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Original Article

The impacts of antibiotic therapy in laparoscopic one anastomosis gastric bypass surgery on anastomotic leaks and wound infections

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Abstract

Background and aims: One of the therapeutic interventions after the onset of anastomotic leak is antibiotic administration, however, there is no clear evidence about the role of continued antibiotic administration after bariatric surgery in preventing wound infections and leak from the anastomosis, therefore, the purpose of this study was to examine this hypothesis.

Methods: Nighty laparoscopic one anastomosis gastric bypass (OAGB) candidates were allocated into two equal groups. Both groups were matched regarding their age, sex, and preoperative body mass index (BMI). Group one received 1500 milligrams (mg) intravenous cefazolin and 750 mg metronidazole just before the surgery. The second group received the same cocktail before the surgery and continued for 48 hours after the surgery as follows: 1500 mg intravenous cefazolin every 6 hours and 750 mg metronidazole every 8 hours. Patients were followed for 30 days for detecting any early surgical wound infection and anastomose leakage. T-test, Chi-square, and ANCOVA model were used for statistical analysis.

Results: Wound infection was observed in 4.44% and 2.22% of the first and second groups, respectively (p=0.315). One leak was occurred in the second group (p=0.981). After the adjustment was made for confounding variables (age, sex, preoperative BMI, duration of the surgery, and length of hospital stay), anastomosis leak and wound infection rates were not significantly different between groups (0.64 and 0.49, respectively).

Conclusion: It seems that antibiotic therapy after the OAGB does not play a significant role in preventing leak or wound infection, and the surgical method is more important than antibiotic therapy.

Keywords: One anastomosis gastric bypass, Bariatric, Wound infection, Anastomosis leak, Antibiotics

Introduction

The only sustainable solution with a substantial result for patients with severe obesity is surgery. Bariatric surgery is recommended for an obese patient with a BMI of at least 40, or above 35 with serious coexisting medical conditions such as diabetes (1). Bariatric surgery is associated with several early and delayed complications (2). Gastric bypass has both malabsorptive and restrictive components by the creation of a small gastric pouch based on the lesser curvature and bypassing the jejunum (3). Meta-analysis studies have shown that gastric bypass can reduce weight and complications of obesity significantly (4). Complications of gastric bypass surgery are categorized as early (<30 days) and late (>30 days). The major early complications are leak from the anastomoses, myocardial infarction, and pulmonary embolism. Overall major complications after bariatric surgery range from 0% to 1.55%. Anastomotic leak after gastric bypass was reported 1.14% (5) and 4-5% in older studies (6). Surgical site infection as a minor early complication was reported in less than 5% (7). Some intra-operative plans have been suggested in an attempt to decrease the incidence of the leak including, reinforcing the staple line, over-sewing the staple line, performing intraoperative leak tests, and placing drains near the gastrojejunal anastomosis. There is no judicious clinical evidence to suggest that any such interventions significantly decrease leak incidence after the surgery (8). Before the bariatric procedures, the first dose of most prophylactic antimicrobials is infused within 30-60 minutes before the incision (9-12). The effects of continuing antibiotics after the surgery for preventing surgical site infections or leaks are unclear. Many cases of leak can be managed conservatively by using the principles of drainage, creation of a controlled fistula with drains, antimicrobial therapy, parenteral nutrition, and some other modality (8-13). This study aims to determine whether routine antibiotic therapy after gastric bypass surgery can reduce the rate of surgical site infection and leak or not.

Methods

For this prospective case-control study, bariatric surgery candidates were selected from the minimally invasive surgery and obesity research center from 2015-2018 after receiving its ethical approval from our institutional review board. Informed written consent was obtained from all of the patients before the surgery. Considering type one error (alpha) of 0.05, type two error (beta) of 0.2, mean

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postoperative wound infection rate of 3%, and d=0.05, a total of 90 patients was calculated to be sufficient. Eligibility criteria included patients 20 to 60 years old, a body mass index 40-55 kg/m^2 without any comorbidity, and no previous surgery on the abdomen. Patients with a major medical problem such as diagnosed or under treatment diabetes mellitus, any immune deficiency condition, or consuming any immunomodulatory drugs like corticosteroids were not enrolled in this study. Both groups were matched regarding their age, sex, and preoperative BMI.

