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A Rare Case of Gastric Cancer Following Sleeve Gastrectomy with Transit Bipartition Surgery: A Case Report and Review of the Literature

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Rezumat

Un caz rar de cancer gastric după gastrectomie longitudinală (sleeve) cu bipartiție de tranzit: prezentare de caz și review de literatură

Context: Cancerul gastric reprezintă o problemă majoră de sănătate publică. În mod particular, o incidență crescută a malignităților gastrice a fost asociată cu intervenții chirurgicale gastrice anterioare.
Prezentare de caz: Raportăm un caz de cancer dezvoltat la nivelul anastomozei gastrojejunale la o femeie în vârstă de 75 de ani, la care s-a practicat în urmă cu şapte ani gastrectomie longitudinală cu bipartiție de tranzit (TB-SG) pe cale laparoscopică, pentru obezitate morbidă şi diabet zaharat de tip 2. Pacienta a fost evaluată prin gastroscopie, biopsie şi tomografie computerizată. După terapia neoadjuvantă, s-a efectuat gastrectomie totală cu esojejunoanastomoză. Suportul nutrițional postoperator a fost asigurat prin nutriție parenterală totală. Alimentația enterală a fost inițiată în a opta zi postoperatorie, iar pacienta a fost externată în stare stabilă în a douăsprezecea zi postoperatorie. În perioada postoperatorie precoce s-au înregistrat rezultate metabolice favorabile; pacienta se află în urmărire de mai puțin de un an de la intervenție.
Discuții: Deşi există raportări conform cărora chirurgia bariatrică contribuie, în anumite contexte, la reducerea incidenței cancerului, dezvoltarea cancerului gastric la nivelul stomacului restant după astfel de intervenții a fost rareori documentată. Au fost identificate câteva cazuri de cancer gastric după gastrectomie longitudinală izolată. Deşi apariția cancerului la nivelul bontului gastric după TB-SG a fost deja raportată în literatură, aceasta este prima prezentare de caz a unui cancer gastric dezvoltat la nivelul anastomozei gastrojejunale după TB-SG.
Concluzie: Apariția unei tumori la nivelul anastomozei după gastrectomia longitudinală cu bipartiție de tranzit este un eveniment rar. Pentru a preveni complicațiile severe, pacienții supuși acestei proceduri trebuie monitorizați atent în privința cancerului gastric în perioada postoperatorie. Chiar şi suspiciunile clinice minore ar trebui să determine, fără întârziere, efectuarea promptă a evaluărilor endoscopice şi imagistice, în vederea facilitării diagnosticului precoce.

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Cuvinte cheie: cancer gastric, gastrectomie longitudinală (sleeve), bipartiție de tranzit, chirurgie bariatrică, gastrectomie totală

Abstract

Background: Gastric cancer is a critical concern for public health. In particular, an increased incidence of gastric malignancies has been linked to previous gastric surgeries.

Case Report: We report a case of cancer developing at the gastrojejunostomy site in a 75-year-old woman who underwent laparoscopic transit bipartition sleeve gastrectomy (TB-SG) seven years ago due to morbid obesity and type 2 diabetes mellitus. The patient underwent gastroscopy, biopsy, and computed tomography. Following neoadjuvant therapy, total gastrectomy with esophageal jejunostomy was performed. Postoperative nutritional support was provided with total parenteral nutrition. Enteral feeding was initiated on the eighth postoperative day, and the patient was discharged in stable condition on the twelfth postoperative day. Positive metabolic outcomes were recorded in the early postoperative period; the patient is being followed up less than one year postoperatively.

Discussion: While bariatric surgery has been reported to contribute to a reduction in cancer incidence in certain settings, gastric cancer developing in the remaining stomach after bariatric surgery has rarely been documented. Several cases of gastric cancer have been identified after sleeve gastrectomy alone. Although cancer developed in the gastric remnant after sleeve gastrectomy and transit bipartition (TB-SG) surgery has been already reported in literature, this is the first case report of gastric cancer developed at the gastrojejunostomy anastomosis site after TB-SG.

