

Transmural Migration of a Gossypiboma in a Bitch - Rare Cause of Intestinal Obstruction and Granulomatous Peritonitis

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ABSTRACT

Background: Gossypiboma is a mass of cotton that remains in the body cavity after a surgical procedure. There are numerous reports of gossypiboma in veterinary medicine, only 4 cases of transmural migration of gossypiboma have been reported. However, none of these cases presented with massive ascites, free gas, or diffuse nodular thickening of the peritoneum. Granulomatous peritonitis is an uncommon postoperative complication that arises from a delayed hypersensitivity reaction to foreign materials. This is the 1st documented case of postoperative granulomatous peritonitis associated with transmural migration of a gossypiboma diagnosed using Computed tomography (CT).

Case: A 6-year-old spayed bitch Pompit that had undergone surgery for pyometra 16 months previously presented with vomiting, diarrhoea, and anorexia. Radiography and ultrasound revealed an abdominal mass, dilated small-intestinal loops, free gas, echogenic ascites, and severe peritonitis. Additionally, a linear foreign body was identified within the jejunum, and a mass with the same echogenicity was found around the expanded intestinal segment. CT showed a classic spongiform pattern in the mass, which continued within the jejunum. A concurrent diffuse nodular pattern and thickening of the peritoneum were also observed. Surgery was performed, and foreign bodies made completely of gauze were found inside the mass and within the jejunal lumen. Ascitic fluid analysis revealed numerous neutrophils, some of which were phagocytosed cocci and bacilli, and a large number of bacteria. Histopathological examination confirmed the presence of pyogranulomatous inflammation. Considering the surgical history and the overall examination results, the occurrence of postoperative granulomatous peritonitis alongside the transmural migration of gossypiboma into the jejunum was strongly suspected, rather than other differential diagnoses such as tuberculous peritonitis or peritoneal carcinomatosis. The bitch was hospitalised in the intensive care unit. She recovered uneventfully, and diffuse nodular thickening of the peritoneum observed on the CT was found to be resolved on ultrasonography performed 5 months after surgery.

Discussion: This report describes an atypical case of transmural migration of gossypiboma and postoperative granulomatous peritonitis. Both conditions are primarily diagnosed through clinical signs, history, and diagnostic imaging (radiography, ultrasonography, and CT). Since the clinical signs are nonspecific, diagnostic imaging becomes crucial. Radiography is nonspecific for diagnosis of gossypiboma and often reveals a soft tissue mass with localized gas lucency that appears whirl-like or speckled. The ultrasonographic appearance of gossypibomas can vary based on the foreign body reaction and the gossypiboma's location. CT is a sensitive method for diagnosing gossypiboma, showing a characteristic spongiform pattern. Granulomatous peritonitis is typically associated with infections, malignancies, or idiopathic inflammation, though it can rarely result from foreign material contamination during surgery. In human medicine, CT showed diffuse peritoneal thickening and omental caking, which spontaneously resolved after surgery, as the same was observed in this case. When an animal with a history of surgery showed a spongiform pattern along with diffuse nodular thickening of the peritoneum on CT, this rare condition should be considered as a differential diagnosis.

Keywords: CT, dog, canine, gossypiboma, postoperative granulomatous peritonitis, transmural migration.

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INTRODUCTION

Gossypiboma is a mass of cotton that remains in the body cavity after a surgical procedure [1,4]. There are numerous reports of gossypibomas in veterinary medicine; however, the migration of a retained sponges is rare. Only 4 cases of transmural migration of gossypiboma have been reported (3 involving migration to the intestines and 1 to the bladder), and only 2 case reports have described the use of computed tomography (CT) to diagnose gossypiboma in dogs [1-3,10]. Furthermore, in all previous cases, the migration site closed after the migration of the gossypiboma, and there was no massive ascites, free gas, or diffuse nodular pattern peritonitis [1-3,10].

Granulomatous peritonitis is an uncommon postoperative complication that arises from a delayed hypersensitivity reaction to foreign materials [5,8,13]. The diagnosis of gossypiboma and postoperative granulomatous peritonitis is based on surgical history, clinical symptoms, and imaging studies [2,10,13]. Additionally, since both conditions present with nonspecific clinical symptoms, imaging diagnosis (radiography, ultrasound, and CT) is especially crucial [2,9,13].

