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CASE REPORT

Gastric Cancer in a Patient with Laparoscopic Adjustable Gastric Band: Case Report and Review of Literature

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Introduction

Obesity has reached a pandemic proportion across continents [1]. Bariatric surgery is a safe and effective procedure that results in sustained weight loss and hence reduction in obesity related comorbidities and mortality [2]. It is also associated with reducing the risk of certain cancers, including gastrointestinal cancers, in formerly obese patients [2]. However, there are a few case reports of late occurrence of gastric cancer in patients who underwent various kinds of bariatric surgery [3, 4]. Here, we report a patient who presented with an umbilical nodule and was subsequently diagnosed with gastric cancer, almost a decade after bariatric surgery. In this report, we will review literature pertaining to this association and possible mechanism involved in the development of gastric cancer in such patients.

Case Report

A 50-year-old man with past medical history of morbid obesity presented to the emergency room with acute onset pain in the right flank. Physical exam was significant for tenderness in the right costo-vertebral angle. In addition to this, a 2 × 2 cm pink colored umbilical nodule was noted (Fig. 1a). On further questioning, the patient reported 30-lbs weight loss over last year. He had a history of laparoscopic placement of adjustable gastric band (LAGB) almost a decade ago for treating obesity but stopped following his bariatric surgeon soon after the surgery. He denied taking any medication or herbal supplements on a regular basis. He did not smoke but reported consumption of alcoholic beverages on social occasions only. The labs at presentation were only remarkable for macroscopic hematuria and large number of leukocytes. The liver and kidney function were within normal range. CT scan of the abdomen showed large ascites and three small kidney stones in the right kidney. The same scan also showed a gastric band around the proximal stomach attached to a port. (Fig. 1b). The right flank pain was attributed to renal colic from kidney stones, which subsided with opioid analgesics within a day after admission. The patient underwent paracentesis, and his peritoneal fluid analysis showed a low serum-albumin gradient (fluid albumin—3.0 g/dL and serum albumin—4.0 g/dL) fluid. The cytopathology of the fluid did not show any evidence of malignancy in fluid cytology. Subsequently, the umbilical nodule was also biopsied, which showed adenocarcinoma on histopathology. An esophago-gastro-duodenoscopy (EGD) done in search of the primary site for malignancy showed a 1.5-cm large ulcer on the proximal body of greater curvature (Fig. 1c) along with infiltration along the edges. Colonoscopy done at the same time was incomplete as the scope could not pass beyond splenic flexure due to mechanical obstruction from the gastric band. The histopathology from the biopsy of this ulcer showed adenocarcinoma with signet ring cells, which led to the diagnosis of gastric cancer. Staging CT scans showed small bilateral pleural effusion and multiple omental nodules. He was started on the FOLFOX-6 regimen (combination of oxaliplatin, 5-fluorouracil bolus, leucovorin rescue, and 48-h continuous infusion of 5-fluorouracil) for metastatic gastric cancer. After 4 cycles of chemotherapy, he presented with severe nausea, vomiting, and rapid expansion of abdominal girth. Repeated CT scans showed worsening of ascites and increase in peritoneal involvement with the tumor. Patient was diagnosed with mechanical small-bowel obstruction secondary to peritoneal carcinomatosis. Palliative resection of the omental metastasis was deferred in view of worsened tumor burden and poor prognosis.

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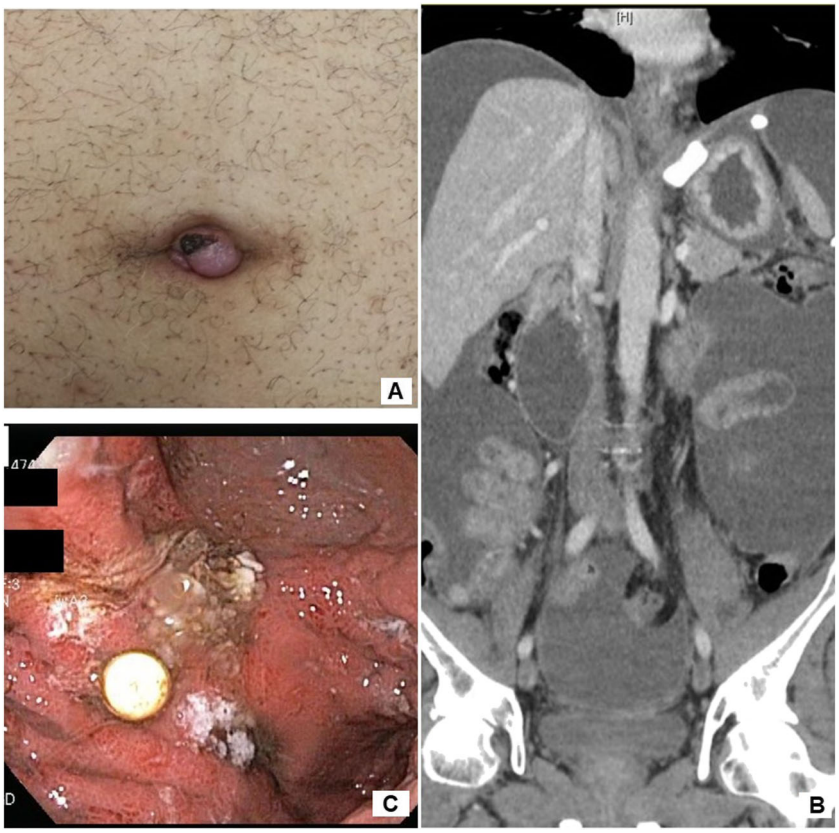

Fig. 1 **a** Sister Mary Joseph nodule. **b** CT scan showing ascites and the gastric band. **c** EGD showing malignant gastric ulcer with surrounding infiltration

Conservative measures like naso-gastric tube and bowel rest failed to relieve his obstruction. At this point, a discussion was held with the patient and his family where they opted for hospice care.

