Gastric Cancer after Laparoscopic Adjustable Gastric Banding: A Case Series

Shai Meron Eldar1,2*, Esther Ovdat1, Nadav Nevo1, Yonatan Lessing1, Ido Nachmany1 and David Hazzan3

1Division of General Surgery, Tel-Aviv Sourasky Medical Center, Affiliated to the Sackler Faculty of Medicine, Tel Aviv University, Tel-Aviv, Israel
2Bariatric Surgery Unit, Tel-Aviv Sourasky Medical Center, Tel Aviv University, Tel-Aviv, Israel
3Department of General Surgery, Sheba Medical Center, Tel Hashomer, Tel Aviv University, Israel

*Corresponding author: Shai Meron Eldar, Division of General Surgery, Tel-Aviv Sourasky Medical Center, Affiliated to the Sackler Faculty of Medicine, Tel Aviv University, Tel-Aviv, Israel. Tel: 972-52-4262021; E-mail: shaime@tlvmc.gov.il

Received date: October 18, 2018; Accepted date: February 20, 2019; Published date: February 28, 2019

Abstract

Background: The association between bariatric procedures and adenocarcinoma of the distal esophagus and stomach is not fully understood. While reflux esophagitis and subsequent Barrett’s esophagus may increase rates of gastric tumors, weight loss may have a protective role. Only a few case reports of gastric cancer following gastric banding have been reported.

Objective: We report three patients who were diagnosed with esophago-gastric adenocarcinoma following laparoscopic adjustable gastric banding surgery.

Methods: A retrospective review of the medical records of 3 patients who were diagnosed with gastric adenocarcinoma following LAGB.

Results: All patients underwent workup that was initiated due to long standing complaints of persisting nausea and vomiting followed by intermittent epigastric pain. One patient was diagnosed by upper endoscopy with the tumor located at the gastro-esophageal junction. The second patient was found to have a gastric body lesion during laparoscopic removal of his gastric band and the pathology was confirmed by upper endoscopy and biopsies the following day. A third patient presented with an antral mass. All patients had localized lesions with regional lymphadenopathy and eventually underwent a gastrectomy with lymph node dissection.

Conclusion: Since epigastric pain, nausea, weight loss, and vomiting are common complaints in bariatric surgery patients, these complaints often do not elicit further investigation. This may result in delayed workup and diagnosis of gastric malignancies. Clinicians must be aware of these entities, and consider routine gastroscopy in this patient population.

Keywords: Laparoscopic adjustable gastric band; Gastric cancer; Bariatric surgery; Endoscopy after bariatric surgery

Introduction

As of 2014 there are 600 million obese adults according to the world health organization, representing 13% of the adult population [1].

Bariatric surgery is currently the most effective treatment for morbid obesity, achieving significant long-standing weight loss and improvement or remission of obesity related co-morbidities [2].

As the morbidly obese population is increasing annually worldwide, so does the number of procedures performed, with 468,609 operations reported in 2013 [3]. These massive numbers are interpreted to a very high safety profile with low complication rates and a mortality risk of 0.3% [4-6].

Obesity is considered to be a major risk factor for the development of several cancers, including colon, breast, endometrium, kidney and esophagus [7]. Bariatric surgery has been shown to decrease the risk of these cancers and therefore decrease cancer mortality [8,9].

But as longer follow up is reported, there have also been few reports of esophago-gastric cancers following bariatric procedures [10]. Chronic reflux, exposure of small bowel mucosa to gastric secretions and chronic irritation of a foreign body can all be considered as contributors to malignancy [11].

Are these procedures a two-edged sword? Do they protect from cancer by reducing weight and obesity related morbidity, but should sometimes be considered as a risk factor?

We report 3 cases of gastric cancer diagnosed in patients carrying longstanding adjustable gastric bands, along with review of the current literature on these rare cases, in an effort to answer this question.

Case 1

A 75-year-old morbidly obese female, with diabetes mellitus, hypertension and hyperlipidemia. Family history of malignancies consists of two siblings with adenocarcinoma of stomach, one with melanoma, and one with breast cancer.
Case 2
In 1999 she underwent laparoscopic adjustable gastric banding. Her pre-operative weight was 117 kg, and her BMI was 45.7 kg/m². She did not undergo an endoscopic evaluation prior to her surgery. She lost 10 kg following the procedure and gained her weight back within 10 months. She was then lost to follow, with no significant weight change and no gastrointestinal symptoms.

