel or visceral

perforation, obstruction, fistula formation, or sepsis, although it may remain asymptomatic for many years [1–6].

Despite its rarity, gossypiboma should be considered in the differential diagnosis of postoperative problems even in patients with mild gastrointestinal symptoms. Imaging methods including plain radiography, ultrasonography (USG), computed tomography (CT), magnetic resonance imaging (MRI), and sometimes endoscopy may be helpful establishing the diagnosis [6, 7]. Once gossypiboma detected or even in gossypiboma suspected cases, adequate surgical intervention should be performed as soon as possible either to prevent further gastrointestinal complications or to overcome medico-legal problems. However, it should be emphasized that developing strategies for prevention of this potential complication is even more important than discussing its treatment modalities.

To date, different clinical presentations and various treatment methods have been reported mostly based on single case presentations. Considering the long period of our study reporting the same problem and the increasing number of recent reports of gossypiboma in the literature imply that this issue remains as an important problem to be solved after intra-abdominal surgery. Thus, in this retrospective report, we aimed to emphasize this potential complication by presenting the clinical outcomes of our 14 patients who underwent different surgical interventions for gossypiboma.

Patients and Method

Between February 2009 and October 2014, a total of 14 patients who underwent surgery for gossypiboma in four 3rd-degree hospitals (4 in Adana Numune Training and Research Hospital, 3 in Izmir Ataturk Training and Research Hospital, 3 in Kahramanmaras Necip Fazil State Hospital and 4 in Mersin University Training and Research Hospital) were reviewed retrospectively. The patients were analyzed with regard to demographic characteristics (age, sex, body mass index (BMI)), initial diagnosis-prior surgery, clinical presentation, the interval period from the first operation to last definite operation, diagnostic methods, gossypiboma location, definite surgery, and postoperative outcomes. Diagnostic methods including plain X-ray, ultrasonography (USG), computed tomography (CT), magnetic resonance imaging (MRI), and gastroscopy were used to support preliminary diagnosis and also to rule out other intra-abdominal pathologic conditions, when necessary.

Results

A total of 14 patients including 6 (42.9 %) male and 8 (57.1 %) female with a median age of 41.4±12 years (22–61 years) enrolled in this study. The median body mass index (BMI) was 33.2±5.4 (25–42). The patients had no accompanying diseases. All patients had a history of surgery for various surgical problems. The prior surgery of 10 (71.4 %) patients was performed by general surgeons, while 4 (28.6 %) patients were operated by gynecologists. All prior operations were performed at other clinical centers, except two patients who underwent cesarean and abdominoperineal resection in hospitals which involved in the study. The duration of clinical presentation of the patients from prior surgery to definite surgery ranged from 14 days to 113 months. Vague gastrointestinal symptoms including mild abdominal pain, nausea, and vomiting are the common clinical symptoms (50 %). The demographic characteristics, previous surgical history, and clinical presentation of the patients were summarized in Table 1.

Table 1 Clinical characteristics of the patients

Patient	Age/sex	Initial diagnosis	Operation	Interval	Presentation
1	38/F	Birth- bleeding	Hysterectomy	14 months	Abdominal pain
2	61/F	Adrenal adenoma	Adrenalectomy	113 months	Asymptomatic
3	47/F	Choledocholithiasis	Cholecystectomy + T-tube drainage	22 months	Nausea,vomiting
4	52/F	Myoma uteri	Hysterectomy	18 months	Abdominal pain
5	22/F	Birth	Caeserean	14 days	Fever, abdominal pain
6	37/M	Gunshot injury	Laparotomy + primary repair	5 months	Enterocutanous fistula
7	31/F	Birth	Caeserean	3 months	Fever, abdominal pain
8	34/M	Multiple trauma	Laparotomy	22 months	Asymptomatic
9	36/M	Gunshot injury	Right nephrectomy	9 months	Enterocutanous fistula
10	38/F	Cholelithiasis	Cholecystectomy	23 days	Abdominal pain, ileus
11	33/M	Gunshot injury	Laparotomy	6 months	İleus
12	62/F	Bowel obstruction	Adhesiolysis	89 months	Asymptomatic
13	34/M	Duodenal ulcer perforation	Primary repair	3 months	Fever, vomiting
14	55/M	Rectum cancer	Abdominoperineal resection	12 days	Perineal wound infection