Discussion

Obesity is directly associated with increased risk of developing multiple malignancies, especially GI malignancies [5]. The positive effect of bariatric surgery in reducing the risk of cancer has been proven in a recent meta-analysis of six observational studies [2]. However, rare reports of the occurrence of gastro-esophageal cancer in patients who underwent bariatric surgery have also been published in the literature [3, 4]. In this report, we will review the presentation, diagnosis, and treatment of patients who were diagnosed with gastro-esophageal cancers after gastric banding (Table 1). Irrespective of the type of bariatric procedure, an average lag time of nearly 8–9 years was observed between the surgery and the diagnosis of the tumor in these studies [3, 4]. The most common site of tumor location was between the distal esophagus and the pouch above the ring in patients who had undergone gastric banding (Table 1). Moderately to poorly differentiated adenocarcinoma with signet ring cells was the most common histopathology in all these tumors (Table 1). Although dysphagia and upper GI bleeding was reported in a few patients, most patients reported non-specific symptoms like nausea, vomiting, weight loss, and epigastric pain prior to diagnosis [3, 4]. Our patient had noticed weight loss for over a year, which he attributed to his LAGB and hence did not seek care. He presented with Sister Mary Joseph nodule (Fig. 1a) which is a sign of advanced GI malignancy and is rarely seen in this era when precision imaging and EGD help to make diagnosis at an early stage [6]. Authors have suggested that patients and clinicians alike, may attribute the common "red flag signs" of weight loss, fatigue, and anorexia to the bariatric procedure, leading to delay in diagnosis of the tumor [3, 4, 7]. Due to the rarity of these reports, it is hard to speculate a definite causal relationship between bariatric surgery and occurrence gastric cancer. A few authors have postulated that restrictive bariatric procedures like LAGB, may cause an increased risk of gastro-esophageal reflux disease which in turn, could increase the risk of esophago-gastric cancers [3]. Others have also reported intestinal metaplasia, atrophy, and foveolar hyperplasia in patients undergoing both restrictive bariatric procedures (like LAGB) and Roux-en-Y gastric bypass [8]. Where, a pre-operative EGD is a must in a symptomatic patient, its role in asymptomatic patients is controversial [7]. Unless a premalignant or a malignant lesion is identified, the treatment plan seldom changes regardless of the EGD findings [7]. As for post-operative EGD, many experts recommend it in

Table 1 Case reports of patients who underwent gastric banding and developed gastro-esophageal cancers

Author	Sex	Age (year)	Time to diagnosis (year)	Preoperative EGD	Presenting symptom	Site of tumor	Stage	Therapy offered	Follow-up
Snook [9]	F	50	6	NR	Persistent dysphagia	Distal esophagus	IV	Band removal + palliative chemotherapy	24 months/death
Hackert [10]	F	62	10	NR	Epigastric pain	Gastric pouch/cardia	IV	Palliative surgery + chemotherapy	NR/NR
Stroh [11]	F	65	2.5	Normal	Hematmesis	Gastric pouch	IV	Exploratory laparotomy	5 days/death
Korswagen [12]	M	43	2	Not done	Back pain from metastasis	Distal esophagus	IV	Palliative radiation to bone metastasis	NR/death
Stauffer [13]	M	66	2	NR	Dysphagia	Distal esophagus	III	Surgery + palliative chemotherapy	9 months/death
Orlando [3]	F	37	0.5	Normal	Infected port removal + EGD	Lesser curvature	I	Surgical resection	Alive
Trincado [14]	F	52	5	NR	Epigastric pain	GE junction	III	Esophagopouchectomy	12 months/alive
Szewczyk [15]	F	33	5	Normal	Nausea + epigastric pain	Lesser curvature	IV	Total gastrectomy + Roux-en-Y + adjuvant chemotherapy	24 months/alive
This study	M	50	10	NR	Nausea + vomiting + weight loss	Entire stomach	IV	Palliative chemotherapy	4 months/death

F female, *M* male, *NR* not reported

patients with persistent symptoms of nausea, vomiting, and weight loss [7]. On our review of literature, almost all patients were diagnosed when they either presented with persistent symptoms or when a malfunction/infection of the gastric band was noted. In all these patients, except one patient, the tumor was diagnosed at an advanced stage where curative treatments could not be deployed. In the report from Orlando et al., the patient underwent EGD due to infection of the port and was diagnosed with a T1 tumor which in turn led to a curative surgery, hence strengthening the case for surveillance EGD [3].

In conclusion, this report highlights the need to maintain a high index of suspicion of esophago-gastric cancer in patients who present with nausea, vomiting, and persistent weight loss after bariatric surgery. Our report favors the argument for postoperative surveillance EGD in asymptomatic patients which can detect early stages of esophago-gastric tumors and hence improve their outcomes. Although bariatric surgery broadly reduces the incidence of various cancer types, our report indicates the need for prospective epidemiological studies to evaluate the risk of cancer related to the procedure.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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