Conclusion: Tumor development at the anastomosis site following Sleeve Gastrectomy with Transit Bipartition is a rare occurrence. To prevent severe complications, patients undergoing this procedure should be closely monitored for gastric cancer during the postoperative period. Even minor clinical suspicions should prompt timely endoscopic and imaging evaluations without delay to facilitate early diagnosis.

Keywords: gastric cancer, sleeve gastrectomy, transit bipartition, bariatric surgery, total gastrectomy

Introduction

Cancer represents a critical public health concern, contributing substantially to mortality associated with noncommunicable diseases and significantly reduces life expectancy and quality of life in all countries worldwide (1).

Notably, an increased incidence of gastric cancer has been reported following gastric surgeries. In the past, studies noted that the likelihood of developing gastric cancer increased after certain stomach surgeries, especially partial gastrectomy performed to treat benign peptic ulcer disease. This link was identified many years ago and has since been reinforced by numerous cohort analyses and systematic reviews (2,3). In contrast, modern bariatric and metabolic surgeries such as sleeve gastrectomy and Roux-en-Y gastric bypass differ considerably from those historical procedures in both structure and function.

Due to the widespread prevalence of obesity and diabetes – two of the most common chronic conditions of our time – bariatric and metabolic surgeries have become increasingly common in recent years. Bariatric surgery, which aims to induce weight loss by altering gastric volume, involves partial resections and/or bypass procedures utilizing various types of bands, and is widely applied for the treatment of obese individuals across many parts of the world (4). Numerous publications address the development of gastric cancer following such surgical procedures (5-7).

Several cases of esophageal and gastric cancers following bariatric surgery have been documented in the scientific literature (8,9). To date, there is only one documented case reporting cancer development in the remaining stomach tissue after transit bipartition surgery and sleeve gastrectomy (10).

Although there have been cases in the English literature in which cancer developed in the gastric remnant in a short time after sleeve gastrectomy and transit bipartition surgery, this is the first case report in the literature of gastric cancer developing in the gastrojejunostomy anastomosis after transit bipartition sleeve gastrectomy.

To the best of our knowledge, this case report is the first published one of a gastric cancer arising at the anastomosis site involving the residual stomach following a Sleeve Gastrectomy with Transit Bipartition procedure.

Although cancer developed in the gastric remnant after sleeve gastrectomy and transit bipartition (TB-SG) surgery has been already reported in literature, this is the first case report of gastric cancer developed at the gastrojejunostomy anastomosis site after TB-SG.

Case Report

A 75-year-old woman attended the general surgery

outpatient department, reporting complaints of rectal hemorrhage accompanied by persistent fatigue.

Her medical history included a right adrenalectomy due to an adrenal adenoma and with open surgery a total abdominal hysterectomy with bilateral salpingo-oophorectomy due to bleeding due to uterine myoma in 1985 (TAH+BSO). Seven years earlier, she underwent a sleeve gastrectomy combined with transit bipartition due to morbid obesity (height: 149 cm; weight: 105.7 kg; BMI:47.6 kg/ m^2) and type 2 diabetes mellitus.

We have no information regarding the patient's follow-up visits in the bariatric surgery program prior to gastric transit bipartition surgery. We also could not access any follow-up information regarding the patient's gastric transit bipartition surgery. The patient did not undergo postoperative gastroscopy after gastric transit bipartition surgery. During an emergency visit in the 4th year postoperatively following gastric transit bipartition surgery, the patient underwent a full abdominal CT scan without contrast at an external center. This CT scan, performed at an external center in 2021, showed pelvicalyceal dilation in the left kidney, an AP diameter of 17 mm in the renal pelvis, and a stone density of 15 mm in the proximal left ureter. Increased density was also observed in the left perirenal fat tissue. The patient was not followed up by a dietitian during the post-operative period. The patient lost approximately 25 kg postoperatively.

The patient's overall condition was good when we took her to surgery. After transit bipartition sleeve gastrectomy surgery, the patient's type 2 diabetes completely disappeared. The total weight loss between the transit bipartition gastric sleeve surgery and our cancer surgery was 23%. She was not taking any supplements. Before the cancer surgery, in the patient's nutritional status there are no pathologic values were identified. Nutritional status is crucial in major surgery so before malignancy surgery, we supported the patient's nutritional status with a protein-rich diet for two weeks before surgery, and then performed the malignancy surgery.

