



Case report

Esophagectomy for Barrett's adenocarcinoma after multiple bariatric surgeries: A case report

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ABSTRACT

Introduction: Bariatric surgery diminishes the incidence of many kinds of neoplasms, but gastro-esophageal cancers may occur after bariatric procedures.

Most esophageal neoplasms arise on Barrett's esophagus, which may be worsened by bariatric surgery, especially restrictive procedures. Endoscopic resections may cure cancer in its early stages, but surgery may be required in more advanced cases.

Presentation of case: A 62-year-old patient with history of adjustable gastric banding, sleeve gastrectomy then Roux-en-Y gastric bypass presented with an early Barrett's adenocarcinoma. Endoscopic treatment was first applied but the patient required surgery due to positive margins on the resected specimen.

As the early tumor was located in the esophagus' lower third, a limited resection with eso-jejunal anastomosis was planned. However, as the previous bariatric did not allow a proper reconstruction, a total esophagectomy with colonic interposition had to be performed.

Discussion: Eso-gastric malignancies remain rare after weight loss procedures, but more cases will arise due to the increasing incidence of bariatric surgery. Esophageal resection and reconstruction becomes increasingly challenging along with the number of bariatric procedures performed on the same patient. Endoscopic screening is of paramount importance before any obesity surgery or to assess any new onset of symptoms after a bariatric procedure, as endoscopic resections may cure cancer in its early stages.

Conclusion: Endoscopic screening and treatment remains of paramount importance, especially after multiple bariatric procedures as surgery and reconstruction gets increasingly challenging. Whenever surgery is required, a proper planning and individual approach is compulsory, as well as a back-up plan.

1. Introduction

It has been proved that obesity is a major risk factor to multiple kinds of neoplasms [1–9]. It has also been shown that bariatric surgery reduces cancer incidence by multiple aspects such as diminishing the body mass index [2,4,6,8,9]. Nevertheless, there are cases of neoplasms developed after a bariatric procedure either due to the natural history of the cancer or to anatomical and physiological changes due to the bariatric surgery itself [1,6,10–12].

Most esophageal adenocarcinomas are due to gastroesophageal reflux disease and Barrett's esophagus (BE) [1–4,8,9]. By worsening a gastroesophageal reflux, restrictive procedures such as laparoscopic

adjustable gastric banding (LAGB) or sleeve gastrectomy (SG) can create or exacerbate a BE [2,7,8,10], which can evolve more rapidly to dysplasia leading to an esophageal adenocarcinoma (ADK) [8,10]. Even though the Roux-en-Y gastric bypass (RYGB) is considered as the best anti-reflux procedure and may sometimes cure a BE [1,4,7,8,10–12], there is still a risk to develop a high grade dysplasia (HGD) or an adenocarcinoma [11,12].

Endoscopic procedures such as endoscopic mucosal resection (EMR) and endoscopic submucosal dissection (ESD) are the treatment of choice for early stages of ADK [2,9,11–14]. But surgery may become compulsory in case of positive margins on the resection specimen without possibility of further endoscopic resection [7,13,14], in case of

Abbreviations: ADK, adenocarcinoma; BE, Barrett's esophagus; BMI, body mass index; EMR, endoscopic mucosal resection; ESD, endoscopic submucosal dissection; H, height; HGD, high grade dysplasia; LAGB, adjustable gastric banding; RY, Roux-en-Y; RYGB, Roux-en-Y gastric bypass; SG, sleeve gastrectomy; W, weight.

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submucosal infiltration by the tumor (T1b) due to the higher risk of lymph node involvement [7,13–15], in case of vascular or lymphatic emboli [7,13,14], in more aggressive tumors [13,14] or advanced cases.

This case-report will focus on a patient that developed an esophageal ADK on a BE in the course of multiple bariatric surgeries. The pre-operative assessments and the esophagectomy were carried out in an academic setting. To our knowledge, this is the first case report of esophagectomy performed after three bariatric procedures.

This case has been reported in line with the SCARE 2020 criteria [16].