Preliminary diagnosis varies widely including gastric carcinoma, liver hydatid cyst, intra-abdominal mass, etc. However, gossypiboma was always considered in the differential diagnosis since we encountered it so often in our experience. Plain X-ray, USG, CT, MRI, and endoscopy were used to support diagnosis, if necessary (Fig. 1). Three (21.4 %) patients were asymptomatic, whereas the vast of the patients were complicated (fistula, ileus, wound infection) (Fig. 2). Gossypiboma was removed by open surgery, laparoscopic surgery, and endoscopic intervention in 10, 2, and 1 patient, respectively. Removal was performed from perineal wound side in 1 patient who underwent abdominoperineal resection for rectum cancer. Removal was enough for definitive treatment in 10 (71.4 %) patients whereas, bowel resection and primary repair was performed in 4 (28.6 %) patients due to fistula or perforation. Superficial wound infection was the most common postoperative complication which was observed in 5 (35.7 %) patients. All of them were treated conservatively. However, re-laparotomy and loop colostomy was performed on postoperative 5th day in 1 patient who underwent primary repair for colonic perforation. This patient was discharged from hospital on postoperative 13th day. Unfortunately, 1 patient (patient 9) died from intra-abdominal sepsis on postoperative 13th day.

The imaging method for diagnosis, preliminary diagnosis, surgical treatment, gossypiboma localization, and postoperative course of the patients was summarized in Table 2.

Discussion

Retained surgical instrument or sponge following intra-abdominal surgery is a potentially dangerous medico-legal problem. Despite a published incidence of 1:1000 to 1:1500 after intra-abdominal surgeries, probably it is encountered more commonly than reported since the fear of litigation, disclosing the error by other clinicians and also asymptomatic gossypiboma may mask the real incidence, as well [8–10]. Gossypiboma is not associated with the sex. However, considering the reports in the literature, female patients are at high risk (63 %) since the gossypiboma has been frequently observed after gynecologic operations [11].

Gossypiboma can be observed after all surgical intervention; however, it is more commonly encountered after general surgery and gynecologic operations at a rate of 52 and 22 %, respectively [11, 12]. Numerous reports about gossypiboma have been published up to date in the literature since it was described by Wilson in 1884. The majority of these reports were single case reports; thus, the diagnosis and the treatment have been performed based on individual case presentation. Therefore, there is not a clear general consensus on the diagnosis and the treatment of this condition. Accordingly, we retrospectively evaluated our cases in order to present our clinical experience and to reach a conclusion about the management and to emphasize the precautions in order to avoid this highly undesired potential complication.

Clinical symptoms may appear in the postoperative period or even after weeks, months, or years [4]. The interval time from the causative operation to clinical presentation has been