No other comorbidities were identified in the patient's medical history, and her family history was negative for gastrointestinal diseases or malignancies. On physical examination, the abdomen had a normal appearance with no palpable masses, organomegaly, ascites, collateral circulation, guarding, or rebound tenderness. Findings from other systemic examinations were within normal limits. Laboratory investigations, encompassing standard biochemical parameters and tumor markers, revealed results within normal reference ranges. However, hemoglobin was slightly reduced at 10.8 g/dL.

Upper gastrointestinal endoscopy revealed bloody fasting secretions upon entry into the stomach. A large, necrotic, and hemorrhagic vegetative mass was observed, extending from the corpus to the pylorus, and multiple biopsies were obtained. The esophageal hiatus appeared mildly lax (*Fig. 1*). Histopathological

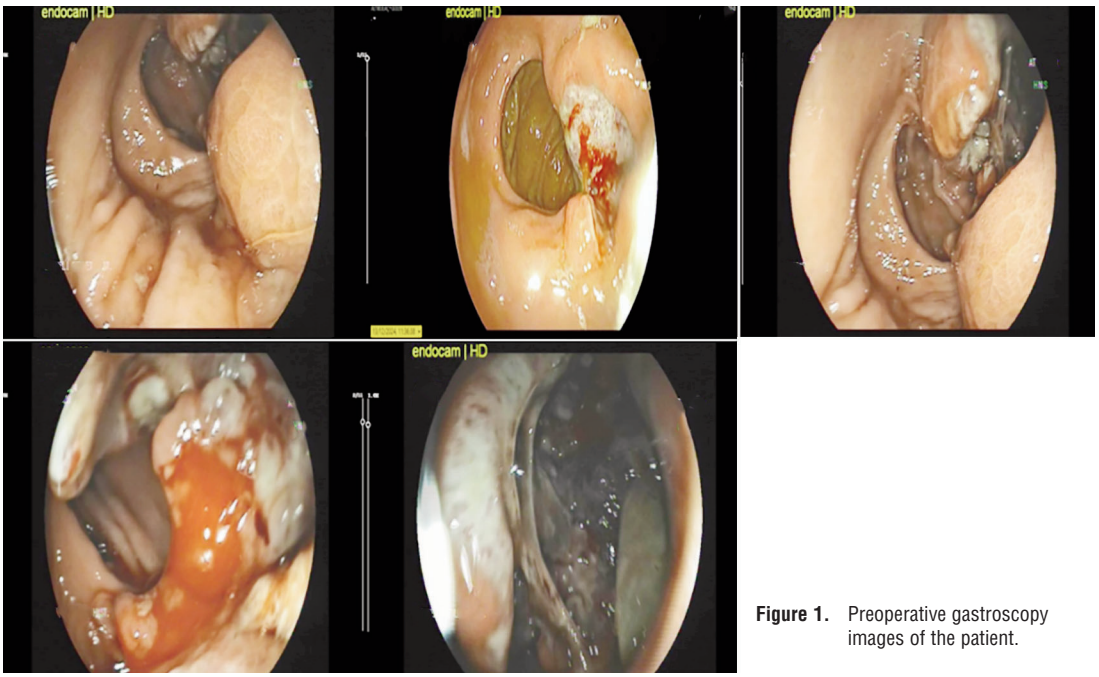

Figure 1. Preoperative gastroscopy images of the patient.

analysis of the biopsy specimens demonstrated a poorly differentiated adenocarcinoma. Additionally, a large ulcer was noted with actinomyces colonies present at the ulcer base. Tumor-free gastric mucosa contains chemical gastropathy findings. PAS-AB was applied. PK: (+) Ki67 index: 90% P53: Scattered nuclear (+) CDX2: Focal (+) Chromogranin A: (-) Synaptophysin: (-) CD56: (-) C-erbB2: (-) HP: (-).