Thirteen years later she presented with dysphagia. She was planned for band removal, but due to uncontrolled hypertension the surgery was delayed, and again she was lost to follow. No endoscopic imaging was performed at that time.

In November 2015 she was admitted due to chest pain and hiccups with resolution of her symptoms following band deflation. At that time she reported a 12 kg weight loss that was attributed to a successful diet. She was referred for endoscopic evaluation. The gastrodeudonoscopy showed external pressure from her known gastric band. Proximal to that an area with inflamed, infiltrated and erythematous mucosa was biopsied and revealed adenocarcinoma. Endoscopic ultrasound evaluation suggested a T2N0 tumor.

She underwent an uneventful proximal gastrectomy. Final pathology was ulcerated adenocarcinoma, T1N1M0, and she is currently under adjuvant chemotherapy treatment.

Case 3
A 59-year-old female, with no co-morbidities and no family history of malignancies, underwent an LAGB in 2005 with a BMI of 35 kg/m². Her BMI decreased to 23.3 kg/m² after losing 32 kg. Upon her diagnosis she weighed 73 kg reflecting a BMI of 26.2 kg/m².

She presented 12 years later due to abdominal distention, epigastric pain and occasional vomiting which she attributed to her gastric band. No weight change was noticed.

A gastrodeudonoscopy was performed revealing an ulcerated lesion in the antrum which was biopsied. Pathology showed poorly differentiated signet ring cell adenocarcinoma. Endoscopic ultrasound suggested a T3N0-1 tumor, and after neoadjuvant therapy she was referred to a sub-total gastrectomy. Final pathology was poorly differentiated adenocarcinoma, T4aN0, and she is currently under adjuvant therapy.

Results
Only 22 cases of esophago-gastric cancers following bariatric surgery have been reported thus far. This is a very small number compared to the millions of bariatric procedures performed, even when considering poor follow-up and under-reporting.

Different tumors in different locations at different time intervals after different procedures were observed (Table 1).

Gender distribution was mostly female (14, 66.7%)-similar to that seen in the general population undergoing bariatric surgery. Mean age at diagnosis was 55 years (range 37-75 years) and the mean time interval after bariatric surgery was 9 years (range 0.5-26 years).

Nine cancer cases (43%) were reported following gastric bypass, 6 (29%) following VBG and SRVG, 5 (24%) after LAGB, and one patient (5%) underwent both a GBP and a LAGB.

Eight carcinomas were found in the gastric pouch (38%), the second most common site being the excluded stomach in gastric bypass.

There were 18 adenocarcinomas, 2 lymphomas and 1 gastrointestinal stromal tumor (GIST).

Only 5 cases (24%) had a prior endoscopy-all of which were negative.

Out of the ten cases with a reported BMI at the time of diagnosis, 50% were obese with a BMI>30.

References

| Authors               | Age (Y) | Sex | BMI pre-op | BMI at diagnosis | Procedure | Site            | Interval surgery after endoscopy | Prior endoscopy | Stage |
|-----------------------|---------|-----|------------|------------------|-----------|-----------------|-------------------------------|-----------------|-------|
| Znak et al. [12]      | 52      | f   |            |                  | SRVG      | Pouch           | 2                             | Normal          | T1N0M0 |
| Papakonstantinou et al. [13] | 46      | m   | 49         | 23.6             | VBG       | Pylorus         | 6                             | no              | T7N1M? |
| Khitin et al. [14]    | 57      | f   |            |                  | GBP       | Excluded stomach| 22                            | n/a             | n/a    |
| Jain et al. [15]      | 67      | f   | 57         |                  | VBG       | Pouch           | 15                            | no              | T2N2M0 |
| Hackert et al. [16]   | 62      | f   | 47         | 29.2             | LAGB      | Pouch           | 10                            | no              | T4N2M1 |
| Escalona et al. [17]  | 51      | f   | 42         | 27               | GBP       | Excluded stomach| 8                             | no              | T4N2   |

This is a very small number compared to the millions of bariatric procedures performed, even when considering poor follow-up and under-reporting.

Different tumors in different locations at different time intervals after different procedures were observed (Table 1).