To the best of our knowledge, this is the 1st documented case of postoperative granulomatous peritonitis associated with transmural migration of a gossypiboma diagnosed using CT.

CASE

A 6-year-old spayed bitch Pompitz and weighing 4.8 kg presented with vomiting, diarrhoea, anorexia, and a suspected abdominal mass. The dog had undergone surgery for pyometra 16 months previously. Physical examination revealed a mildly elevated body temperature (39.3°C). Blood examination indicated a systemic infection and inflammation.

Abdominal radiographs showed moderately decreased serosal detail, diffuse free gas outside the gastrointestinal tract, and soft tissue opacity measuring 7.9 × 5.0 cm with speckled gas opacity internally in the mid-to-caudal aspect of the abdomen. Dilated small-intestinal loops were also observed (Figure 1). These findings strongly suggested small intestinal obstruction, perforation, peritonitis, and secondary ascites. Abdominal ultrasonography¹ revealed a linear foreign body within the jejunum, and a mass with the same echogenicity was found around the expanded

intestinal segment. The mass exhibited poorly defined echogenic areas and strong acoustic shadows. Overall, the small intestinal segments were tortuous and dilated, indicating the presence of an obstruction caused by a foreign body (Figure 2).

Computed tomography² revealed a 3.0 × 2.9 × 6.0 cm-sized heterogeneous mass (13.2 - 46.0 Hounsfield Unit [HU]) with a sponge pattern (mixed gas and soft tissue attenuation), which was continuously observed within the jejunum, indicating that the mass had invaginated into the small intestine. The layers of the affected intestine were preserved, and no mass-like appearance was observed. Postcontrast images [600 mg iodine/kg iohexol³] revealed a mass with an outer rim of contrast-enhanced soft tissue attenuation, measuring 3.2-5.3mm in thickness (119.2 - 121.9 HU), surrounding a small air bubble at its centre. Overall, the small intestinal segments were tortuous and showed luminal dilatation, indicating bowel obstruction. Fat stranding was observed throughout the peritoneal cavity, indicating severe peritonitis. Additionally, an atypical form with a maximum diameter of 7.0 mm and diffuse nodular thickening of the peritoneum [26.0 - 36.5 HU] was observed, and the nodular regions showed mild contrast enhancement [53.7 - 91.3 HU] (Figure 3). These findings were suggestive of a transmural migration of the gossypiboma into the jejunum with mechanical obstruction and postoperative granulomatous peritonitis, although the possibility of a diffuse tumour could not be ruled out.

Exploratory laparotomy and surgery were performed. The mass extensively adhered to the jejunum and was inserted into the lumen. The visceral peritoneum was generally thickened and had nodules. Foreign bodies comprising surgical gauze were found inside the mass and jejunal lumen. The surgical procedure involved 2 enterectomies and the resection of the mass. Biopsies of the jejunum and adjacent tissues were performed (Figure 4). Ascitic fluid analysis revealed numerous neutrophils, some of which were phagocytosed cocci and bacilli, and a large number of bacteria. Histopathological examination revealed large multifocal inflammatory foci in the peritoneal fat tissue attached to the serosa of the ulcerated (perforated) jejunum. These inflammatory foci comprised a mixed population of inflammatory cells centrally located in large numbers of neutrophils containing

foreign materials and peripheral mononuclear cells such as major macrophages and minor lymphocytes. Multinucleated giant cells (foreign-body type) were also observed in the inflammatory foci (Figure 5). These findings indicated severe pyogranulomatous peritonitis.

The bitch was hospitalised in the intensive care unit; she recovered uneventfully and was discharged on postoperative day 7. The diffuse nodular thickening of the peritoneum observed on the CT was found to be resolved on ultrasonography performed 5 months after surgery.



Figure 1. Left lateral (A) and ventrodorsal (B) abdominal radiographs. There was a soft-tissue opacity mass with speckled gas opacity (arrows). Diffuse free gas was observed outside the gastrointestinal tract (arrowhead).