Group one received 1500 milligrams (mg) intravenous cefazolin and 750 mg metronidazole just before the surgery. The second group received the same cocktail before the surgery and continued for 48 hours after the surgery as follows: 1500 mg intravenous cefazolin every 6 hours and 750 mg metronidazole every 8 hours. Our laparoscopic OAGB technique and postoperative management were reported previously (14, 15).

Patients were follow-up regularly every day for evaluating any secretions from the wounds and signs and symptoms of peritonitis or any other complication until one month after surgery.

IBM SPSS software version 20.0 (IBM Cor. Chicago, USA) was used for statistical analysis. Categorical variables were reported as the number of patients and percentages. Quantitative variables were reported as means and standard deviations. The normal distribution of the variables was checked by the Kolmogorov-Smirnov test. Independent t-tests and Chi-square were used to compare two sets of normal-distributed quantitative and categorical variables between two groups, respectively. One ANCOVA model was used to compare the study outcomes between two groups after adjusting for the confounding variables (age, sex, preoperative BMI, duration of the surgery, and length of hospital stay). P-value (2-tailed) of < 0.05 was considered statistically significant.

Results

Of the 90 patients included in this study, 79 patients were women (87.77%), mean age was 34.6±8.04 (range, 21-57) years, and mean preoperative BMI was 46.13±3.95 kg/m^2 (range, 40.03-57.81). All data are summarized in the Table 1. The duration of the surgery was the same in both groups and both patients stayed at the hospital the same. Although we found some postoperative complications in our patients (one leak in the second group; two and one wound infections in the first and second group, respectively; and one readmission in the first group), no significant relationship was found with the Chi-square test.

After the adjustment was made for confounding variables (age, sex, preoperative BMI, duration of the surgery, and length of hospital stay) as a whole in one ANCOVA model, anastomosis leak, wound infection, and readmission rates were not significantly different between group (0.64, 0.49, and 0.87, respectively).

Discussion

Early major complications of bariatric surgery mainly include anastomotic leak, myocardial infarction, and pulmonary embolism, which could lead to death (5). Surgical site infection occurs within 30 days after the operation. The incidence of infection has decreased with the introduction of laparoscopic procedures which is affecting nearly 4% of the cases (9). The incidence of anastomosis leak and wound infection in our study was in the range of what other studies have reported (8-12). Our study shows that prolonging antibiotics after the surgery does not have any effect on the reduction of surgical site infections and leaks from the anastomosis. The most important and well-known antibiotic dose in the preventing settings is administering the initial prophylactic dose, 30-60 minutes before starting the incision to a maximum of 90-120 minutes (9). Many guidelines recommend that prophylactic antimicrobial drugs should be discontinued within 24 hours after the end of the surgery (12, 13). Other recommendations for preventing infection include the following: preoperative antiseptic shower or bath, clipping hair immediately before the operation, skin preparation with an antiseptic agent, standard hand scrub, and observe the principles of sterilization (13). Redosing of antimicrobials during surgery should occur if the procedure exceeds two half-lives of the drug (12). Using a dual ring wound protector

Table 1. Comparison of study variables between two groups of different antibiotic therapy approach in laparoscopic one anastomosis gastric bypass surgery candidates. Minimum-maximum of the numerical variable is put in brackets

Variables	First group* (n=45)	Second group† (n=45)	P
Age (years)	34.89±2.04 [22-48]	35.44±1.94 [21-47]	0.554
Female sex n, (%)	40 (88.88)	39 (86.66)	0.914
Preoperative BMI (kg/m^2)	46.27±3.76 [40.26-54.78]	46.00±4.17 [40.03-54.61]	0.652
Hospital stay (days)	3.13±0.34 [3-4]	3.07±0.25 [3-4]	0.806
Duration of the surgery (minutes)	91.58±9.58 [80-120]	90.98±8.37 [80-120]	0.723
Anastomosis Leak n, (%)	0	1 (2.22)	0.981
Wound Infection n, (%)	2 (4.44)	1 (2.22)	0.315
Readmission n, (%)	1 (2.22)	0	0.829

N: number of the patients; p: p-value; BMI: body mass index; kg/m^2: kilograms per square meter.
*Group one received 1500 milligrams (mg) of intravenous cefazolin and 750 mg of metronidazole only before the surgery.
† second group received the same cocktail as the first group before the surgery and continued for 48 hours after the surgery as follows: 1500 mg intravenous cefazolin every 6 hours and 750 mg metronidazole every 8 hours.

in the trocar site decreased wound infection (16). Some other advice to decrease the surgical site infection is to use a stapler cover, wound irrigation, wound antibiotic application, and primary wound closure (17). Our study does not show a relationship between the duration of the surgery and the surgical site infection, otherwise, many other studies demonstrated that reducing the duration of surgery is associated with a reduction in post-operative infection (9, 16-18). This difference may be due to the small sample size of our study.