Gender distribution was mostly female (14, 66.7%)-similar to that seen in the general population undergoing bariatric surgery. Mean age at diagnosis was 55 years (range 37-75 years) and the mean time interval after bariatric surgery was 9 years (range 0.5-26 years).

Nine cancer cases (43%) were reported following gastric bypass, 6 (29%) following VBG and SRVG, 5 (24%) after LAGB, and one patient (5%) underwent both a GBP and a LAGB.

Eight carcinomas were found in the gastric pouch (38%), the second most common site being the excluded stomach in gastric bypass.

There were 18 adenocarcinomas, 2 lymphomas and 1 gastrointestinal stromal tumor (GIST).

Only 5 cases (24%) had a prior endoscopy-all of which were negative.

Out of the ten cases with a reported BMI at the time of diagnosis, 50% were obese with a BMI>30.
together with the routine use of proton pump inhibitors following
to the fact that symptoms of gastric cancer—including weight loss,
carcinoma were discovered at an early stage.

diagnosis and treatment of these patients. Furthermore, diagnosis may
mimic post-bariatric surgery complaints, which can delay the
diagnosis of these pathologies in this patient population
increased risk for gastric stump cancer, usually decades
But reports thus far have not shown that
greater risk to develop esophago-gastric is still undetermined [8,9].

Table 1: Upper gastro-intestinal malignancies reported following bariatric surgery.

| Authors            | Gender | Age (yrs) | Procedure | Site          | T stage | Grade | Stage       |
|--------------------|--------|-----------|-----------|---------------|---------|-------|-------------|
| Trincado et al.    | f      | 45        | LAGB and GBP | Pouch        | 5       | no    | T3N1M0      |
| De Roover et al.   | m      | 44        | GBP       | Excluded stomach | 3     | no    | Lymphoma – DLBCL |
| De Roover et al.   | f      |           | VBG       | Antrum        | 12     | no    | GIST - High risk No mets |
| Corsini et al.     | m      |           | GBP       | Excluded stomach | 4     | Normal | Non -resectable |
| Babor and Booth    | f      | 61        | Loop GBP  | Pouch         | 26     | no    | T3N0        |
| Harper et al.      | f      | 48        | GBP       | Excluded stomach | 1     | no    | End stage (carcinomatosis) |
| Chebib et al.      | m      | 36        | VBG       | Pouch         | 15     | no    | T2bN1M0     |
| Watkins et al.     | m      | 51        | GBP       | Excluded stomach | 16    | Normal | Grade1-2/3, r0 |
| Sun et al.         | m      | 65        | GBP       | Pouch         | 5      | no    | T?N?M1     |
| Stroh et al.       | f      | 46        | LAGB      | Pouch         | 2.5    | Normal | End stage   |
| Beihaj et al.      | m      | 40        | VBG       | Pylorus       | 10     | no    | T2bN1      |
| Orlando et al.     | f      | 40        | LAGB      | Lesser curve  | 0.5    | Normal | T1N0        |
| Courtney et al.    | f      | 36        | GBP       |               | 0.75   | no    | Lymphoma   |
| Meron Eldar        | f      | 46        | LAGB      | G-E junction  | 16     | no    | T1N1M0     |
| Meron Eldar        | m      | 41        | LAGB      | Angulus       | 18     | no    | T2-3N1M0    |
| Meron Eldar        | f      | 59        | LAGB      | Antrum        | 12     | no    | T4aN0      |

Discussion

Bariatric surgery has been shown to decrease incidence and mortality from several cancers, but whether these patients are at greater risk to develop esophago-gastric is still undetermined [8,9].

Upper GI malignancies following bariatric surgery are extremely rare, and the diagnosis of these pathologies in this patient population is challenging. Reviewing the literature, only a few cases of gastric carcinoma were discovered at an early stage. This may be contributed to the fact that symptoms of gastric cancer-including weight loss, dysphagia, reflux, early satiety epigastric pain/discomfort-may all mimic post-bariatric surgery complaints, which can delay the diagnosis and treatment of these patients. Furthermore, diagnosis may be difficult because of limited access to the excluded stomach in some of these procedures (eg GBP).