2. Presentation of case

A 62 year old female patient, smoker, with no history of drug use nor family history of cancer, but history of depression under medication, who benefited thirteen years ago from a LAGB (body mass index (BMI) of 72; weight (W): 160 kg, height (H): 149 cm)). Four years later a SG was achieved (BMI 50 – W: 111 kg) and two years later a RYGB (BMI 42 - W: 94 kg). All those surgeries were performed in another hospital, and no BE was known at that time. She presented seven years later a new onset of symptoms with dysphagia and epigastric pain resistant to high doses of proton pump inhibitors, along with iron deficiency without anemia. She also presented chronic reflux and diarrhea and a current BMI of 35 (W: 77 kg, H: 149 cm).

Endoscopic investigations were therefore realized, revealing a C2M3 Prague Classification BE metaplasia with at least HGD on the lower third of the esophagus. Complementary endoscopic procedure with EMR and ESD were made. Histological findings confirmed BE metaplasia with HGD and well differentiated ADK, with positive lateral and deep margins. Resection was classified at least pT1a m3 R1. As all the margins were positive and another endoscopic resection was not deemed possible by the gastroenterologist, a surgical resection was proposed in a multidisciplinary team in oncology meeting. The extension assessment by thoraco-abdominal computed tomography was negative and the patient was considered fit for surgery.

Due to the localization and the early stage of the ADK (Fig. 1), a resection of the lower esophagus with the eso-gastric junction and the gastric pouch was considered. The planned reconstruction was to use the Roux-en-Y (RY) alimentary limb to either realize an eso-jejunal anastomosis (Fig. 2) or even a double tract reconstruction (Fig. 3) as it may diminish the risks of postoperative malnutrition [17]. A Merendino procedure was also considered, and a colonic preparation was performed the day before surgery in case colonic interposition was necessary.

Surgery was performed by an Upper GI tract specialist, accustomed to esophagectomies. We started laparoscopically. Abdominal exploration revealed multiple adhesions at the supramesocolic space and a classical RYGB with a 150 cm alimentary limb and a 60 cm biliopancreatic limb. Adhesiolysis and dissection of the different components proved to be difficult, especially on the sleeved remnant stomach which needed a partial resection, leaving only 2 cm of remnant stomach above the pylorus. A double tract reconstruction or a Merendino procedure could therefore not be performed.

Once the esophagus and the gastro-jejunal junction were released, we realized an intraoperative endoscopy to assert the upper limit of the BE and ensure free margins on the esophagus. We performed en bloc resection of the lower esophagus, gastric pouch and gastro-jejunal anastomosis, with jejunal section a few centimeters below the gastric pouch. A classical lymph node dissection was performed.

Due to shortness and adiposity of the small bowel mesentery (SBM), an eso-jejunal anastomosis on the RY alimentary limb could not be performed as it led to lacerations in both the esophageal stump and the alimentary limb. Same result was obtained after further dissection of the root of the SBM and several more attempts. Conversion to laparotomy was required to maximize the dissection of the SBM's root and lower the tension as much as possible, but an eso-jejunal anastomosis was still not



Fig. 1. Pre operative anatomy:

Localization of the lesion on lower third of the esophagus. Anatomy explained by history of sleeve gastrectomy and Roux-en-Y gastric bypass.

feasible. We therefore made a total esophagectomy with blunt dissection of the thoracic esophagus and a colonic interposition between the cervical esophagus and the RY alimentary limb to restore digestive continuity (Figs. 4 and 5).

It was a 14 hour surgery, well tolerated by the patient on the hemodynamic, infectious and renal levels. The patient was transferred to the intensive care unit for a first 3-day stay before returning to the digestive surgery unit.

The post operative period was marked by an acute pneumonia which required another 9-day stay in the intensive care unit, and an anastomotic eso-colic leakage, both treated medically. The patient was discharged on postoperative day 35. Final histological findings showed no residual tumor: final stage pT1m3N0M0. There were no sign of recurrence at the last follow-up 18 months after the procedure. She is currently presenting alimentary disorders with overeating as she no longer feels satiety and is regaining weight, which greatly bothers her.

