Case Report

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# Gossypiboma: Is it always what it appears to be? A Rare Complication in Everyday Practice

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**Background:** While the management of liver injury is usually conservative, the major indication for surgery remains hemodynamic instability. Different techniques are described for hemostasis in cases which require surgery. Several commercial hemostatic agents are readily available and can be used as an adjunct after the repair of liver injuries. One of the most well-known local agents is gelfoam, which is used in multiple fields of surgery. The purpose of this work is to present a very rare complication of liver surgery in trauma, using gelfoam following hepatic angioembolization, mimicking gossypiboma.

**Design:** A case study describing a hemodynamically unstable patient who had a penetrating liver injury. Hemostasis was achieved by liver suture and gelfoam with subsequent angioembolization. In the post-operative period, the patient demonstrated signs of intraabdominal sepsis due to liver abscess. Repeated attempts of percutaneous drainage failed, and all cultures were negative. Due to a strong suspicion of a forgotten abdominal pad (gossypiboma), the patient underwent an operation and the object was removed. The final pathological report showed no textile in the specimen, the findings were compatible with a piece of gelfoam without signs of absorption.

**Conclusions:** Commonly used hemostatic agents are made of gelatin gelfoam, microfibrillar collagen, thrombin, and fibrin sealant. Gelfoam is available in sponge or powder form. The sponge can be left in place and is supposed to be completely absorbed in four to six weeks. In the relevant literature, only one case of gelfoam use related to granuloma formation. In our case, the radiologic findings in the liver were interpreted as an abscess. The suspicion of a foreign body was raised only during the second admission and thus forced us to operate. There is no clear reason why the piece of gelfoam was not absorbed in that time period. Our assumption is that post-angiography liver ischemia may have disturbed the process of fibrin destruction. The major take-home message is that the lack of gelfoam absorption may mimic an abdominal foreign body, and this needs to be considered in post-operative care.

**Keywords:** *Liver Trauma; Gelfoam; Gossypiboma*

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## INTRODUCTION

The liver is one of the most commonly injured organs in abdominal trauma. Most cases of hepatic injuries are managed conservatively with a success rate of 90% [1,2]. In cases which require surgery, different techniques are described for hemostasis. Several commercial hemostatic agents are readily available and can be used as an adjunct after the repair of liver injuries [3,4]. One of the most well-known local agents is gelfoam, which is used in multiple fields of surgery.

Here we present a case of a very rare complication while using gelfoam, mimicking gossypiboma.

## CASE DESCRIPTION

A 47-year-old male patient was admitted to the trauma unit after being stabbed in the lower segment of his right chest. He also had additional multiple stab wounds to the back, and upper and lower extremities. On admission, the patient looked pale and agitated, his initial blood pressure was 80/40, pulse over 130 per minute. On auscultation, breath sounds were slightly diminished on the right, where a wound with evisceration of omentum was seen 3 cm above the right chest cage. After insertion of a chest tube into the right thorax, and evacuation of a small amount of air and blood, the patient was then immediately taken to the operating room. During surgery, 1.5 L of blood were found inside the abdominal cavity, a deep liver, segment IV, laceration was demonstrated, with active arterial bleeding. In addition, a 3 cm diaphragmatic tear was also demonstrated.

The bleeding from the liver was stopped by the insertion of a piece of gelfoam into the wound and by suturing of the liver above in order to create a local tamponade effect. The procedure was completed with formal liver packing, diaphragm repair, and the abdomen was closed with a Bogota bag, as is acceptable in "damage control".

In the post-surgery period, the patient was stable and was then transferred to the angiographic unit. On angiography, extravasation was demonstrated from one of the intrahepatic arteries, and successful angioembolization was achieved. Forty-eight hours later, a relaparotomy was performed and the liver packing was removed. No bleeding or bile leakage were observed, drains were left inside the abdomen, and the abdomen was sutured closed. In addition, all surgical instruments and tagged pads were accounted for.

At post-operative day 6, after the second operation, bile leakage was visualized in a drain located in the Morrison pouch, and due to continuous bile leakage an endoscopic retrograde cholangiography (ERCP) was performed with stent insertion into the common bile duct. A few days later the leak stopped, and the drain was removed at post-operative day 13.

At post-operative day 17, the patient developed chills and an elevated fever. As can be seen in Figure 1, abdominal CT scan revealed an intrahepatic collection in segment IV, but transcutaneous CT guided drainage did not contain pus or other infected fluids. The patient continued to suffer from an elevated fever and elevated WBC count despite wide spectrum antibiotic administration. Another CT scan was performed on post-operative day 21, and it showed similar findings.

Another attempt of percutaneous drainage was performed, but no pus or other fluid was obtained. This was followed by a gallium scan, which was interpreted as negative. Gradually, the condition of the patient

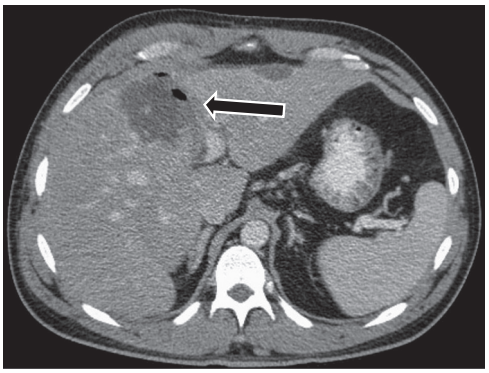

***Figure 1*** Contrast-enhanced abdominal computed tomography demonstrating a hypodense lesion containing gas bubbles, suspected to be a liver abscess.
Source: Hillel Yaffe Medical Center media archive.