Patients after distal gastrectomy for peptic ulcer disease are at an increased risk for gastric stump cancer, usually decades after their primary surgery [29,30]. But reports thus far have not shown that gastric bypass patients share this increased cancer risk, probably because of the small size and low acid production of the gastric pouch, together with the routine use of proton pump inhibitors following surgery.

Nevertheless, several mechanisms should be kept in mind as contributing factors to the development of cancer in these patients. Patients after bariatric surgery, particularly restrictive surgeries (LAGB, SRVG, LSG) commonly suffer from chronic reflux resulting in chronic inflammation of the distal esophagus, which may lead to a pre-malignant condition such as Barrett's esophagus.

Frequent exposure of the esophagus to bile acids in patients undergoing single anastomosis gastric bypass is another potential mechanism which may increase cancer incidence, and has been a critical part in the debate regarding this specific bariatric procedure.

Long standing irritation of a foreign body like the adjustable gastric band (in LAGB) or the silastic ring (in SRVG) can also contribute to chronic inflammation, metaplasia and dysplasia.

The 3 new cases presented in this report both occurred nearly 2 decades after a foreign body (Gastric band) was inserted, raising the thought that chronic irritation and inflammation could have played a role in the development of malignancy, yet 9 of the other cases reviewed (43%) occurred within 5 years of the bariatric procedure, making it more difficult to “blame” the operation.

This case series has several limitations. The retrospective nature of this study is often subject to biases in data collection that could limit the validity of our results. Presenting a case series is another limitation as we have no control group for comparison to validate our observations.

Finally, due to the scarce literature on the topic – the literature review was non-systematic.
Conclusion

As longer follow up is available for bariatric surgery patients, more reports of these tumors are expected, but the numbers are probably not significant enough to conclude at this time that bariatric surgery should be considered as a risk factor for upper GI malignancy.

Nonetheless, it is crucial for the following physician to keep a high index of suspicion for these pathologies and be liberal in referring symptomatic patients for endoscopy and CT scans when necessary.

Further investigation should be performed to better define the long term risk of bariatric surgeries for cancer, and if there is an increased risk – to identify the contributing mechanisms.

Conflict of Interest Disclosure

The authors declare that they have no conflict of interest.