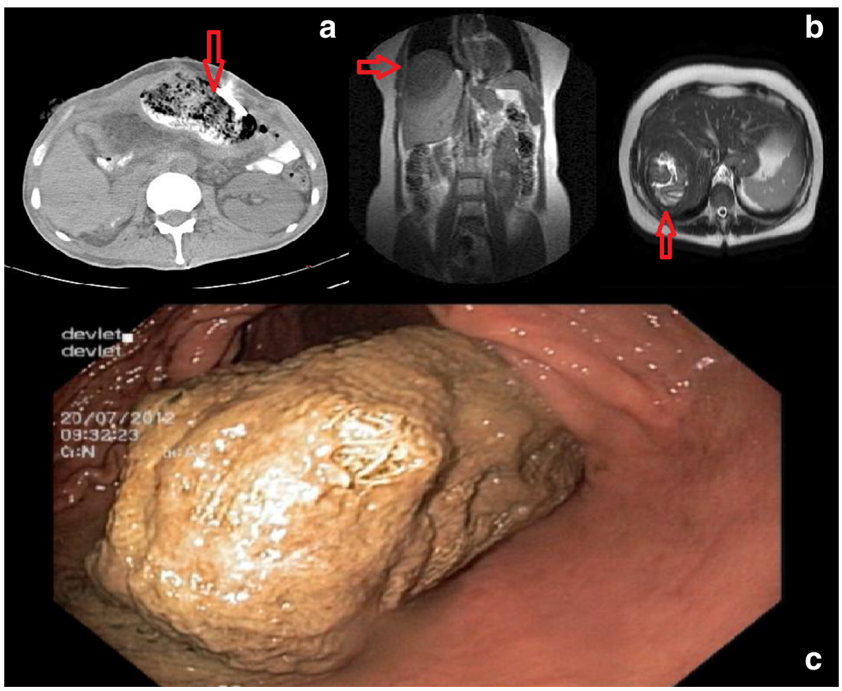

Fig. 1 Imaging of gossypiboma. **a** CT imaging of gossypiboma which was misdiagnosed and catheterized for intra-abdominal abscess. **b** MRI of gossypiboma which was misdiagnosed as liver cancer or hydatid cyst. **c** Endoscopy imaging of gossypiboma which was migrated into the stomach

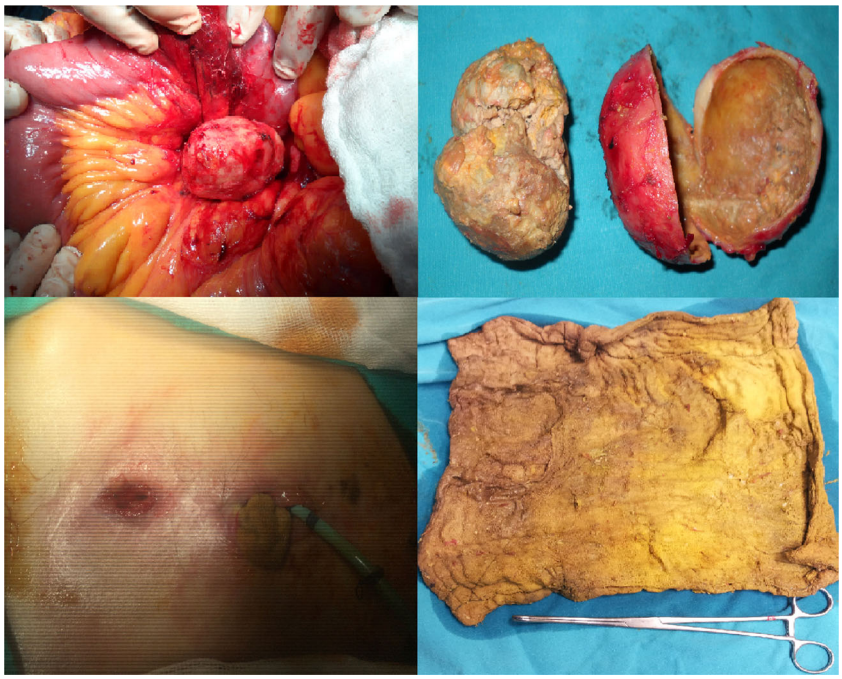

Fig. 2 Imaging of asymptomatic and complicated gossypiboma

reported from first postoperative day to 43 years [1–14]. This interval period was found to be 14 days to 12 years in our study. The clinical presentation of gossypiboma is variable and usually depends on the tissue reaction and localization of gossypiboma. Gossypiboma induces two types of biological responses, aseptic fibrinous response or exudative reaction [2, 6, 15]. Aseptic fibrinous response usually creates adhesions and encapsulation that result in a foreign body granuloma (pseudotumor) in the abdomen. Patients usually remain asymptomatic; however, they may suffer of nonspecific gastrointestinal symptoms like mild abdominal pain or painless abdominal mass, as well. On the other hand, exudative