The rate of the leak in our study was 0% and smaller than most studies (8, 10, 18-21). Detection of the leaks is still a challenging topic and based on radiologic data, physical exam, and surgeon clinical judgment (16). There was no gold standard method for detecting leaks (17-19). Some conditions such as patient demographics and co-morbidities like diabetes, technical considerations, and surgeon's experience, affecting the incidence of the leak (20). The majority of anastomotic leaks seem to occur in the absence of technical errors, which is why in most studies with high sample size, the leak rate is similar. The exact surgical method of how we did the stapling and created the anastomosis was discussed in the method section and was published in other articles with the same team (18-25). As our results indicated, our method is one of the meticulous and cautious techniques, which are being used in our institutions. Reinforcing is one of the proven and non-demanding ways of decreasing postoperative leaks and infections.

To state the limitations of this study, the patients of one center of excellence for bariatric surgery were included and patients were followed up shortly after the surgery. A large multicenter randomized clinical trial can solve these problems.

Conclusion

It seems that antibiotic therapy after the laparoscopic one anastomosis gastric bypass does not play a significant role in preventing leak and wound infection. Therefore, surgical techniques, scrubbing methods, and sterilization considerations in these aspects are still more important.

Ethical Considerations

Informed consent was obtained from all individual patients in the study before the surgery. All procedures performed in this study involving human participants were in accordance with the ethical standards of our institutional research committee board and were indicated as part of the ethical patient follow-up of operations done for the benefit of the patient.

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References

1. Buchwald H, Avidor Y, Braunwald E, Jensen MD, Pories W, Fahrbach K, et al. Bariatric surgery: a systematic review and meta-analysis. JAMA. 2004 Oct 13;292(14):1724-37.
2. Jakobsen GS, Småstuen MC, Sandbu R, Nordstrand N, Hofsø D, Lindberg M, et al. Association of bariatric surgery vs medical obesity treatment with long-term medical complications and obesity-related comorbidities. JAMA. 2018 Jan 16;319(3):291-301.
3. Bellorin-Marin OE, Pomp A. Gastric Bypass. In Global Bariatric Surgery, Springer, Cham. 2018:97-111.
4. Chang SH, Stoll CR, Song J, Varela JE, Eagon CJ, Colditz GA. The effectiveness and risks of bariatric surgery: an updated systematic review and meta-analysis, 2003-2012. JAMA Surg. 2014 Mar 1;149(3):275-87.
5. Chang SH, Freeman NL, Lee JA, Stoll CR, Calhoun AJ, Eagon JC, et al. Early major complications after bariatric surgery in the USA, 2003–2014: a systematic review and meta-analysis. Obes Rev. 2018 Apr;19(4):529-37.
6. Higa KD, Boone KB, Ho T, Davies OG. Laparoscopic Roux-en-Y gastric bypass for morbid obesity: technique and preliminary results of our first 400 patients. Arch Surg. 2000 Sep 1;135(9):1029-33.
7. Schauer PR, Ikramuddin S, Gourash W, Ramanathan R, Luketich J. Outcomes after laparoscopic Roux-en-Y gastric bypass for morbid obesity. Annals of surgery. 2000 Oct;232(4):515.
8. Kim J, Azagury D, Eisenberg D, DeMaria E, Campos GM. ASMBS position statement on prevention, detection, and treatment of gastrointestinal leak after gastric bypass and sleeve gastrectomy, including the roles of imaging, surgical exploration, and nonoperative management. Surg Obes Relat Dis. 2015 Jul 1;11(4):739-48.
9. Chopra T, Zhao JJ, Alangaden G, Wood MH, Kaye KS. Preventing surgical site infections after bariatric surgery: value of perioperative antibiotic regimens. Expert Rev Pharmacoecon Outcom Res. 2010 Jun 1;10(3):317-28.
10. De Luca M, Tie T, Ooi G, Higa K, Himpens J, Carbajo MA, et al. Mini gastric bypass-one anastomosis gastric bypass (MGB-OAGB)-IFSO position statement. Obes Surg. 2018 May 1;28(5):1188-206.
11. Musella M, Susa A, Manno E, De Luca M, Greco F, Raffaelli M, et al. Complications following the mini/one anastomosis gastric bypass (MGB/OAGB): a multi-institutional survey on 2678 patients with a mid-term (5 years) follow-up. Obes Surg. 2017 Nov 1;27(11):2956-67.
12. Bratzler DW, Houck PM, Workgroup SI. Antimicrobial prophylaxis for surgery: an advisory statement from the National Surgical Infection Prevention Project. Am J Surg. 2005 Apr 1;189(4):395-404.
13. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR, Hospital Infection Control Practices Advisory Committee. Guideline for prevention of surgical site infection, 1999. Infect Control Hosp Epidemiol. 1999 Apr;20(4):247-80.
14. Keleidari B, Mahmoudieh M, Mofrad RM, Shahabi S, Sheikhbahaei E. Gastroileostomy for controlling body weight and lipid profile: An experimental rat model. Obes Med. 2019 Sep 1;15:100096.
15. Keleidari B, Mahmoudieh M, Shahabi S, Sheikhbahaei E, Rezaei M, Sayadi M, Melali H. Reversing One-Anastomosis Gastric Bypass Surgery due to Severe and Refractory Hypoalbuminemia. World J Surg. 2020 Apr;44(4):1200-1208.
16. Chen J, Miller M, Ibele A, Morrow E, Glasgow R, Volckmann E. Dual Ring Wound Protector Reduces Circular Stapler Related Surgical Site Infections in Patients Undergoing Laparoscopic Roux-En-Y Gastric Bypass. Obes Surg. 2018 Oct 1;28(10):3352-9.
17. Shabino PJ, Khoraki J, Elegbede AF, Schmocker RK, Nabozny MJ, Funk LM, et al. Reduction of surgical site infections after laparoscopic gastric bypass with circular stapled gastrojejunostomy. Surg Obes Relat Diss. 2016 Jan 1;12(1):4-9.
18. Genser L, Carandina S, Tabbara M, Torcivia A, Soprani A, Siksik JM, et al. Presentation and surgical management of leaks after mini–gastric bypass for morbid obesity. Surg Obes RelatDis. 2016 Feb 1;12(2):305-12.
19. Gonzalez R, Sarr MG, Smith CD, Baghai M, Kendrick M,