Intravenous contrast-enhanced abdominal computed tomography (CT) revealed a 1.5 cm subcapsular hypodense lesion in segment 8 of the liver, at the level of the hepatic dome. Following the detection of a liver cyst on CT, the patient was evaluated by a board of our hospital's surgical-oncology multidisciplinary team, and ultrasound follow-up for the liver cyst was recommended. Correlative ultrasonography (US) findings were consistent with a simple hepatic cyst. Since the ultrasound confirmed the lesion as a hepatic cyst, no further biopsy, treatment, or other intervention was deemed necessary. The decision was made to monitor the cystic lesion in the liver. Therefore, MRI imaging was not performed. Intraoperative examination revealed that the liver lesion was macroscopically consistent with a cystic lesion, thus no further ultrasound or biopsy was needed. This is a procedure we routinely perform in malignancy surgeries.

CT findings also demonstrated an anatomical appearance compatible with prior Roux-en-Y surgery. At antropyloric level of the stomach, a 9 cm segment showed mass-like wall thickening, heterogeneous enhancement suggestive of infiltration into the adjacent fatty tissue and lymphadenopathy (LAP) with short axis measuring up to 13 mm. An anastomosis line was visualized between the small bowel loops in the right lower quadrant, but it could not be fully evaluated due to inadequate distension.

When the case was evaluated by the surgical-oncology multidisciplinary board of our institution, neoadjuvant chemotherapy was recommended as the initial treatment approach due to the diagnosis of gastric cancer, the presence of a mass near the anastomosis site, regional lymphadenopathy (LAPs) on CT scan, hypodense liver lesions suggestive of local spread, and mediastinal lymphadenopathy. Following the diagnosis, the patient was referred to the medical oncology unit to begin neoadjuvant therapy.

Following four cycles of neoadjuvant chemotherapy, a follow-up CT was performed to assess the treatment response. The subcapsular hypodense lesion in segment 8 of the liver remained unchanged, measuring 1.5 cm, with fluid attenuation consistent with a benign cyst. Findings remained compatible with the prior Roux-en-Y configuration. The previously noted wall thickening at the antropyloric level had decreased to a 6 cm segment, showing regression compared to the previous CT scan. The associated regional LAPs had also regressed. The anastomosis line between the small bowel loops in the right lower quadrant appeared normal.

After neoadjuvant therapy, the patient, who had previously undergone Sleeve Gastrectomy with Gastric Transit Bipartition, underwent a total gastrectomy with esophagojejunostomy. Intraoperative exploration revealed no ascitic fluid in the abdominal cavity. The liver, Douglas pouch, peritoneal cavity, and other intra-abdominal organs appeared macroscopically normal. A palpable mass was detected at the site of the gastrojejunostomy anastomosis from the prior surgery. In exploration during cancer surgery the Y-limb of the anastomosis was located 300 cm distal to the ligament of Treitz and 70 cm proximal to the ileocecal valve, with a distance of 70 cm from the Y-limb to the gastrojejunostomy site. Intraoperative gastroscopy was performed to confirm tumor location, revealing a malignant mass approximately 4 cm in diameter directly on the anastomotic line (*Fig. 2*).

Given the involvement of multiple lymph nodes surrounding the left gastric artery, considerations were made regarding the risk of local recurrence and the adequacy of surgical margins. Thereupon, it was decided to perform a total gastrectomy with resection of the remaining stomach of the patient, who had previously undergone gastric transit bipartition surgery. Lymph node dissection was also performed over the common hepatic artery (*Figs. 3, 4*).

In the final configuration following total gastrectomy and lymph node dissection, we resected 20 cm of small intestine with clean surgical margins. Since the patient's metabolic problems resolved after gastric transit bipartition surgery and metabolic control was achieved, we planned surgery solely for the cancer. We did not alter the Y-arm anastomosis because there was

