Adenocarcinoma of the upper gastrointestinal tract after bariatric surgery. A review of the literature.

Vladimirov M *, Hesse U, Stein H.J.
Department of General, Visceral and Thoracic Surgery, Paracelsus Medical University Nürnberg, Nuremberg Hospital, Germany

*Corresponding author: Vladimirov M, Department of General, Visceral and Thoracic Surgery, Paracelsus Medical University Nürnberg, Nuremberg Hospital, Germany. E-mail: Vladimirov@uni-tuebingen.de

Received Date: January 24, 2020; Accepted Date: February 03, 2020; Published Date: February 14, 2020.

Citation: Vladimirov M, Hesse U, Stein H.J. (2020) Adenocarcinoma of the upper gastrointestinal tract after bariatric surgery. A review of the literature. Journal of Surgical Case Reports and Images, 3(2): Doi: 10.31579/2690-1897/018

Copyright: © 2020. Vladimirov M. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract
Obesity is associated with an increased risk of cancer development in the upper gastrointestinal tract.

One own case of a female patient with gastric carcinoma after sleeve gastrectomy was the reason to review the literature about the frequency and the genesis of gastric carcinoma after bariatric surgery. Additional to our case 3 further patients with gastric carcinoma after sleeve gastrectomy and 33 patients with carcinomas of the upper gastrointestinal tract after other bariatric operations are reported in the literature. Due to a lack of registry studies the incidence of gastric cancer after bariatric surgery cannot be calculated. Early diagnostics should be performed in symptomatic patients and in patients with unspecific symptoms after bariatric surgery to avoid a delay of the diagnosis of potential carcinomas of the upper gastrointestinal tract.

Keywords: bariatric surgery; gastrointestinal

Introduction
The frequency of weight-loss surgeries is increasing. After bariatric procedures postoperative complications and a variety of symptoms may occur. Malignancies after bariatric surgery are rare, but accurate quantification is not available. The treatment of a female patient with gastric cancer after sleeve gastrectomy was the reason to review the literature about the incidence and etiology of gastric cancer following bariatric surgery.

Material and methods

| Author, year of publication | Author, year of publication | Author, year of publication |
|-----------------------------|-----------------------------|-----------------------------|
| Scheepers, A.F. 2011 (1)    | Angrisani, L. 2013 (2)      | Masrur, M. 2016 (3)         |
| Vladimirov, M 2016         |

| Patient (age, gender)       |
|-----------------------------|
| 57 years, female            |

| Cancer localisation         |
|-----------------------------|
| lower esophageal adenocarcinoma uT2, uN1, cMx |

| Histology                   |
|-----------------------------|
| body and antrum of stomach, signet-ring cell adenocarcinoma pT4, pN1, cM0 |

| Time between bariatric surgery |
|-------------------------------|
| 4 months                      |

The literature search was carried out in PubMed for articles published to July 31, 2016. Key words used were gastric cancer, gastric adenocarcinoma, esophageal cancer, esophageal carcinoma, bariatric surgery, gastric bypass, vertical banded gastroplasty, gastric band, sleeve gastrectomy.

Abstracts were reviewed, relevant articles were obtained and their reference lists were searched to identify further relevant studies.

Results
In addition to one own case 3 further patients with gastric carcinoma after sleeve gastrectomy are reported in the literature (Table 1) (1, 2, 3). 

Anthropometric data of the patients per operation:

| Patient | Age (years) | Gender | Cancer localisation | Histology | Time between bariatric surgery |
|---------|-------------|--------|---------------------|-----------|-------------------------------|
| 1       | 57          | Female | lower esophageal adenocarcinoma | body and antrum of stomach, signet-ring cell adenocarcinoma | 4 months |
| 2       | 51          | Female | lower esophageal adenocarcinoma | body and antrum of stomach, signet-ring cell adenocarcinoma | 24 months |
| 3       | 44          | Female | lower esophageal adenocarcinoma | body and antrum of stomach, signet-ring cell adenocarcinoma | 9 months |
| 4       | 47          | Female | lower esophageal adenocarcinoma | body and antrum of stomach, signet-ring cell adenocarcinoma | 75 months |
and diagnosis of cancer

Preoperative upper endoscopy no yes no yes

Table 1. Case reports of esophagogastric cancer after sleeve gastrectomy

After other bariatric operations additional 33 carcinomas of the upper gastrointestinal tract are described. The majority of the tumors, n = 19, was located in the distal esophagus, at the cardia or within the proximal gastric pouch (Table 2) (4, 5, 6, 7, 8, 9, 10, 11).

