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Nutritional deficiencies 1 year post OAGB among the patients: A comparative study

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Abstract
Aim: The aim of the study was to evaluate nutritional deficiencies 1 year post OAGB among. pre and post bariatric surgery patients.
Material and method: The present study was conducted among 80 subjects in the department of physiology at BJS Dental College, Ludhiana with the help of gastro surgery department of SPS hospital, Ludhiana among the patients who underwent OAGB surgery in the past one year. Following surgery, all-patients received standard dietary and lifestyle recommendations which were the same as those given for "standard" (Roux-en-Y) gastric bypass including iron-rich multivitamin, calcium, vitamin D and vitamin B12 supplementation. Pre-surgery demographic data, anthropometrics, comorbidities, blood tests, supplementation use, physical activity and smoking habits were obtained from the patients' medical records. Anthropometric measurements for weight and height which were measured on a digital medical scale, and BMI was calculated accordingly. Blood tests were collected for lipid profile, glucose profile, vitamin B12, vitamin D, folate, iron, ferritin, transferrin, blood count, albumin and total protein.
Results: Mean weight (kg), BMI (kg/m2) before the surgery was 114.8±18.3 and 41.8±4.1and after the surgery, the same was found to be 77±12.7 and 26.9±3.8 respectively. Post surgery i.e. after one year, total protein (%low values), iron (%deficiency), vitamin B12 (% <350 pg/ml), folate (%deficiency), vitamin D (%insufficiency, <30 ng/ml) and vitamin D (%deficiency, <20 ng/ml) was revealed as 25.4, 24.1, 28.9, 11.7, 54.9 and 17.4 respectively.
Conclusion: The results of the study concluded that substantial improvements in health and anthropometric parameters are found in the short-term follow-up after OAGB.

Keywords: weight, BMI, OAGB, bariatric surgery

Introduction

Bariatric metabolic surgical techniques are still evolving in an effort to accomplish constant weight loss. Although Roux-en-Y gastric bypass (RYGB), a gold-standard bariatric procedure, has been shown to be effective in achieving weight loss, as well as improvement in metabolic syndromes, there are some shortcomings of the operation. One is a non-responder's rate of up to 25 to 40% (% excess weight loss < 50%) documented at 5 to 10-year follow up [1, 2]. To address this, the one anastomosis gastric bypass (OAGB), a technically simpler and easier bariatric procedure to perform was introduced by Rutledge in 1997 [3]. This operation has gained much popularity as a viable option for the treatment of obesity. According to the last worldwide survey of the International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO), One Anastomosis Gastric Bypass (OAGB) surgery grew from 0.6% to 4.8% of the overall bariatric procedures from 2011-2016. In India, 172 patients underwent bariatric surgeries in 2012 at an individual centre, out of which OAGB was performed in 90 subjects [4]. OAGB procedure requires the development of a broad, narrow gastric tube in combination with a 150-250 cm distal gastrojejunostomy distal to the ligament of Treitz. This technique has also been accepted by the IFSO MGB-OAGB Task Force as an appropriate bariatric treatment and is no longer being prosecuted. According to recent literature, OAGB has several possible advantages in terms of weight loss and co-morbidity treatment, such as shorter operative time, less chances of anastomotic leakage and internal herniation, shorter learning curve, simplicity of reversibility with equivalent or better results [5, 6].

The benefits of the OAGB come with an acceptable concern about the incidence of bile reflux gastritis and esophagitis, marginal ulcers and hypoproteinemia. However, there are no details on the short-and long-term nutritional effects of this treatment and no clear dietary recommendations for OAGB patients are currently available. Therefore the present study was done to evaluate nutritional deficiencies 1 year post OAGB among pre and post bariatric surgery patients.

Material and method

The present study was conducted among 80 subjects in the department of physiology at BJS Dental College, Ludhiana with the help of gastro surgery department of SPS hospital, Ludhiana among the patients who underwent OAGB surgery in the past one year. Inclusion criteria included age>18 years, body mass index (BMI) > 40 kg/m2 or BMI>35 kg/m^2 with obesity-related co-morbidities. Exclusion criteria included BS in the past, pregnancy or lactation and major complication which led to a revision surgery. The study was approved by the local institutional review board and informed consent was obtained from all individual participants included in the study.

Following surgery, all-patients received standard dietary and lifestyle recommendations which were the same as those given for "standard" (Roux-en-Y) gastric bypass including iron-rich multivitamin, calcium, vitamin D and vitamin B12 supplementation [7-8]. Orally vitamin B12 was given by

disintegrating tablet, sublingual, or liquid: 350-500 mcg daily, 400-800 mcg oral folate daily from their multivitamin, 1200-1500 mg/day of calcium and vitamin D and multivitamin with minerals containing 100% of the RDA (8-11 mg/day).

Pre-surgery demographic data, anthropometrics, comorbidities, blood tests, supplementation use, physical activity and smoking habits were obtained from the patients' medical records. Anthropometric measurements for weight and height which were measured on a digital medical-scale, and BMI was calculated accordingly. Excess weight loss (EWL) percentage was calculated as follows: [(pre-operation weight- post-operation weight)/(pre-operation weight - ideal body weight)]*100. Ideal body weight was considered as the weight for BMI=25 kg/m^2. Percentage of total weight loss (TWL) was calculated as follows: ([pre-operation weight - post-operation weight]/[pre-operation weight])*100 [14].

