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# The new retained foreign body!
## Case report and review of the literature on retained foreign bodies in laparoscopic bariatric surgery

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**Abstract. – The advent of laparoscopic surgery has created a set of peculiar morbidities. As the laparoscopic devices, also the type of retained foreign bodies has changed.**

**We present a case of unusual, apparently isolated and recurrent lung abscess, pleural effusion and poorly evident subphrenic abscess after laparoscopic gastric bypass, due to a retained Endo-Catch bag. A 27-year-old obese female underwent an uneventful laparoscopic Roux-en-Y gastric bypass. After sugery she developed a left basal lung abscess, that resolved in two weeks with heavy antibiotic therapy, while radiological abdominal imaging was apparently normal. Patient was discharged on p.o. day 30. After two months, she presented with fever and dyspnoea and no gastrointestinal complaints. Chest and abdominal computer tomography showed a left recurrent abscess with effusion but this time a 3 cm subphrenic mass with metallic clips inside was demonstrated on CT scan. Patient was treated with an explorative laparoscopy that identified an Endo-Catch bag with the jejunal blind loop inside. Postoperative left lung abscess can be a warning of a suphrenic surgical complication. Laparoscopic surgery requires even more attention to retained foreign bodies due to the reduced visibility of the surgical field. The recommendation to enforce recording of laparoscopic maneuvers is mandatory.**

*Key Words:*
Retained foreign body, Laparoscopy, Bariatric surgery.

## Introduction

In the United States 5% of adults have a body mass index (BMI) exceeding 40[1] kg/m$^2$. The health consequences of severe obesity have been well described[2]. Current evidence has validated surgical therapy as the best hope for the morbidly obese for a substantial and sustainable weight loss[3], with resultant mortality reduction[4]. These data, together with improvements in laparoscopic techniques, have driven a fourfold increase in the population-based rate of bariatric surgery performed in recent years[5].

Gastric bypass was first developed in the 1960s as a means for combining restrictive, malabsorptive, and behavioural components to achieve weight loss. Since then, technical modifications have included the use of a small lesser curvature-based gastric pouch, gastric transection, Roux-en-Y reconstruction, and variations in length of the alimentary limb[6-7]. Feasibility of the laparoscopic approach to Roux-en-Y gastric bypass (RYGB) was first shown in the early 1990s[8].

Minimally invasive laparoscopic methods have gained large success and consequently reduced the demand for "open" bariatric procedures. Laparoscopic procedure are technically more complex and determine a change in the nature of possible retained foreign bodies.

Minimally invasive surgical methods have caused a new outlook also in imaging studies since the foreign bodies accidentally left behind and even the different types of surgical reconstruction can result unfamiliar to the radiologist.

### Case Report

A 27 year-old obese female underwent a laparoscopic RYGBP with gastro-jejunostomy performed with a circular stapler. Blood loss was inferior to 100 mL, and the operation lasted 170 minutes. The anastomosed gastric pouch had a volume of 60 ml, while gastric fundus was sutured with a mechanical device and remained with a "dead end". The surgical technique requires during gastric-jejunal anastomosis the use of numerous stapler devices and the removal of a small jejunal tract closed with a stapler and inserted into an Endo-Catch bag.

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In the postoperative period the patient developed fever and dyspnoea. The chest X-ray showed a left basal pneumonia, with blood cultures positive for *Enterococcus faecalis* D and the patient was treated with appropriate antibiotic therapy with a slow resolution of pulmonary infection; gastrografin enema routinely performed on day 7 did not show any leak. The patient was discharged thirty days after surgery.

Two months later, she returned to the Hospital for abrupt left upper quadrant pain, fever, dyspnoea, chills, vomiting, shortness of breath, and a dry cough. She also reported an unintentional 12-pound weight loss and an increasing fatigue.

Physical exam was significant for decreased breath sounds at the left lung base and for left upper quadrant tenderness.

Laboratory tests revealed an elevated leukocyte count (23.1 × 10^9/liter). Chest radiograph showed a left pleural effusion with left lower lobe infiltrate.

Chest and abdominal computer tomography (CT) was performed: it revealed a left recurrent pneumonia, left pleural effusion with associated atelectasia and a pulmonary abscess (Figure 1); unexpectedly, a small subphrenic abscess with some metallic bodies inside was also evident (Figure 2). The pleural effusion was needle-aspirated under CT guidance. A chest tube was inserted, yielding 500 cc of purulent fluid with a leukocyte count of 81,600 (87% neutrophils) and a pH 6.92. Cultures from effusion showed multidrug resistant *Peptostreptococcus micros* and *Streptococcus mitis*.

The presence of metallic clips in the subphrenic abscess and the positivity of the blood and pleural fluid cultures for enteric bacteria made us suspect the possibility of a retained Endo-Catch bag with the intestinal loop inside, even though no radiological tag was evident. The Endo-Catch bag used at the time of surgery was successively discovered not to have a radiopaque tag.