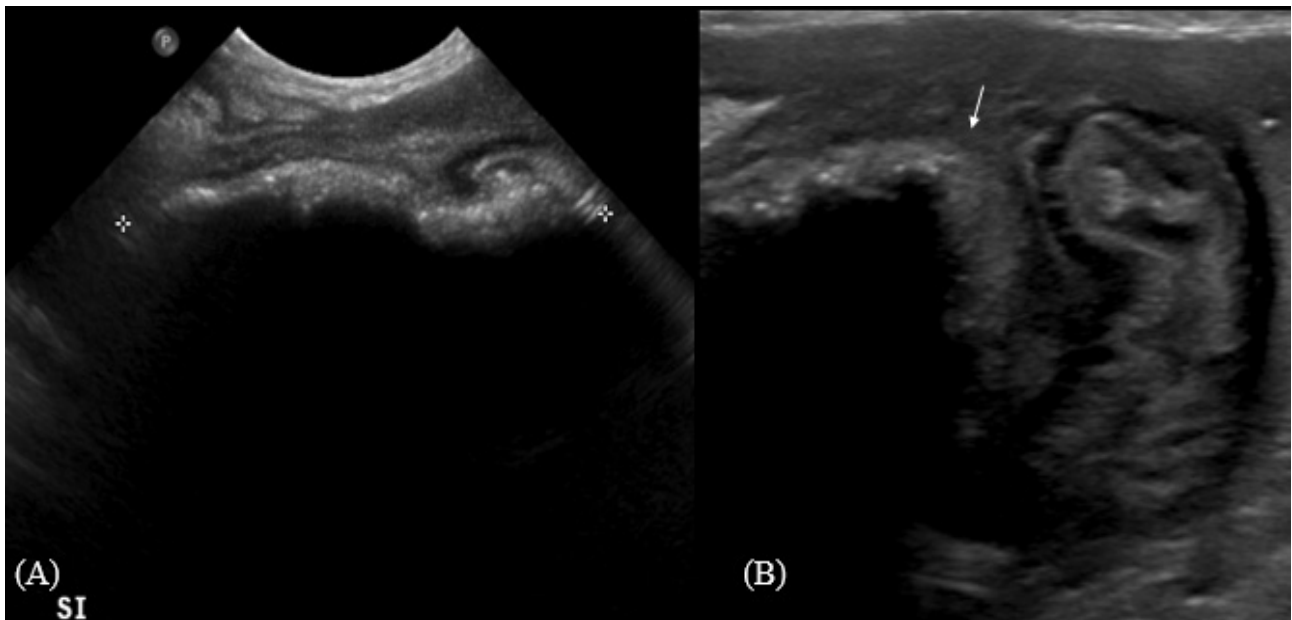


Figure 2. Ultrasound images of the jejunum and an abdominal mass. A linear foreign body was identified within the jejunum (A). A mass with poorly defined echogenic areas and strong acoustic shadow (B, white arrow) was identified around the expanded intestinal segment.