3. Discussion

There have been 6.4 million estimated bariatric procedures performed worldwide between 1998 and 2018, with a total estimated of 3.162 esophageal cancer [9]. Even though esophageal malignancies remain rare after a weight loss procedure [1,4,6,9], more post-bariatric neoplasms will occur due to the higher incidence of bariatric surgery itself [4,9]. Screening of esophageal ADK gets more complicated after a bariatric surgery as symptoms can be attributed to usual secondary effects of a bariatric procedure such as weight loss, dysphagia, nausea and vomiting, anemia, ... [1–4,7] leading to delays in diagnosis and the development of more advanced tumors. It is therefore of paramount

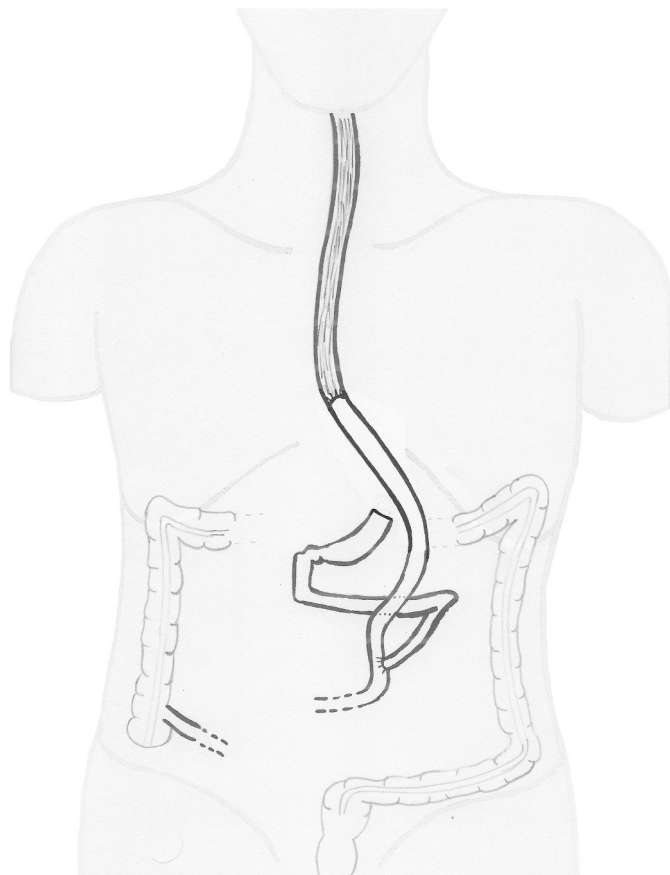


Fig. 2. Planned reconstruction: Eso-jejunal anastomosis on the Roux-en-Y alimentary limb.

Initial reconstruction plan is to use the Roux-en-Y alimentary limb for an eso-jejunal anastomosis, after en bloc resection of the cancer.

importance to assess any new onset of symptoms with an endoscopic examination [1–4,7], which can be more complicated due to the anatomical changes [1,2,9]. Endoscopic assessment should be performed prior to any bariatric surgery to exclude any precancerous lesions or *Helicobacter pylori* infection [1,3,4,7,8].

If HGD is found on a BE, endoscopic resection should be applied to all visible abnormalities regardless the degree of dysplasia (except for excavated Paris 0-III lesions that contraindicates endoscopic resection and requires immediate surgery [13,14]) in order to obtain a proper histopathological staging [13,14]. Such resections may be sufficient to cure early stages of malignancy up to T1a infiltration [2,9,13–15], and even T1b with submucosal infiltration below 500 μ m [13,14]. In case of positive margins [13,14], vascular or lymphatic emboli [13–15], invasive or poorly differentiated ADK on the resection specimen [13,14], surgery becomes compulsory.

Surgery itself is much more challenging after bariatric surgery due to anatomic modifications and adhesions [1,2,9,18], and gets even more complicated after multiple bariatric procedures.

There are many case reports of esophagectomy after LAGB [5,9], SG [4,9] or RYGB [5,9,19], but to our knowledge none performed after those three bariatric procedures.