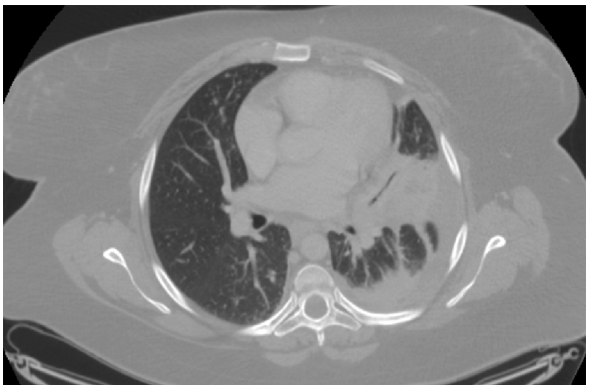

**Figure 1.** The chest CT revealed left pleural effusion, left pneumonia with associated atelectasis and a pulmonary abscess.

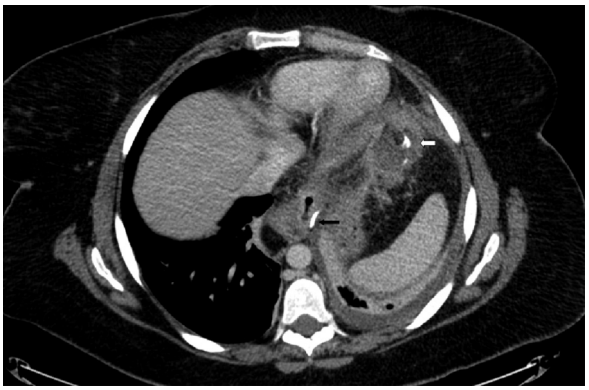

**Figure 2.** CT abdomen with contrast revealed a subphrenic fluid collection measuring 78 mm by 66 mm. Radiopaque bodies within the subphrenic abscess suspicious for metallic clips of the resected jejunal blind loop (*white arrow*). The black arrow shows the gastrojejunostomy.

An explorative laparoscopy in order to drain the subphrenic abscess was scheduled. After opening the abscessual cavity, the Endo-Catch bag with the jejunal blind loop inside was easily retrived. Cultures from subphrenic abscess grew bacteria identical to those in pleural fluid.

The patient tolerated the procedure well and was discharged 8 days later on oral antibiotic therapy (linezolid, 600 mg bid). Follow-up CT scans showed resolution of the abscess and a substantial improvement of the left lower lobe infiltrate and of pleural effusion. One month later symptoms were resolved. At imaging the abscess had disappeared; drain tubes were removed and antibiotic therapy was suspended. Presently the patient is well, having lost over 40 kilograms as programmed.

## Discussion

The prevalence of morbid obesity is increasing worldwide, resulting in an ever-increasing number of patients being submitted to bariatric surgery, and especially Roux-en-Y gastric bypass (RYGBP), which is presently considered as the gold standard procedure[8-11].

Since its introduction in 1994, the safety of laparoscopic RYGBP has been shown to be at least equal, if not superior, to that of open RYGBP[12-13].

The stomach is divided to form a small proximal gastric pouch; the small intestine is reconstructed using a Roux-en-Y in order to form an alimentary limb. In creating the Roux-en-Y bypass, the jejunum typically is divided below the ligament of Treitz: the distal segment is then elevated and surgically connected to the gastric pouch (thus creating the alimentary "Roux" limb); the proximal bowel segment (the biliopancreatic limb), is usually connected to the alimentary limb 75-150 cm distal to the gastrojejunostomy.

Such reconstruction, bypassing the distal stomach, the duodenum, and a portion of jejunum creates malabsorption[14].

Since the first RYGBP performed laparoscopically by Wittgrove and Clark in 1993[15], different surgical techniques have been described for the establishment of the gastro-jejunostomy (GJS). Wittgrove et al[15] described a circular-stapled anastomosis (CSA) with the stapler anvil introduced transorally. The coulpling end of the stapler is inserted into the blind jejuna loop, which is successively resected by linear stapling. This resected segment is inserted into an Endo-Catch bag and removed at the end of surgery.

Laparoscopic RYGBP, however, carries a risk of morbidity that is similar or inferior to that of "open" procedure; complications related to the procedure (leaks, hemorrhage, stricture, and occlusion) still represent a large percentage of the total complication rate and are responsible for prolonged hospital stay, increased cost and mortality.

The complications represented by leaks are difficult to diagnose, and it is known that often the presence of a gastric or intestinal leak can determine a pulmonary infection[16-24].