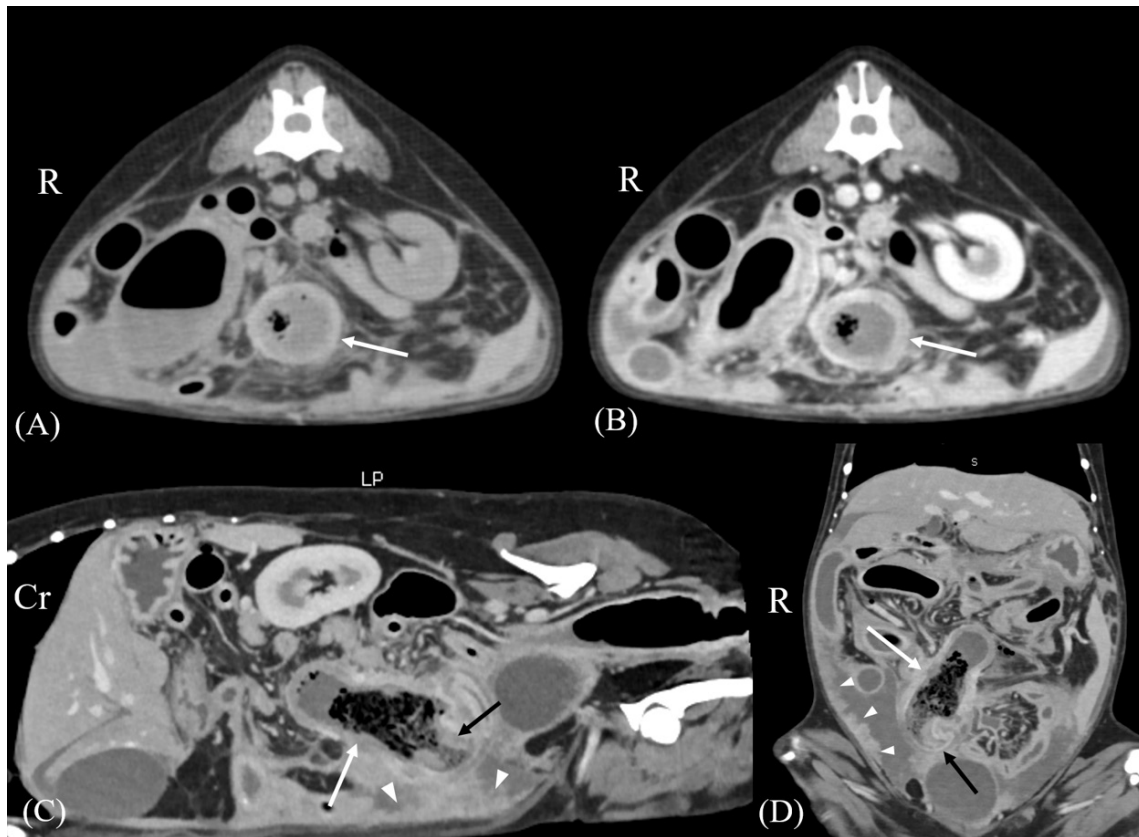


Figure 3. Abdominal computed tomography (CT) images. A mass (white arrows) with an outer rim of contrast-enhanced soft tissue attenuation, surrounding a non-contrast-enhanced small air bubble at its centre (spongiform pattern) was identified on precontrast (A) and postcontrast (B) transverse CT images. The spongiform pattern of the mass (white arrows) was continuously observed within the jejunum (black arrows), indicating that the mass had invaginated into the small intestine on sagittal (C) and dorsal (D) multiplanar post-contrast CT reformatted images. Diffuse nodular pattern and thickening of the peritoneum was observed (C and D, white arrowheads).