Table 2. Case reports of adenocarcinomas of the upper gastrointestinal tract after bariatric operations, n = 33 (4, 5, 6, 7, 8, 9, 10, 11)

In the 4 patients with gastric adenocarcinoma after sleeve gastrectomy tumors were diagnosed 4, 9, 24 and 75 months after the bariatric procedures had been carried out (Table 1). Esophagogastric cancers after the other bariatric operations (n = 33) listed in Table 2 were diagnosed between 2 months and 29 years postoperatively, at a mean of 8.6 years.

Discussion

Cohort studies have shown a positive association between obesity and the incidence of malignancies of the esophagus, the gallbladder, the breast, the ovaries, the pancreas, the prostate, the colon, the endometrium, the kidney and leukemia (12). Obesity is involved in 16% (12) of all types of cancer. Obesity and gastric cancer are strongly related, particularly a BMI ≥25 kg/m² (odds ratio = 1.55) (13) was associated with an increased risk of gastric cancer of the cardia. One proposed pathway is that increased body weight may increase gastroesophageal reflux which has been associated with adenocarcinoma in Barrett’s esophagus. Obesity in adolescence at an age of 18 with a BMI ≥25.3 kg/m² was associated with a higher risk of gastric cancer (14). Other mechanisms (Table 3) are discussed such as alterations in insulin resistance, increased insulin and IGF levels (insulin-like growth factor), the levels of adiponectin and leptin (13, 14, 15, 16, 17, 18).

Table 3 Gastric cancer etiology. Pathophysiology and risk factors (13, 14, 15, 16, 17, 18)

BMI = body mass index; GERD = gastroesophageal reflux disease; IGF = insulin-like growth factor
Bariatric surgery is an effective treatment of obesity and related with a significant reduction in incidence of cancer (5), but carcinogenesis cannot be prevented completely. In a retrospective review 3 of 2875 patients (0.1 %) were reported who had undergone bariatric operations and developed adenocarcinoma of the distal esophagus (19). Due to a lack of registry studies the incidence of gastric cancer after bariatric surgery cannot be calculated.

Pathophysiologic explanations for esophagogastric cancer after restrictive bariatric procedures are chronic gastroesophageal reflux with development of Barrett’s esophagus (20), stasis of food and gastric acid in the gastric pouch causing mucosal irritation (9), increased exposure of the vulnerable lower esophagus to carcinogens unavoidably placed closer to the esophagus within a gastric pouch (11), and local irritation caused by implanted gastric bands (10).

After Roux-en-Y gastric bypass cancer may develop within the gastric pouch as well as in the excluded stomach. The exclusion of the bypassed part of the stomach eliminates its contact with exogenous carcinogens and may be cancer protective. In an experimental rat model Roux-en-Y gastric bypass reduced the risk of dietaryinduced gastric cancer (21). On the other hand bile reflux into the excluded stomach is proven, which is discussed to be carcinogenic (22, 23). Also as a potential carcinogen, Helicobacter pylori, even if eradicated before restrictive bariatric surgery, may persist in the bypassed part of the stomach (23).

In the here reported 37 cases of upper gastrointestinal cancers the malignancies were diagnosed at a mean of 95 months (7.9 years) after bariatric surgery, ranging from 2 months to 29 years. In patients not undergoing preoperative endoscopy, time intervals between bariatric surgery and cancer diagnosis were shorter than in patients with preoperative endoscopy. In some patients with reported intervals less than 24 months after surgery it can be speculated, whether the tumors had existed at the time of the bariatric procedures. In these cases routine preoperative endoscopy might have been able to detect the malignancies. Regardless of the possible link between bariatric procedures and subsequent cancer development, we recommend early esophagogastrroduodenoscopy in symptomatic patients and in patients with unspecific symptoms after bariatric surgery to avoid a delay in the diagnosis of potential cancer of the upper gastrointestinal tract.