However, in our case, the presence of a leak of the gastric pouch, that could have represented a major problem, was excluded by an oral gastrographin study of the upper digestive tract. Notwithstanding, pulmonary abscess was the evident spy of a subphrenic problem as variously described[25].

There are no studies on the incidence of retained foreign bodies in laparoscopic RYGBP.

We think that in CSA approach there are more risks of forgetting a foreign body than in LSA, because CSA necessitates the removal of the jejunal blind loop used for CEA stapler insertion.

Leaving a sponge, needle, or instrument in a patient during surgery is an error avoidable by a systematic approach[26]. Estimates of retained foreign bodies in surgical procedures range from 1 case per 8000 to 18,000 operations[27]. Cases of retained foreign bodies after surgery have been reported in the literature since the mid-19$^{th}$ century. The earliest case mentioned took place in 1859 when a "sea sponge" was lost in an operation. At least 500 cases of retained sponges and instruments were described; they were reviewed by Crossen brothers in their 1940 classic book *Foreign Bodies Left in the Abdomen*[28]. The Authors reported that the mortality rate from objects left in the abdomen ranged as high as 25% and almost 20% of the cases were discovered during autopsy. Sponges were found up to 30 years after surgery.

No experimental evidence addresses directly the problem of retained foreign bodies after surgery, but these events occur because of faulty processes of care in the OR and poor communication between assistant nurses and doctors. Examples of faulty processes of care include inadequate or incomplete wound explorations, poorly performed sponge and instrument counts, and incomplete, inadequate, or misread intraoperative radiographs. With the advent of laparoscopy faulty process of care must be defined in terms no more of open abdomen surgery but of the laparoscopic technique.

The possibility of retained surgical items (RSI) should be included in the differential diagnosis of any postoperative patient who presents with pain, infection, or a palpable mass. Plain radiography, ultrasound, and even magnetic resonance imaging (MRI) have been used for diagnosis, but the computed tomography (CT) scan has emerged as the most reliable method for diagnosing retained items[29-32]. Computerized tomography remains the diagnostic technique of choice for differential diagnosis also in laparoscopy, but a key role is played in this case by the interaction of the surgeon with the radiologist to explain the adopted surgical technique and the newly created anatomy. For example, analyzing the present complication, in the first CT scan performed after the operation, the metallic clips (chain clips) were already evident under the diaphragm, with no evident abscess, but the radiologist had no suspect because he was unaware that the chain clips should have not been in that location.Intraoperative radiographs are often of poor quality and can be difficult to obtain, especially in obese patients.

As too the removal of the foreign body the minimally invasive surgical approach appears to be most successful if the object is located early in the postoperative course.

In a case-control study designed to identify risk factors for retained items, several patient and procedure characteristics were examined. Of the 8 risk factors the Authors identified (emergency operation, unexpected change in operation, more than 1surgical team involved, change in nursing staff during procedure, body mass index, volume of blood loss, female sex, and surgical counts) only 3 were found to be statistically significant. The 3 significant risk factors were emergency surgery (risk ratio [RR] 8.8; 95% confidence interval [CI] 2.4-31.9), unplanned change in the operation (RR 4.1; CI 1.4-12.4), and increased body mass index (RR for each 1 unit increment 1.1; CI 1.0-1.2)[33].

It can be hypothesized that some of these risk factors also pertain to laparoscopic surgery, where the restricted visual field does not consent accurate control as in open surgery. For this reason, every device (instrument, gauze, suture, etc) must be tracked individually until it is extracted from the abdomen. As in open surgery, also in laparoscopy, every object that is introduced into the abdomen must have a radiopaque tag, which was not present in our case.

Another useful safety measure, not applicable to open abdomen surgery, is the systematic registration of the entire operation. This registered document can produce very useful information to verify the missed retrieval of a device and also to reconstruct the possible cause of a successive complication.

In theory the advent of laparoscopy should decrease the cases of retained foreign bodies. In practice, such as instruments, also foreign bodies have changed. In literature there are few studies about retrieved foreign bodies after laparoscopy.

## Conclusions

Perioperative care nurses should practice well-defined counting methods for sponges and needles and other surgical devices. They should perform these actions "as a team" using good communication techniques. Both surgeons and nurses should evaluate new technologies (e.g., wands used by surgeons, counting systems used by nurses) that may improve the accuracy of their work. Radiologists and radiology technicians should provide their expertise in an efficient manner and develop systems for analysis of film and image quality in changing environments. They should work all together in order to provide tightly linked communication channels and well-organized processes of care. It's a good practice to record all laparoscopic operations.

Only radiopaque internal devices should be used in laparoscopic surgery. The Endo-Catch bag's wire should be left outside the abdomen during manouvers.

If a CSA was performed in the laparoscopic RYGBP, the risk of leaving a foreign body is higher.

Laparoscopic retrieval is a safe and effective alternative to laparotomy.

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