Szomstein S, et al. Diagnosis and contemporary management of anastomotic leaks after gastric bypass for obesity. J Am College Surg. 2007 Jan 1;204(1):47-55.
20. Gonzalez R, Nelson LG, Gallagher SF, Murr MM. Anastomotic leaks after laparoscopic gastric bypass. Obes Surg. 2004 Nov 26;14(10):1299-307.
21. Keleidari B, Mahmoudieh M, Kafi S, Shahabi S, Sheikhbahaei E, Farahmand A, et al. Which one is better for Non-Alcoholic Fatty Liver Disease, the Roux-en-Y Gastric Bypass or One Anastomosis Gastric Bypass? A Paired Liver Biopsy Report. Obes Med. 2020 Feb 25:100205.
22. Keleidari B, Mahmoudieh M, Gorgi K, Sheikhbahaei E, Shahabi S. Hepatic Failure After Bariatric Surgery: A Systematic Review. Hepat Mon. 2019;19(1):e86078.
23. Keleidari B, Mofrad RM, Shahmiri SS, Sanei MH, Kolahdouzan M, Sheikhbahaei E. The impacts of gastroileostomy rat model on glucagon-like peptide-1: A promising model to control type 2 diabetes mellitus. Obes Surg. 2018 Oct 1;28(10):3246-52.
24. Keleidari B, Mahmoudieh M, Mofrad RM, Shahabi S, Sheikhbahaei E. Gastroileostomy for controlling body weight and lipid profile: An experimental rat model. Obes Med. 2019 Sep 1;15:100096.
25. Kermansaravi M, Shahmiri SS, DavarpanahJazi AH, Valizadeh R, Berardi G, Vitiello A, et al. One Anastomosis/Mini-Gastric Bypass (OAGB/MGB) as Revisional Surgery Following Primary Restrictive Bariatric Procedures: a Systematic Review and Meta-Analysis. Obes Surg. 2020 Oct 28:1-4.