Review Article

Gossypiboma (Retained Surgical Sponge): an Evidence-Based Review - ©

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INTRODUCTION

Gossypiboma refers to a foreign body—a retained surgical sponge—and it is a direct consequence of human error [1]. This term has its roots in gossypium (“cotton” in Latin) and boma (“place of concealment” in Kiswahili) [2]. The first published report of a gossypiboma dates back to 1884 [3]. Since then, many standardized protocols of sponge counting [4] and use of radio plaque sponges [5] have been implemented; however, such mishaps continue to happen even today [6]. Despite the morbidity associated with gossypiboma, this disorder remains an obscure entity within the medical community and most physicians seldom consider it in their differential diagnoses [7, 8]. Here, we provide an evidence-based review of this infrequent—yet clinically significant—entity.

Epidemiology

The exact incidence of this disorder is difficult to determine as it is seldom reported due to its associated medico legal implications [9]. However, estimates based on various retrospective studies suggest that a foreign body is retained in 1 of every 1000 to 1500 abdominal surgeries [10]. For the purpose of this article, a search of Pub Med, Ovid and EMBASE databases was performed using the keywords “gossypiboma” OR “retained surgical sponges” and all publications retrieved were reviewed. Furthermore, all articles referenced in these articles were also manually reviewed. Using this method, we could find 340 cases reported in 254 peer-reviewed publications, which pertained to nearly all surgical specialties including general surgery, cardiothoracic surgery, obstetrics and gynecology, orthopaedics, urology and neurosurgery (Figure 1).

Pathogenesis

Once retained in the body, surgical gauze act as foreign bodies and induce a strong inflammatory response. An infiltrate comprising of polymorph nuclear leukocytes is seen initially followed by a mononuclear infiltrate, which eventually results in the formation of a foreign-body type granuloma [11]. Chronic inflammation leads to proliferation of fibroblasts, production of granulation tissue and deposition of collagen fibres. Over time, a conglomerate mass is formed and dystrophic calcification can occur within it [12]. In certain cases, invasion by a mixture of anaerobic and aerobic bacteria can lead to the formation of a frank abscess [13]. Occasionally, inflammation within the lesion may ‘spill over’ to an adjacent organ and this can result in the formation of a fistula. Rarely, this may even lead to spontaneous expulsion of a retained sponge [14-18].

Clinical features

Patients with gossypiboma often have vague clinical presentations (Table 1) and the diagnosis usually comes as a surprise [79]. Exact clinical symptomatology depends on the site of the retained surgical sponge. Abdomen, pelvis and thorax have been reported to be the most frequent sites [80]. Patients often present with pain, discomfort, palpable mass or unexplained fever [81]. Irritation of bowel loops, bladder or rectum can lead to vomiting, diarrhoea, hematuria, dysuria, tenesmus and other systemic complaints [82]. Sponges retained within the thoracic cavity can lead to pain and cough [83], while those retained within the cranial cavity can lead to headache, loss of vision or focal neurologic deficits [84]. However, there have been reports of asymptomatic gossypiboma as well [19,21]. As a consequence, the average time interval between the surgical procedure and diagnosis of gossypiboma is approximately 7 years [85].

Risk factors

Retention of surgical sponges and other foreign objects are widely considered as avoidable mistakes [86]. Consequently, such cases often receive extensive media coverage and result in adverse consequences for the health professionals involved [87,88]. The infrequent occurrence of such errors coupled with their under-reporting precludes the identification of predisposing factors [10]. Nevertheless, a systematic review of 254 cases concluded that ‘emergency surgery’ and ‘poor communication’ are the strongest predictors of a retained surgical sponge [85]. Moreover, in nearly all cases, the sponge count is erroneously believed to be correct at the end of the procedure [89].
A single-centre retrospective study of 14 cases also identified ‘obesity’ as a risk factor for retained surgical gauze [90].

Complications

Gossypiboma retained within the abdomen can have numerous adverse sequela. Acute peritonitis can develop as a result of acute inflammation around the retained foreign body [91,92]. Chronic inflammation can lead to the formation of adhesions, which can precipitate intestinal obstruction [29,30]. Inflammation of surrounding viscer can result in the formation of fistulae and migration of the sponge into the lumen [14,15,54,94]. This in turn can lead to intestinal obstruction [95,96] or, in some cases, spontaneous expulsion of the retained sponge [14-18]. Visceral perforation can also occur with resultant secondary peritonitis [36,97]. In rare cases, the retained gauze may transmigrate into the stomach to result