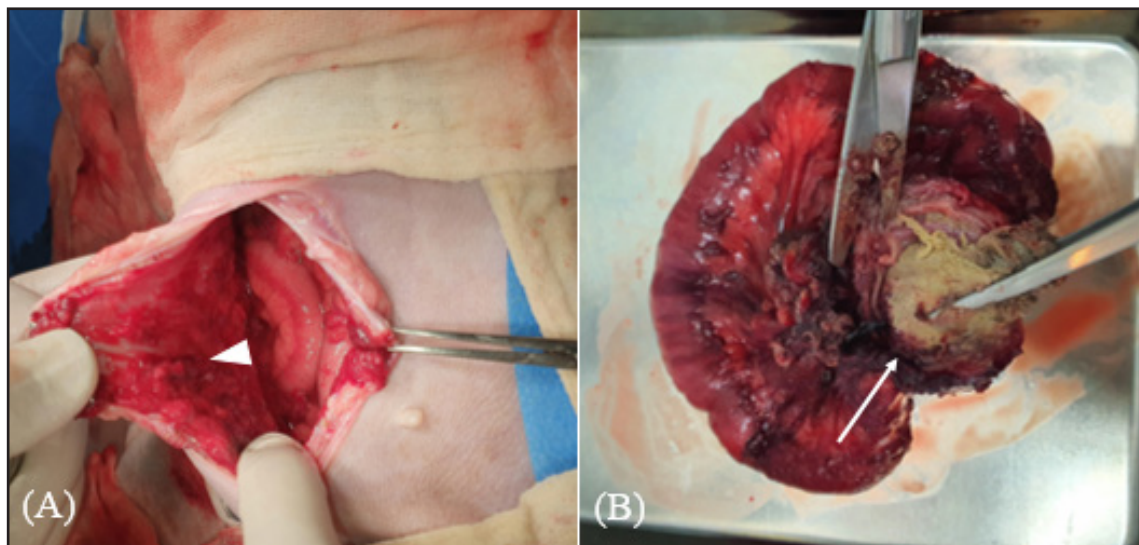


Figure 4. A mass extensively adhered to the jejunum, accompanied by a diffuse nodular thickening of the peritoneum (A, white arrowhead) was observed. Surgical gauze foreign bodies (B, white arrow) were found inside the mass and within the jejunal lumen.

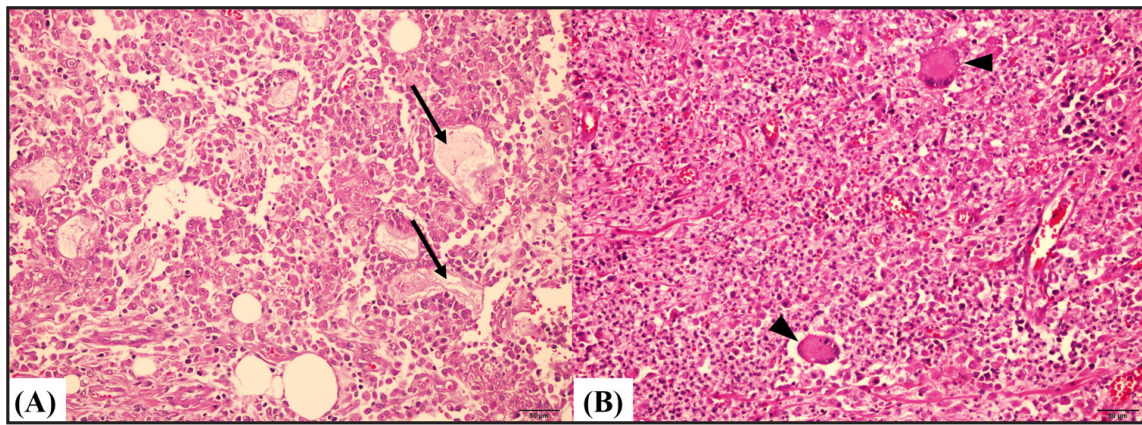


Figure 5. Histopathologic examination. Multifocal inflammatory foci comprised a mixed population of inflammatory cells with foreign materials (A, arrows). Multinucleated giant cells (B, arrowheads) were also seen in the inflammatory foci. [HE; 200×].

DISCUSSION

The pathophysiology of gossypiboma is classically described in 2 types of reactions: exudative and fibrinous [1,2]. The transmural migration of gossypibomas is associated with this exudative reaction and occurs because of inflammation in the intestinal wall, which becomes necrotic [2,15]. In this case, there are 2 possible causes for the fabric mass in the abdomen. First, during surgery, the gossypiboma may have entered the abdominal cavity, causing inflammation and adhesion reactions, leading to intestinal obstruction through transmural migration to the intestine. Second, an ingested foreign fabric object may have caused intestinal obstruction, perforation, and peritonitis. Considering the relatively chronic clinical symptoms; the typical features of gossypiboma on imaging studies, particularly ultrasonography and CT; and, the size of the fabric mass, the gossypiboma is more likely to have undergone transmural migration. However, the possibility of intestinal perforation and peritonitis due to gauze ingestion cannot be excluded.

Including surgeries due to pyometra, ovariohysterectomy (OHE) was reported as the most frequent previous surgery in 5 out of 8 cases and 9 out of 14 cases [12,14]. Moreover, both the previous 4 cases of gossypiboma with transmural migration and this case had a history of OHE, including surgeries due to pyometra [1-3,10]. Therefore, caution is needed when performing OHE to prevent the occurrence of gossypiboma. Of the previous 4 cases of gossypiboma with transmural migration, 2 involved the small

intestine, while the other 2 involved the cecum and bladder, respectively [1-3,10]. This case also involved the jejunum, and the frequent transmural migration of gossypiboma into the small intestine is likely due to the thin wall and large outer surface of the small intestine [1,15].