Table 2 The diagnostic method, surgical treatment, localization of gossypiboma, and postoperative course of the patients

Patient	Diagnostic method	Preliminary diagnosis	Treatment	Location	Postoperative complication
1	USG, CT	Gossypiboma	Removal + small bowel resection	Intraluminal	Uneventful recovery
2	USG, CT, MRI	Liver hydatid cyst	Removal	Right retroperitoneal area	Uneventful recovery
3	CT, gastroscopy	Gastric cancer or gossypiboma	Endoscopic removal	Intragastric	Uneventful recovery
4	X-ray, USG, CT	Bowel obstruction	Laparoscopic removal	Interloop	Uneventful recovery
5	X-ray, USG	Gossypiboma	Removal	Interloop	Wound infection
6	X-ray, USG, CT	Anastomotic leakage	Removal + primary repair of colonic perforation	Intraluminal	Re-laparotomy: colostomy due to fistula
7	USG, CT	Gossypiboma	Removal	Interloop	Wound infection
8	X-ray, USG, CT	Intraabdominal mass or gossypiboma	Laparoscopic removal	Right retroperitoneal area	Uneventful recovery
9	X-ray, USG, CT	Gossypiboma	Removal + small bowel resection + primary repair of colonic perforation	Intraluminal	Died from sepsis on postoperative 13th day
10	USG, CT	Bile leakage	Removal	Subhepatic area	Uneventful recovery
11	X-ray, USG, CT	Bowel obstruction or gossypiboma	Removal + small bowel resection	Intraluminal	Wound infection
12	None	Strangulated incisional hernia	Removal	Interloop	Uneventful recovery
13	X-ray, USG, CT	Intraabdominal abscess	Removal	Subhepatic	Wound infection
14	None	Wound infection	Removal	Douglas pouch	Wound infection

reaction leads to abscess formation; thus, it may manifest as a severe clinical course resulting in intestinal perforation, obstruction, external-internal fistula formation, or sepsis, which is likely due to the transmural migration of retained surgical sponges [2, 3, 10, 16]. Transmural migration occurs as a result of inflammation in the intestinal wall that evolves into necrosis [17]. Although the first type is indicated as the most common response in many reports, 78 % of our patients were complicated with gossypiboma related to the latter reaction. Considering the reports in the literature and according to our results, we suggest that gossypiboma tends to migrate into the adjacent viscera [2, 3, 6, 16, 17]. Therefore, localization of the gossypiboma should be considered as a major determinant factor in the evolution and nature of clinical presentation. Gossypiboma can be located anywhere in the peritoneal cavity, although the small intestinal loops are frequently the most affected viscera due to their thin wall and their high-volume surface occupied in the abdomen compared to other rare localizations including colon, rectum, stomach, duodenum, and retroperitoneum. Hence, as in our study, most of the patients present with intestinal perforation, obstruction, or fistula which may lead to bowel resection. According to our experience, gossypiboma usually remains asymptomatic when located in the retroperitoneum, between the mesenteric leaves of the intestines or when it is surrounded with a solid organ [12]. Complications are inevitable when gossypiboma contacts with the surface of a luminal viscera.