<table>
<thead>
<tr>
<th>Table 1: Various clinical presentations of gossypiboma</th>
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<td>---------------------------------------------------------</td>
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<tr>
<td>Gastrointestinal:</td>
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<td>Biloma*</td>
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<td>Pancreatic lesion</td>
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<td>Splenic lesion</td>
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<tr>
<td>Intra-abdominal abscess</td>
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<td>Blumer’s shelf†</td>
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<tr>
<td>Defecated spontaneously</td>
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<tr>
<td>Respiratory</td>
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<td>Tracheal foreign body</td>
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<td>Pulmonary nodule</td>
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<td>Pleural lesion</td>
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<td>Diaphragmatic abscess</td>
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<td>Cardiovascular</td>
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<td>Cardiac mass</td>
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<td>Recurrent syncope</td>
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<td>Genitourinary</td>
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<td>Perinephric abscess</td>
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<td>Bladder outflow obstruction</td>
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<td>Acute urinary retention</td>
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<td>Ureteroappendiceal fistula</td>
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<td>Testicular lesion</td>
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<td>Ovarian lesion</td>
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<td>Neurological</td>
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<td>Spinal mass</td>
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<td>Paraspinal tumor*</td>
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<td>Psoas abscess</td>
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<td>Intracranial tumor*</td>
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<td>Musculoskeletal</td>
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<td>Lesion of hip</td>
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<td>Tumor of femur*</td>
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<td>Recurrent thigh lesion</td>
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<td>Soft tissue sarcoma*</td>
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<td>Lesion of mandible</td>
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<tr>
<td>Other</td>
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<tr>
<td>Neck mass</td>
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<td>Abdominal wall lesion</td>
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</tbody>
</table>

*Gossypiboma misdiagnosed as this disorder.
†A lesion in the pouch of Douglas, which is palpable on digital rectal examination as a ‘shelf’. Gi = Gastrointestinal; Ref. No. = Reference number as given in the list of references.

Figure 2: Computed tomography of the abdomen and pelvis demonstrating a mottled lesion in the left lower abdomen with a coiled metallic density (arrows).

Copyright © 2014 Rehman, Baloch, Awais, licensee Bloomsbury Qatar Foundation Journals. Adapted from: Rehman A, Baloch NU, Awais M. (2014) Gossypiboma diagnosed fifteen years after a cesarean section: A case report. Qatar Med J. 2014: 12. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

in upper gastrointestinal bleeding [35], or erode the bladder wall to precipitate bladder outflow obstruction [98]. Few incidents of ureteric obstruction with proximal hydro nephrosis have also been reported in the literature [99].

Figure 3: Intraoperative picture of a lump adherent to bowel loops with a gossypiboma visible inside.

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Diagnosis

Diagnosis of gossypiboma is often difficult to make and requires a high index of suspicion [100]. In patients presenting with a long-standing history of vague symptoms, the possibility of a gossypiboma must be kept in mind [101,102]. During history taking, it is important to establish the chronology of symptoms and whether they relate to a particular surgical procedure [81]. Equally important is to inquire about the patient’s past surgical history and specifically regarding the nature of surgeries (i.e. Elective or Emergency). A focused physical examination must be performed to exclude other pathologies. Imaging modalities, especially CT and magnetic resonance imaging, can accurately delineate the lesion and identify its characteristic features [38,103-106]. Most often, gossypiboma appear as spongiform lesions with mottled lucencies and gas bubbles [107,108]. On a CT scan, a characteristic pattern of calcification can be noted along the architectural network of a surgical sponge–the “calcified reticulate rind” sign [109]. Moreover, gossypiboma present within the bowel result in the formation of prominent longitudinal folds, which are visible on a wide range of window settings on a CT scan; this is termed the “stretched faces” sign [110].

Management

Once a gossypiboma is suspected based on clinical presentation and radiologic findings, the first and foremost step is to inform the patient clearly regarding what has happened and how it can be rectified. Cooperation between the primary physician, radiologist and a surgeon can help streamline patient care and allow the patient take an informed decision. The treatment in all such cases is surgical removal of the retained foreign object [111]. Pathologic evaluation of the resected specimen is warranted to confirm the diagnosis and exclude other pathologies [112].

Prevention

Gossypiboma is a direct consequence of human error and extensive research has been conducted on the prevention of this iatrogenic disorder. Sponge-counting protocols [4] and use of radiopaque sponges [5] have been implemented across the globe in this regard. However, cases of gossypiboma still occur [6] and this has led to the development of several other strategies. Sponges with radiofrequency identification tags have been devised, which can be detected automatically by a machine, thereby removing the ‘human’ element in the process [113-115]. Bar-coding of surgical sponges has also been tried, which also shows promise for reducing the incidence of such errors [116]. Some preliminary decision-analytic models have even demonstrated the feasibility and cost-effectiveness of these measures [117]. However, these technologies are still in their incipient stages and their implementation across the globe will only be possible if they are able to stand the test of time. As of now, sponge counting is often mentioned as the “gold standard” for prevention of gossypiboma.

CONCLUSION

Gossypiboma is an infrequent but devastating consequence of a human error. Prevention of such untoward incidents is far better than cure and can be achieved by strictly adhering to sponge-counting protocols and improving communication amongst nurses, technicians and surgeons. At the same time, awareness among all general physicians, surgeons and radiologists regarding this important clinical entity is vital to vouchsafe patient safety and prevent unnecessary morbidity.

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