An individual approach is required for each patient as options to ensure digestive continuity will get more and more limited [9]. It is of paramount importance to obtain proper preoperative imaging to ensure good knowledge of the patient's anatomy and plan the best surgical resection and reconstruction possible [9]. Ideally operative reports of previous surgeries should be retrieved, given the patient's poor knowledge of its previous surgeries. A back-up plan should be figured out

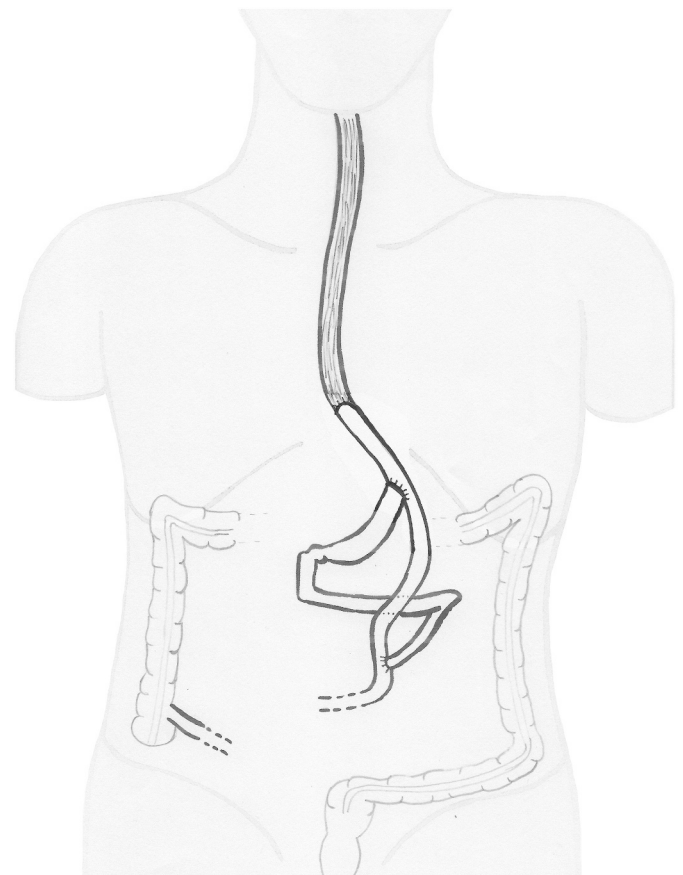


Fig. 3. Planned reconstruction: Double-tract reconstruction.

Eso-jejunal anastomosis with supplementary gastro-jejunal anastomosis to allow food passage through the remnant stomach, therefore diminishing risks of postoperative malnutrition.

preoperatively in case of intraoperative difficulties.

4. Conclusion

Eso-gastric malignancies remain rare after weight loss procedures [1,4,6,9], but more and more post-bariatric neoplasms will occur due to the increasing incidence of bariatric surgery [4,9].

Endoscopic resection should be applied whenever possible as surgical resection and reconstruction gets increasingly challenging with the number of bariatric procedures performed on the same patient, with increasing morbidity and mortality rates [1,2,9,18]. It is therefore of paramount importance to screen any precancerous lesion prior to any bariatric surgery [1,3,4,7,8] and to assess any new onset of symptoms occurring after a weight loss procedure [1–4,6–8,11,12] with endoscopic evaluation.

Whenever surgery is required, preoperative imaging should be performed and previous operative reports should be retrieved to ensure a better understanding of the patient's anatomy. This will allow better planning of upcoming surgery, as reconstructive options get increasingly limited after each bariatric procedure [1,2,9,18]. An individual approach is compulsory [9], and a back-up plan always welcomed in case of intraoperative difficulties.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this