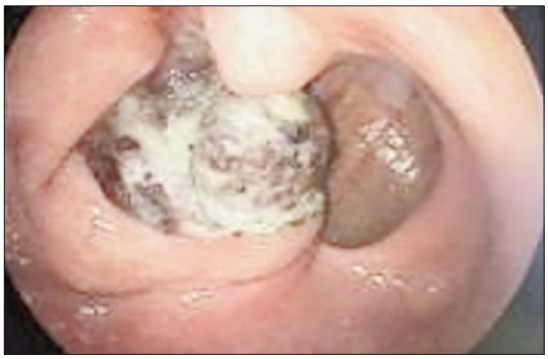

Figure 2. Intraoperative gastroscopy image

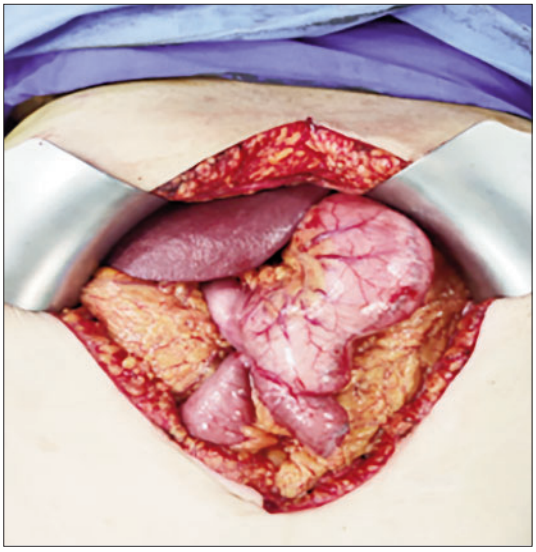

Figure 3. Intraoperative image

Figure 4. Specimen image after surgery

no need for revision and to avoid extra-anastomotic complications. We performed an esophagojejunostomy 50 cm away from the Y-arm anastomosis performed in the previous surgery (*Fig. 5*).

We began minimally invasive surgery with laparoscopy. Exploration revealed dense intra-abdominal adhesions from previous surgeries, and because these adhesions prevented proper exploration during dissection, we decided to convert to open surgery.

Histopathological findings: the tumor was located at the gastrojejunostomy anastomotic line within the residual stomach and measured 3×2.5 cm. Histopathological analysis revealed a poorly cohesive carcinoma with a signet ring cell component. The tumor invaded the muscularis propria layer, without evidence of invasion into the subserosa or serosa. Although tumor invasion was confined to the muscularis propria, acellular mucin pools were observed within the subserosal adipose tissue, and free acellular mucin was noted on the serosal surface. No lymphovascular or perineural invasion was identified.

A total of 26 lymph nodes were excised along with the specimen. These demonstrated reactive changes, anthracosis, and granulomatous inflammation, with-

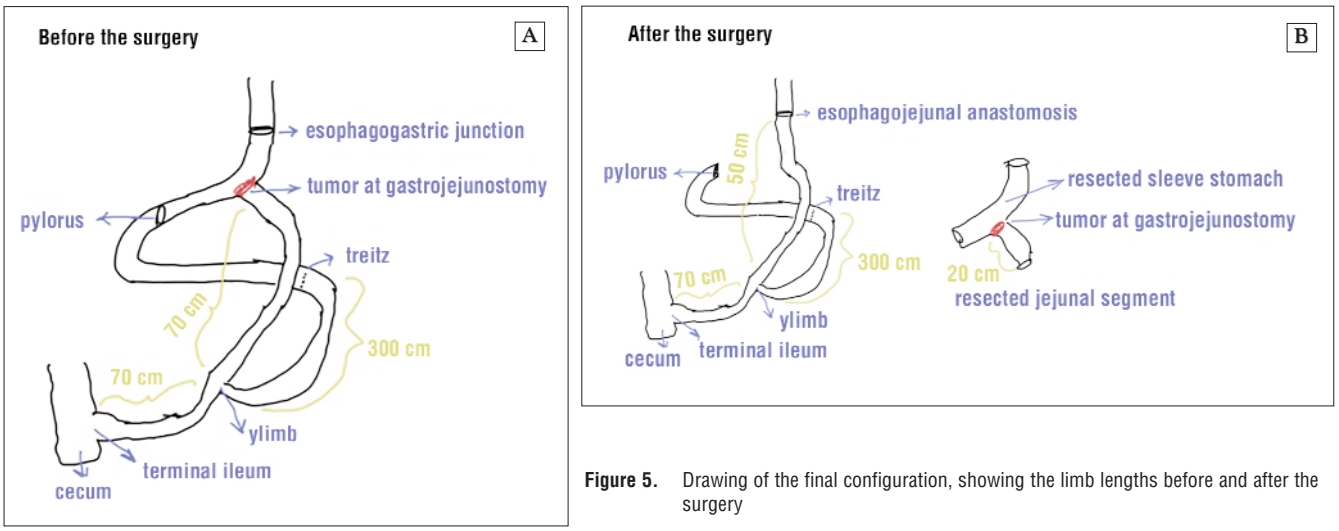

Figure 5. Drawing of the final configuration, showing the limb lengths before and after the surgery

out evidence of metastatic involvement. One additional lymph node removed from the area over the common hepatic artery showed reactive lymphoid hyperplasia.