The diagnosis of gossypiboma is difficult to establish since the clinical symptoms are non specific and the imaging methods are often inconclusive [4]. Medical history and physical examination of the patient might sometimes be adequate for the establishment of the diagnosis. Physical examination should carefully be carried out especially in postoperative patients with vague gastrointestinal symptoms or with persistent wound infection in order to figure out the nature of palpable mass that may represent a gossypiboma. Furthermore, accurate diagnosis can sometimes be done by observing the migrated gossypiboma from the wound site as was the case in our two patients. Imaging methods such as plain X-ray, USG, CT, MRI, and/or endoscopy may usually be helpful in the diagnosis. Many characteristic radiological findings are used to diagnose gossypiboma, if the sponge contains a radioopaque marker. Basically, a “whorl-like” mass imaging on plain X-ray, imaging of a hyperechogenic mass with hypoechoic rim on USG, or a rounded mass with a dense central part and enhancing wall on CT are the basic signs of gossypiboma [7, 18, 19]. However, the specificity of these imaging methods is 35, 34, and 61 %, respectively. So, the first diagnostic modality to rule out other conditions seems to be CT. MRI can be confusing because the radio-opaque marker is not magnetic or paramagnetic [20]. In addition, as was the case in our one patient, endoscopy can be the first diagnostic tool in case of suspected transgastric migration [2]. Moreover, gossypiboma usually creates a diagnostic dilemma in imaging methods since mimicking intra-abdominal abscess, hydatid cyst, or carcinoma which leads to unnecessary radical surgical interventions. It is noteworthy that nine of our patients were referred to our clinic with these preliminary diagnoses. Furthermore, percutaneous drainage was performed in two of these patients for intra-abdominal abscess. Hence, we emphasize that gossypiboma should be considered in the differential diagnosis of any postoperative patient who presents with such suspicious radiological findings.

Gossypiboma should be removed as soon as possible either to prevent further complications or to overcome medico-legal problems. Considering the reports in the literature, open surgery is the most common approach in the treatment for gossypiboma [3, 4, 9, 15]. However, minimally invasive techniques including laparoscopy or endoscopy can be performed both for the treatment and diagnosis depending on the localization of gossypiboma, clinical presentation, skills of the clinician, and availability of medical equipments [1, 2, 10, 16, 17]. In this study, removal was performed by laparoscopy in two patients and by endoscopy in one patient. According to our experience, such minimally invasive approaches should be preferred in uncomplicated cases. Open surgery should be considered in case of fixed reaction, incomplete migration, or intestinal fistula.

It should be noted that more attention needs to be paid for the prevention of this complication rather than on the treatment modalities. Patients undergoing emergency surgery, those with high BMI, intraoperative complications, unplanned or unforeseen change in surgical procedure, longer operation duration, inexperienced staff, incorrect sponge count, shift changes for surgical team, and involvement of more than the surgical team during the operation are all associated with increased gossypiboma risk [21, 22]. However, gossypiboma can be easily prevented by simple precautions like educating the staff, tagging the sponges with markers or intra- and perioperative multiple counts and materials should reduce the incidence of gossypiboma. Plain X-ray or fluoroscopy could be used perioperatively to detect gossypiboma, if suspicion still persists. Furthermore, new technologies like electronic tagging of sponges may be helpful in decreasing the incidence [23]. However, the feasibility of the procedure for our country is questionable.

Postoperative course after removal of gossypiboma is usually uneventful after diagnosis. Unfortunately, delayed diagnosis is usually associated with high morbidity and mortality. The morbidity and mortality rate was reported at a high rate of 50 and 11–35 %, respectively, which is compatible with our study 50 and 7 % [24]. The most common reason of these high rates is sepsis related to intra-abdominal abscess, as in our case. For this reason, urgent surgical intervention should be performed as soon as possible to prevent further complications.

Conclusion

Gossypiboma is a non-desired, life-threatening but preventable surgical complication. Considering the period of our study, gossypiboma still seems to be a problem to be solved after intra-abdominal surgery even though we are in the modern surgical era. Nevertheless, simple precautions may easily prevent this potential complication. It is notable that gossypiboma should strongly be kept in mind in differential diagnosis of postoperative patients with mild gastrointestinal symptoms or with persistent wound infection. In case of suspicion or when gossypiboma detected, adequate surgical intervention should be planned as soon as possible either to prevent further complications or to overcome medico-legal problems. Minimally invasive procedures including laparoscopy or endoscopy could be preferred in the treatment of uncomplicated cases with gossypiboma.

Conflict of Interest We have no conflict of interest.

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