References

1. World health organization (2016) Obesity and overweight fact sheet.
2. Ribaric G, Buchwald JN, McGlennon TW (2014) Diabetes and weight in comparative studies of bariatric surgery vs. conventional medical therapy: A systematic review and meta-analysis. Obes Surg. 24: 437-455.
3. Angrisani L, Santonicola A, Iovino P, Formisano G, Buchwald H, et al. (2015) Bariatric Surgery Worldwide 2013. Obes Surg 25: 1822-1832.
4. Smith MD, Patterson E, Waheed AS, Belle SH, Berk PD, et al. (2011) Thirty-day mortality after bariatric surgery: Independently adjudicated causes of death in the longitudinal assessment of bariatric surgery. Obes Surg 21: 1687-1692.
5. Alvarenga ES, Lo Menzo E, Szomstein S, Rosenthal RJ (2016) Safety and efficacy of 1020 consecutive laparoscopic sleeve gastrectomies performed as a primary treatment modality for morbid obesity. A single-center experience from the metabolic and bariatric surgical accreditation quality and improvement program. Surg Endosc. 30: 2673-2678.
6. Osland E, Yunus RM, Khan S, Alodat T, Memon B, et al. (2016) Postoperative early major and minor complications in laparoscopic vertical sheet gastrectomy (lsg) versus laparoscopic roux-en-y gastric bypass (lbsg) procedures: A meta-analysis and systematic review. Obes Surg. 26: 2273-2284.
7. Calle EE, Thun MJ (2004) Obesity and cancer. Oncogene 23: 6365-6378.
8. Zhou X, Yu J, Li L, Gloy VL, Nordmann A, et al. (2016) Effects of bariatric surgery on mortality, cardiovascular events, and cancer outcomes in obese patients: Systematic review and meta-analysis. Obes Surg 26: 2590-2601.
9. Adams TD, Gress RE, Smith SC, Halverson RC, Simper SC, et al. (2007) Long-term mortality after gastric bypass surgery. N Engl J Med 357: 753-761.
10. Orlando G, Pilone V, Vitiello A, Gervasi R, Leroze MA, et al. (2014) Gastric cancer following bariatric surgery: A review. Surg Laparosc Endosc Percutan Tech. 24: 400-405.
11. Sinning C, Schaefer N, Standop J, Hinser A, Wolff M (2007) Gastric stump carcinoma: epidemiology and recent concepts in pathogenesis and treatment. Eur J Surg Oncol 33: 133-139.
12. Zirak C, Lemaître J, Lebrun E, Journé S, Carlier P (2002) Adenocarcinoma of the pouch after silastic ring gastroplasty. Obes Surg 12: 693-694.
13. Papakonstantinou A, Moustafellos P, Terzis I, Stratopoulos C, Hadiyannakis EL, et al. (2002) Gastric cancer occurring after vertical banded gastroplasty. Obes Surg 12: 118-120.
14. Khitin L, Roses RE, Birkett DH (2003) Cancer in the gastric remnant after gastric bypass: a case report. Curr Surg 60: 521-523.
15. Jain PK, Ray B, Royston CM (2003) Carcinoma in the gastric pouch years after vertical banded gastroplasty. Obes Surg 13: 136-137.
16. Hackert T, Dietz M, Tjaden C, Sieg A, Buchler MW, et al. (2004) Band erosion with gastric cancer. Obes Surg 14: 559-561.
17. Escalon A, Guzmán S, Ibáñez L, Meneses L, Huete A, et al. (2005) Gastric cancer after Roux-en-Y gastric bypass. Obes Surg 15: 423-427.
18. Trincado MT, del Olmo JC, Garcia Castaño J, Cuesta C, Blanco JI, et al. (2005) Gastric pouch carcinoma after gastric bypass for morbid obesity. Obes Surg 15: 1215-1217.
19. de Roover A, Detry O, de Leval L, Coimbra C, Desaive C, et al. (2006) Report of two cases of gastric cancer after bariatric surgery: lymphoma of the bypassed stomach after Roux-en-Y gastric bypass and gastrointestinalsemel tumor (GIST) after vertical banded gastroplasty. Obes Surg 16: 928-931.
20. Corsini DA, Simonetti CA, Moreira G, Lima SE Jr, Garrido AB (2006) Cancer in the excluded stomach 4 years after gastric bypass. Obes Surg 16: 932-934.
21. Babor R, Booth M (2006) Adenocarcinoma of the gastric pouch 26 years after loop gastric bypass. Obes Surg 16: 935-938.
22. Harper JL, Biech D, Tichansky DS, Madan AK (2007) Cancer in the bypassed stomach presenting early after gastric bypass. Obes Surg 17: 1268-1271.
23. Chebib I, Beck PL, Church NG, Medlicott SA (2007) Gastric pouch adenocarcinoma and tubular adenoma of the pylorus: a field effect of dysplasia following bariatric surgery. Obes Surg 17: 843-846.
24. Watkins BJ, Blackmun S, Kuehner ME (2007) Gastric adenocarcinoma after Roux-en-Y gastric bypass: access and evaluation of excluded stomach. Surg Obes Relat Dis 3: 644-647.
25. Sun C, Jackson CS, Reeves M, Rendon S (2008) Metastatic adenocarcinoma of the gastric pouch 5 years after Roux-en-Y gastric bypass. Obes Surg 18: 345-348.
26. Stroh C, Hohmann U, Urban H, Manger T (2008) Gastric cancer after laparoscopic adjustable gastric banding. Obes Surg 18: 1200-1202.
27. Belhaj A, Memmo L, Mehdi A, Mboit F, Closset J (2010) Gastric adenocarcinoma following "silastic vertical ring gastroplasty": Case report. Rev Med Brux 31: 459-462.
28. Courtney MJ, Chattopadhyay D, Rao M, Light D, Gopinath B (2014) Diffuse large B-cell lymphoma (DLBCL) in the bypassed stomach after obesity surgery. Clin Obes 4: 116-120.
29. Safatle-Ribeiro AV, Ribeiro U Jr, Reynolds JC (1998) Gastric stump cancer: what is the risk? Dig Dis 16: 159-168.
30. MacDonald WC, Owen DA (2001) Gastric carcinoma after surgical treatment of peptic ulcer: An analysis of morphologic features and a comparison with cancer in the nonoperated stomach. Cancer 91: 1732-1738.