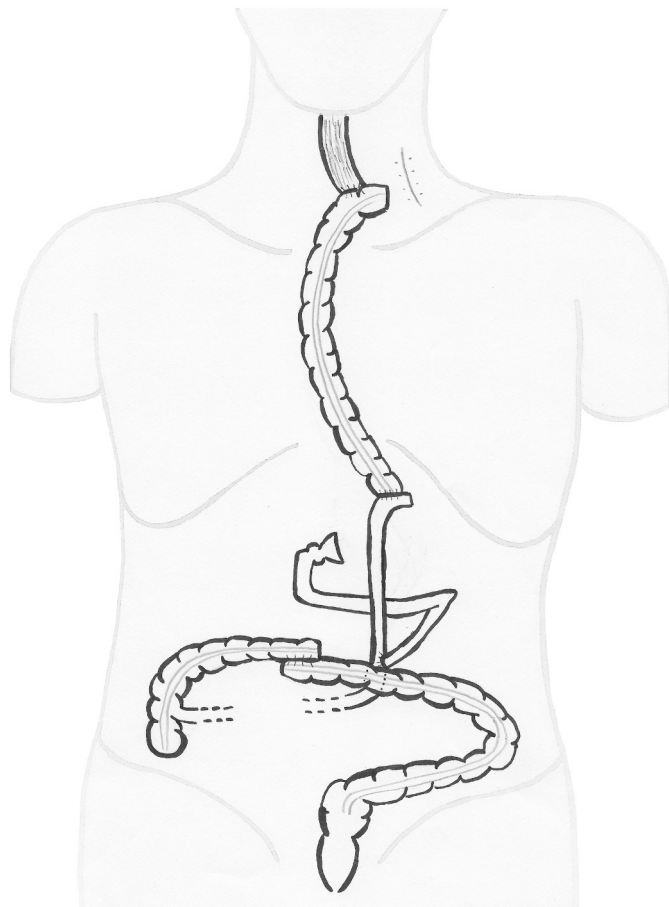


Fig. 4. Post operative anatomy. Colonic interposition of the transverse colon between the cervical esophagus and the Roux-en-Y alimentary limb.

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- Arnaud Steygers: Writing – original draft; Writing – review and editing.



Fig. 5. Barium X-ray: Postoperative barium swallow, demonstrating the colonic interposition.

- Véronique De Moor: Supervision of writing; Patient's recruitment, surgery and follow-up.

Conflicts of interest

N/A.

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References

- [1] G. Scozzari, R. Trapani, M. Toppino, M. Morino, Esophagogastric cancer after bariatric surgery: systematic review of the literature, *Surg. Obes. Relat. Dis.* 9 (2013) 133–142, <https://doi.org/10.1016/j.soard.2012.10.002>.
- [2] P.R. Burton, G.J. Ooi, C. Laurie, K. Shaw, P.E. O'Brien, A. Smith, P.D. Nottle, W. A. Brown, Diagnosis and Management of Oesophageal Cancer in bariatric surgical patients, *J. Gastrointest. Surg.* 20 (2016) 1683–1691, <https://doi.org/10.1007/s11605-016-3221-0>.
- [3] J. Jie Min Lam, F. Di Maggio, W. Lynn, D. Khoo, Oesophageal adenocarcinoma following gastric band surgery in two patients, *J. Surg. Case Rep.* 10 (2018) 1–4, <https://doi.org/10.1093/jscr/rjy293>.
- [4] R. Ebrahimi, M. Kermansaravi, A. Khalaj, F. Eghbali, A. Mousavi, A. Pazouki, Gastro-intestinal tract cancers following bariatric surgery: a narrative review, *Obes. Surg.* 29 (2019) 2678–2694, <https://doi.org/10.1007/s11695-019-04007-y>.
- [5] M. Latzko, B. Ahmed, Z. Awad, Minimally invasive Ivor-Lewis esophagectomy for esophageal cancer after gastric bypass, *Ann. Surg. Oncol.* 28 (2021) 203, <https://doi.org/10.1245/s10434-020-08646-9>.
- [6] M. Musella, G. Berardi, A. Bocchetti, R. Green, V. Cantoni, N. Velotti, K. Di Lauro, D. Manzillo, M. Vitiello, M. Milone, G.D. De Palma, Esophagogastric neoplasms following bariatric surgery: an updated systematic review, *Obes. Surg.* 29 (2019) 2660–2669, <https://doi.org/10.1007/s11695-019-03951-z>.
- [7] A. De Roover, O. Detry, C. Desai, S. Maweja, C. Coimbra, P. Honoré, M. Meuris, Risk of upper gastrointestinal cancer after bariatric operations, *Obes. Surg.* 16 (12) (2006) 1656–1661, <https://doi.org/10.1381/096089206779319419>.
- [8] L. Castagneto-Gissey, J. Casella-Mariolo, G. Casella, G. Mingrone, Obesity surgery and cancer: what are the unanswered questions? *Front. Endocrinol.* 11 (2020) 213, <https://doi.org/10.3389/fendo.2020.00213>.
- [9] V.D. Plat, A. Kasteleijn, J.M. Greve, M.D. Luyer, S.S. Gisbertz, A. Demirkan, F. Daams, Esophageal cancer after bariatric surgery: increasing prevalence and