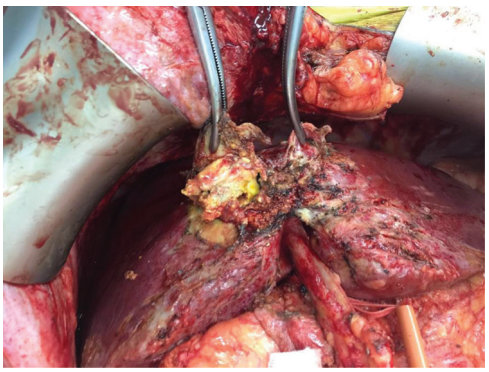

***Figure 2*** Resection of foreign body from segment IV of the liver taken during foreign body resection from the patients liver in "Tel Hashomer" hospital.

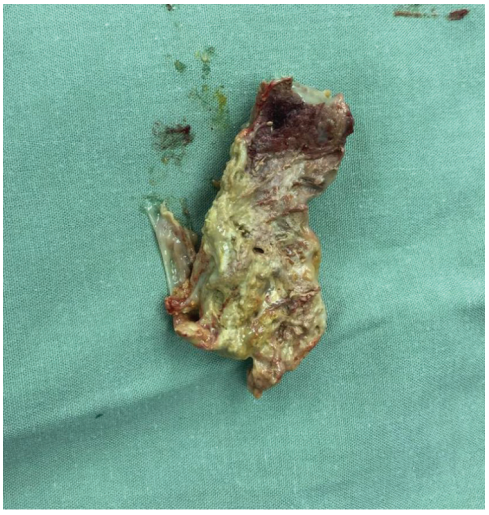

***Figure 3*** Macroscopic view of the resected foreign body from segment IV of the liver taken during foreign body resection from the patients liver in "Tel Hashomer" hospital.

improved, his temperature normalized, and he was discharged at post-operative day 31.

Two weeks later, the patient was readmitted with complaints of biliary discharge via the midline scar. An abdominal CT fistulography scan revealed a hepatocutaneous biliary fistula originating from the right lobe of the liver, and a strong suspicion of a foreign body. However, no signs of marked pads were observed.

Due to the presence of recurrent biliary fistula originating from the right liver lobe, and high suspicion of gossypiboma in place, the patient was transferred to a tertiary medical center with a hepatobiliary department. The patient underwent surgery in which a gray abscess-like mass was demonstrated. After the opening of the mass, a foreign body sized $8 \times 3$ cm$^2$ was resected from segment IV (Figures 2 and 3), and a drain was left in the perihepatic space.

After the surgery, the patient was uneventfully discharged at post-operative day 9. A final pathologic report showed no textile in the specimen, and findings were compatible with a piece of gel form with no signs of absorption.

## DISCUSSION

The liver is one of the most commonly injured organs in abdominal trauma [5]. Most hepatic injuries are minor and heal spontaneously with non-operative management, which consists of observation and the adjunctive use of arteriography and embolization. Hommes study on 99 patients, in whom non-operative management was initiated, found only 5% failure of conservative management, not related to the grade of the injury [6]. However, other studies report that about 17% of patients with hepatic injury will require surgical intervention [7].

When surgery is required, a systematic approach is used to control bleeding while conserving liver parenchyma, hepatic resection is reserved for severe injuries. The use of damage control techniques during the initial laparotomy, specifically perihepatic packing, reduces the extent of subsequent surgical procedures [8]. Several commercial hemostatic agents are readily available and can be used as an adjunct after repair of liver injuries. The most commonly used agents are gelatin gelfoams, oxidized cellulose, microfibrillar collagen, thrombin, thrombin with gelatin ("Floseal"), and fibrin sealant.

Gelatin ("Gelfoam", "Surgifoam") is a hydrocolloid made from acid partial hydrolysis of porcine-derived collagen that is whipped into foam and then dried. It is available in sponge or powder form. Gelatin sponge absorbs blood or fluid up to 40 times its weight and can expand up to 200% in dimension. The sponge can be left in place and should be completely absorbed after four to six weeks [9].

There are several reports of adverse reactions in the use of gelfoam. Gabay in his review on absorbable hemostatic agents reported cases of elevated fever without demonstrable infection, most probably because a piece of gelfoam might form a nidus of infection and potentiate bacterial growth [10]. Foreign body reactions, "encapsulation" of fluid, and hematoma have also been reported. Reviewing relevant medical literature, we found only one case of gelfoam use related to granuloma formation. In this specific case, a giant cell occurred in the brain, most probably due to the blockage of cerebrospinal fluid [11].

In our case, the radiologic findings in the liver were interpreted as an abscess. The suspicion for a foreign body was raised only on the second admission and this forced us to re-operate on the patient. We can only speculate why the piece of gelfoam was not absorbed in that time period. Our opinion is that post-angiography liver ischemia may have disturbed the process of fibrin destruction. The major take-home message is that lack of gelfoam absorption may mimic abdominal foreign body, and this needs to be considered in late post-operative care.

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