Imaging studies are crucial for diagnosing gossypiboma due to the nonspecific nature of its clinical symptoms [1,2]. Radiographic findings may be nonspecific or associated with the presence of a soft tissue mass, with localised gas lucency within the mass that appears whirl-like or speckled [2,6]. The ultrasonographic appearance of gossypiboma can vary, potentially presenting as a hypoechoic mass with an irregular hyperechoic center, a mass with a hypoechoic outer rim and a hyperechoic inner rim with acoustic shadowing seen deep to the mass, or a mass with no acoustic shadowing [2,3,11]. In this case, intestinal obstruction due to transmural migration of the gossypiboma into the jejunum was present, which has been reported in a previous case [2]. This variation may be related to the type of foreign body reaction and the location of the gossypiboma [2,12]. Computed tomography is often nonspecific but is a sensitive method for diagnosing gossypiboma [2]. However, in veterinary medicine, only 2 case reports have described the CT findings of transmural migration of a gossypiboma [1,2]. The CT findings of gossypibomas may include spongiform patterns, radiopaque markers, calcifications, capsulation, low- and high-density masses, or masses with low- and high-density components [1,2]. Among these, the most characteristic sign of gossypiboma is a spongiform

pattern resulting from air bubble entrapment within the fibres of the gossypiboma, which persists for a long time [1,2]. In the present case, a typical spongiform pattern was identified on CT. However, unlike other published cases of transmural migration of gossypibomas, this case showed significant ascites, free gas, and severe peritonitis. This suggests that, in this case, the damage to the intestinal wall might have been more severe, leading to the possibility that the gossypiboma migration site was not completely closed or that other adjacent intestinal walls were damaged and perforated due to complications such as intestinal obstruction.

Granulomatous peritonitis is commonly associated with infections, malignancies, and idiopathic inflammation [5,8,13]. Rarely, it can be caused by contamination with foreign materials, such as surgical glove powder, undigested particles from accidental intestinal perforation, and cotton lint from disposable surgical drapes, during surgery [7,8,13]. This condition is known as postoperative granulomatous peritonitis [13]. The pathophysiology of postoperative granulomatous peritonitis is not well understood; however, foreign material triggers a delayed cell-mediated hypersensitive inflammatory response, resulting in the formation of foreign-body granulomas in susceptible individuals [8,13]. The clinical symptoms are variable and nonspecific [8]. Additionally, in a human case report, the haematological parameters were within normal limits, which highlights the importance of reviewing the surgical history and conducting imaging studies for accurate diagnosis [13]. In a human case report, CT findings of postoperative granulomatous peritonitis showed diffuse peritoneal thickening and omental caking [13]. In this case, CT also revealed contrast-enhanced diffuse nodular thickening of the peritoneum. During exploratory laparotomy, a generally thickened peritoneum with nodules was confirmed. However,

unlike cases in humans, where no bacteria were found, and lymphocytes predominated in the ascitic fluid, in this case, numerous neutrophils and bacteria were observed. This indicated that secondary bacterial peritonitis due to intestinal perforation was concurrently present. The most important differential diagnoses of postoperative granulomatous peritonitis include tuberculous peritonitis and peritoneal carcinomatosis [8,13]. Considering the low possibility of tuberculosis occurring in dogs in South Korea, the absence of a primary tumour in this patient, and the fact that, similar to reports of human cases, the lesion gradually decreased and eventually disappeared after surgery, this case is likely postoperative granulomatous peritonitis [5,13].

In conclusion, this is the 1st report of intestinal obstruction and postoperative granulomatous peritonitis caused by transmural migration of a gossypiboma. These conditions are rare, and because their clinical symptoms are nonspecific, a history of surgery and imaging studies are very important. In patients with a history of surgery and gastrointestinal symptoms, gossypiboma migration should be considered, particularly if a spongiform pattern is observed on CT. Postoperative granulomatous peritonitis should be considered in patients who exhibit atypical peritoneal patterns with gossypiboma after surgery.

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