- treatment strategies, *Obes. Surg.* 31 (2021) 4954–4962, <https://doi.org/10.1007/s11695-021-05679-1>.
- [10] V. Jaruvongvanich, R. Matar, K. Ravi, M.H. Murad, K. Vantanasiri, N. Wongjarupong, P. Ungprasert, E.J. Vargas, D.B. Maselli, L.J. Prokop, B.K. Abu Dayyeh, Esophageal pathophysiologic changes and adenocarcinoma after bariatric surgery: a systematic review and meta-analysis, *Clin. Transl. Gastroenterol.* 11 (2020), e00225, <https://doi.org/10.14309/ctg.000000000000225>.
- [11] O. Alaber, E. Mansoor, K. Mejia Perez, J. Dumot, A. Bhatt, A. Chak, High grade dysplasia or esophageal adenocarcinoma in patients with a history of roux-en-Y gastric bypass surgery: a case series, *Endoscopy* 53 (2) (2021) 147–151, <https://doi.org/10.1055/a-1203-5832>.
- [12] V. Jaruvongvanich, K. Osman, R. Matar, S. Baroud, Y. Hanada, F.N.U. Chesta, D. B. Maselli, T. Mahmoud, K.K. Wang, B.K. Abu Dayyeh, Impact of bariatric surgery on surveillance and treatment outcomes of Barrett's esophagus: a stage-matched cohort study, *Surg. Obes. Relat. Dis.* 17 (8) (2021) 1457–1464, <https://doi.org/10.1016/j.soard.2021.04.018>.
- [13] B. Weusten, R. Bisschops, E. Coron, M. Dinis-Ribeiro, J.M. Dumonceau, J. M. Esteban, C. Hassan, O. Pech, A. Repici, J. Bergman, M. di Pietro, Endoscopic management of Barrett's esophagus: european Society of Gastrointestinal Endoscopy (ESGE) position statement, *Endoscopy* 49 (02) (2017) 191–198, <https://doi.org/10.1055/s-0042-122140>.
- [14] E. Coron, in: *L'œsophage de Barrett: de la surveillance au traitement endoscopique. Association Française de Formation Médicale Continue en Hépatogastro-Entérologie (FMC-HGE) POST'U 2018*, 2018, pp. 83–92.
- [15] R.D. Odze, Diagnosis and grading of dysplasia in Barrett's oesophagus, *J. Clin. Pathol.* 59 (2006) 1029–1038, <https://doi.org/10.1136/jcp.2005.035337>.
- [16] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, for the SCARE Group, The SCARE 2020 guideline: updating consensus Surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 84 (2020) 226–230.
- [17] K. Yamashita, M. Iwatsuki, Y. Koga, T. Toihata, Y. Kiyozumi, D. Kuroda, K. Eto, Y. Hiyoshi, S. Iwagami, Y. Baba, Y. Miyamoto, N. Yoshida, H. Baba, Preservation of physiological passage through the remnant stomach prevents postoperative malnutrition after proximal gastrectomy with double tract reconstruction, *Surg. Today* 49 (2019) 748–754, <https://doi.org/10.1007/s00595-019-01799-5>.
- [18] N.T. Nguyen, E. Kim, Consideration for esophagectomy in patients with prior bariatric surgery, *Obes. Surg.* 26 (2016) 727–729, <https://doi.org/10.1007/s11695-016-2099-y>.
- [19] N.T. Nguyen, C.L. Tran, D.V. Gelfand, E. Varela, K. Chang, M. Stamos, S.E. Wilson, Laparoscopic and thoracoscopic Ivor Lewis esophagectomy after roux-en-Y gastric bypass, *Ann. Thorac. Surg.* 82 (2006) 1910–1913, <https://doi.org/10.1016/j.athoracsur.2006.02.065>.