References

1. Scheepers AF, Schoon EJ, Nienhuijs SW. (2011). Esophageal carcinoma after sleeve gastrectomy. Surg Obes Relat Dis, 7:e11-e12.
2. Angrisani L, Santo Nicola A, Iovino P. (2014). Gastric cancer: a novo diagnosis after laparoscopic sleeve gastrectomy. Surg Obes Relat Dis, 10:186-187.
3. Masrur M, Elli E, Gonzalez-Ciccarelli LF, Giulianotti PC. (2016). De novo gastric adenocarcinoma 1 year after sleeve gastrectomy in a transplant patient. Int J Surg Case Rep, 20:10-13.
4. Scozzari G, Trapani R, Toppino M, Morino M. (2013). Esophagogastric cancer after bariatric surgery: systematic review of the literature. Surg Obes Relat Dis, 9:133-142.
5. Orlando G, V Pitone, Vitiello A, Gervasi R, Leroese MA, Silecchia G, Puzziello A. (2014). Gastric Cancer Following Bariatric Surgery: A Review. Surg Laparosc Endosc Percutan Tech, 24(5):400-405.
6. Menéndez P, Villarejo P, Padilla D. (2013). Krukenberg tumor after gastric bypass for morbid obesity. Bariatric surgery and gastric cancer. Rev Esp Enferm Dig, 105(S):296-298.
7. Timoco A, Gottardi LF, Boechat ED. (2015). Gastric Cancer in the Excluded Stomach 10 Years after Gastric Bypass. Case Rep Surg, 2015:468293.
8. Wu CC, Lee WJ, Ser KH, Chen JC, Kuan WS. (2013). Gastric cancer after mini-gastric bypass surgery: a case report and literature review. Asian J Surg Endosc, 6(4):303-306.
9. Jain PK, Ray B, Royston CM. (2003). Carcinoma in the gastric pouch years after vertical handed gastroplasty. Obes Surg, 13(1):136-137.
10. Hackert T, Dietz M, Tjaden C, Sieg A, Büchler MW, Schmidt J. (2004). Band erosion with gastric cancer. Obes Surg, 14(4):559-561.
11. Allen JW, Leeman MF, Richardson JD. (2004). Esophageal Carcinoma Following Bariatric Procedures. JSLS, 8(4):372-375.
12. Deutsche Adipositas Gesellschaft (DAG). Interdisziplinäre Leitlinie der Qualität S3 zur “Prävention und Therapie der Adipositaten”, 2014.
13. Yang P, Zhou Y, Chen B, Wan HW, Jia GQ, Bai HL, Wu XT. (2009). Overweight, obesity and gastric cancer risk: Results from a meta-analysis of cohort studies. Eur J Cancer, 45:2867-2873.
14. Song M, Choi JY, Yang J, Sung H, Lee Y. (2015). Obesity at adolescence and gastric cancer risk. Cancer Causes Control, 26:247-256.
15. Menéndez P, Padilla D, Villarejo P, Menéndez JM, Lora D. (2012). Does bariatric surgery decrease the gastric cancer risk? Hepatogastroenterology, 59(114):409-412.
16. Raghavendra RS, Kini D. Benign, (2012).Premalignant, and Malignant Lesions Encountered in Bariatric Surgery. JSLS, 16:360-372.
17. Rebecchi F, Allaix ME, Giaccone C, Uglieno E, Scozzari G, Morino M. (2014). Gastroesophageal Reflux Disease and Laparoscopic Sleeve Gastrectomy: A Physiopathologic Evaluation. Ann Surg, 260(5):909-915.
18. Turati F, Tramacere I, La Vecchia C, Negri E. (2013). A meta-analysis of body mass index and esophageal and gastric cardia adenocarcinoma. Ann Oncol. 24(3):609-617.
19. Melstrom LG, Bentrem DJ, Salvino MJ, Blum MG, Talamonti MS, Printen JK. (2008). Adenocarcinoma of the gastroesophageal junction after bariatric surgery. Am J Surg, 196(1):135-138.
20. Näslund E, Stockeld D, Granström L, Backman L. (1996). Six Cases of Barrett’s Esophagus after Gastric Restrictive Surgery for Massive Obesity: An Extended Case Report. Obes Surg, 6(2):155-158.
21. Inoue H, Rubino F, Shimada Y, Lindner V, Inoue M, Riegel P, Marescaux J. (2007). Risk of gastric cancer after Roux-en-Y gastric bypass. Arch Surg, 142(10):947-953.
22. Sundbom M, Heddenström H, Gustavsson S. (2002). Duodenogastric bile reflux after gastric bypass: a cholescintigraphic study. Dig Dis Sci, 47(8):1891-1896.
23. Kuga R, Safatie-Ribeiro AV, Faintuch J, Ishida RK, Furuya CK Jr. (2007). Endoscopic findings in the excluded stomach after Roux-en-Y gastric bypass surgery. Arch Surg, 142(10):942-946.