All surgical margins were negative for tumor involvement. Pathological Staging (pTNM) was ypT2, N0, Mx.

Postoperative Course: The patient was closely monitored in the intensive care unit (ICU) in the early postoperative period and then transferred to the general surgery ward on the seventh postoperative day. Due to ongoing acidosis during intensive care monitoring, the patient underwent bedside dialysis. Nutritional support was provided with total parenteral nutrition, and oral intake was initially discontinued. Enteral nutrition was initiated on the eighth postoperative day, and the patient was discharged in stable condition on the twelfth postoperative day.

Based on postoperative pathology results, the patient was referred to the oncology department for continued oncological treatment. The oncology department requested a follow-up gastroscopy at six months postoperatively. The gastroscopy performed at six months postoperatively revealed a total gastrectomy, esophagoenterostomy, and normal upper gastrointestinal findings. There is no sign of recurrent lesion (*Fig. 6*). The patient does not currently have any active complaints. Because the patient was scheduled for a PET-CT after the first year postoperatively, the patient's follow-up has not yet been completed.

Discussion

Gastric cancer is a significant malignancy with high global morbidity and mortality, with more than one million new cases diagnosed annually (11). While epidemiological research has established a link between obesity and heightened risk for specific malignancies, including colorectal and esophageal adenocarcinomas, definitive evidence associating obesity with increased incidence of non-cardia gastric cancers remains lacking.

Bariatric surgery has been associated with various complications, including mortality, malabsorption, fistula formation, bleeding, band slippage, infection, urolithiasis, bowel obstruction, perforation, and cardiopulmonary events (4). In addition to these complications, bariatric surgery has been reported to contribute to a reduction in cancer incidence in certain contexts. Schauer et al. reported a 33% reduction in the incidence of obesity-related cancers among patients who underwent bariatric surgery (12). Similarly, in a study by Adams et al., the incidence of cancer at diagnosis, including anatomical site and stage, was significantly lower among patients who underwent gastric bypass surgery compared to a matched control cohort of severely obese individuals who did not receive surgical intervention (13).

Notwithstanding these observations, occurrences of gastric cancer arising in the residual stomach following bariatric surgery remain infrequently documented (14).

Although gastric carcinoma developing after bariatric surgery is exceptionally uncommon, the increasing global frequency of metabolic procedures has led to a corresponding rise in documented cases. Current evidence suggests that bariatric operations overall do not elevate the likelihood of gastric malignancy; nonetheless, procedures such as sleeve gastrectomy (SG) and sleeve gastrectomy with transit bipartition (SG-TB) induce distinctive anatomic and physiological alterations that may affect gastric tumorigenesis (15-17).

The staple-line has repeatedly been identified as a predominant site for tumor occurrence in published reports. Chronic mucosal inflammation, localized ischemia, and continuous exposure to bile reflux are considered major contributors to this phenomenon

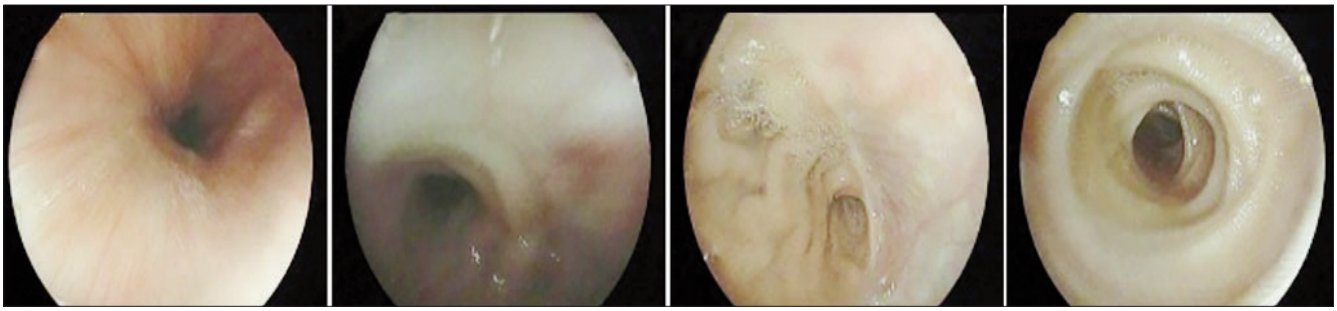

Figure 6. Postoperative control gastroscopy image

(18-19). In our case, unlike cancer developing at the staple line, we are talking about carcinoma formation in the gastrojejunostomy anastomosis a few years after the operation.

Several biological and environmental factors appear to play a role in carcinogenesis following SG or SG-TB. Among them, Helicobacter pylori infection remains the principal and best-established etiologic agent for gastric adenocarcinoma. Inadequate eradication of this microorganism before bariatric surgery can perpetuate chronic gastritis, atrophy, and intestinal metaplasia (20-21). In addition, duodenogastric bile reflux resulting from altered postoperative anatomy may chronically expose the residual gastric mucosa to bile acids capable of inducing oxidative stress and activation of oncogenic signaling cascades such as IL-6/JAK/STAT and NF-κB (22-23). Alterations in the gastric and intestinal microbiota as well as persistent mucosal regeneration at the staple-line may synergistically foster malignant transformation (24-25).

Considering these mechanisms, a comprehensive preoperative endoscopic evaluation including *H. pylori* screening and eradication therapy is strongly recommended before metabolic surgery (26). After surgery, patients who present with persistent dyspepsia, unexplained anemia, or weight loss should promptly undergo upper gastrointestinal endoscopy (27). Furthermore, expert consensus statements have proposed regular endoscopic surveillance for individuals exhibiting bile reflux or possessing additional risk factors (28).

Management of such malignancies should be discussed within a multidisciplinary tumor board, integrating both bariatric and oncologic surgical perspectives. The definitive surgical approach whether subtotal or total gastrectomy with formal lymphadenectomy depends primarily on tumor site and the type of prior reconstruction (29). Although laparoscopic resections may be technically feasible, previous anatomical modifications and adhesions frequently necessitate open surgery (30).

In summary, the development of gastric carcinoma after sleeve gastrectomy combined with transit bipartition represents a rare yet clinically relevant complication. Ongoing bile reflux, inflammation along the staple-line, and persistent Helicobacter pylori infection likely contribute to its pathogenesis. Therefore, meticulous preoperative assessment and vigilant postoperative surveillance are crucial to facilitate early detection and improve patient outcomes (31).

In 2014, Angrisani et al. documented the first case of gastric cancer arising in the corpus and antrum following sleeve gastrectomy for obesity treatment (32).

After this case, a thorough review of the English-language literature was performed utilizing PubMed, Medline, and Google Scholar databases to investigate occurrences of cancer development following sleeve gastrectomy and transit bipartition procedures. Although numerous cases of gastric cancer following sleeve gastrectomy alone were identified, only one case was found involving cancer after sleeve gastrectomy combined with transit bipartition. This previously reported case described the development of gastric cancer on the stapler line in the corpus of the residual stomach three years after surgery (10). Our case is the first in the literature to report gastric cancer arising specifically at the gastrojejunostomy anastomosis following Sleeve Gastrectomy with Transit Bipartition.

Conclusion

Tumor development at the anastomosis site following Sleeve Gastrectomy with Transit Bipartition is a rare occurrence. To prevent severe complications, patients undergoing this procedure should be closely monitored for gastric cancer during the postoperative period. Even minor clinical suspicions should prompt timely endoscopic and imaging evaluations without delay to facilitate early diagnosis.

Conflicts of Interest

The authors declare no conflict of interest.

Ethical Statement

Written informed consent was obtained from the individual for the publication of any potentially identifiable images or data included in this article.

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