Blood tests collected for lipid profile, glucose profile, vitamin B12, vitamin D, folate, iron, ferritin, transferrin, blood count, albumin and total protein. Micronutrient deficiencies were defined if serum levels exceeded the Health Medical Organization (HMO) laboratory determined normal range values, according to the micronutrient type. Serum vitamin B12 deficiency was defined also as levels <350 pg/ml, since it has been demonstrated to have higher sensitivity and specificity for detecting deficiency compared to the laboratory lower normal range value [17].

Nutritional interviews were performed by a trained registered dietitian and data were collected for eating and lifestyle habits, including adherence to standard dietary recommendations for BS patients, fluids intake, vegetable and fruit intake, hours spent per week in doing physical activity, smoking habits, number of dietitian follow-up meetings, participation in support group meetings, GI related side effects (i.e. vomiting, regurgitation, nausea, heartburn, belching, diarrhea, flatulence and no. defecations per day) and use of dietary supplementation. Moreover, patients were asked to assess their current volume of food intake compared to the pre-surgery period from 0 to 100% by using a visual analogue scale (VAS) [8].

Statistical analysis: Data so collected was tabulated in an excel sheet, under the guidance of statistician. The means and standard deviations of the measurements per group were used for statistical analysis (SPSS 22.00 for windows; SPSS inc, Chicago, USA). Difference between two groups was determined using student t-test as well as chi square test and the level of significance was set at $p < 0.05$.

Results

Eighty OAGB patients (70% women) were surveyed 1 year following surgery. Their mean age and BMI preoperatively were 46.1 ± 11.4 years. Type 2 Diabetes, dyslipidaemia, hypertension and current smoker was reported among 52.5%, 64%, 60% and 8% of the subjects respectively (table 1).

Mean weight (kg), BMI (kg/m2) before the surgery was 114.8±18.3 and 41.8±4.1and after the surgery, the same was found to be 77±12.7 and 26.9±3.8 respectively. When mean BMI was compared statistically before and after the surgery, it was found to be statistically significant as $p<0.01$ (table 2).

Before the surgery, total protein (%low values), iron (%deficiency), vitamin B12 (% <350 pg/ml), folate (%deficiency), vitamin D (%insufficiency, <30 ng/ml) and vitamin D (%deficiency, <20 ng/ml) was found to be 11.9, 34.2, 49.2, 30.8, 86.4 and 56.2 respectively. Post surgery i.e. after one year, total protein (%low values), iron (%deficiency), vitamin B12 (% <350 pg/ml), folate (%deficiency), vitamin D (%insufficiency, <30 ng/ml) and vitamin D (%deficiency, <20 ng/ml) was revealed as 25.4, 24.1, 28.9, 11.7, 54.9 and 17.4 respectively. When these nutrients were compared statistically before and after surgery, it was found to be statistically significant as $p<0.05$ as shown in table 3.

Discussion

In the present study we present the health and nutritional status over a short-term follow-up of patients after OAGB. The participants rated their overall postoperative state of health as high. However, relatively high rates of nutritional deficiencies, both preoperatively and postoperatively, for iron, folate and vitamin D. The deficiency rates for folate and vitamin D improved postoperatively compared to baseline probably due to high adherence to intake of multivitamin and vitamin D supplementation postoperatively, and the release of vitamin D from fat tissue [11]. However, more than half of the participants presented vitamin D insufficiency and close to a fifth presented vitamin D deficiency at 1 year postoperatively. It is important to note that even if patients have demonstrated significant improvement in their vitamin D status, they may require continued monitoring and supplementation [12]. Moreover, higher vitamin D concentrations (>20 ng/ml) during the first postoperative year following adequate vitamin D supplementation was shown to be related to decelerate bone loss following OAGB according to a recent published study.

We found that the iron deficiency rates were high and stayed stable through the study, but the mechanisms for both time-points (i.e. pre- and post-surgery) might be different[13]. While obese patients are predisposed to develop iron deficiency due to low intake, higher blood volume and the presence of low-grade chronic inflammation, post-surgery iron deficiency may occur due to alterations in the GI anatomical architecture, possibly decrease in GI villi height, a low tolerance for red meat, reduced acidity in the stomach and the chronic use of drugs to suppress the secretion of gastric acid. Only a small number of participants presented low ferritin or high transferrin levels pre- and post-surgery, but a high prevalence of low transferrin saturation (<20%), suggesting an inadequate supply of iron for hemoglobin synthesis and red cell production [14], was noticed before and after the surgery.

More studies are needed with a larger sample-size and broad hematological parameters in order to better understand this phenomenon. Currently, there are no specific guidelines for supplementation regime following OAGB and it is possible that OAGB patients have a further reduction in capacity to absorb iron compared to those undergoing Roux-en-Y gastric bypass or sleeve gastrectomy, and may need higher doses of iron supplementation following the surgery [15]. Hence, future studies may need to optimize doses of iron and other key micronutrients for these patients.

There are some limitations to be acknowledged for the present study. First, the sample-size and the follow-up term were limited. Second, several micronutrients were not measured (e.g. vitamin A, vitamin K, vitamin E, zinc, selenium, copper). Third, detailed food intake of macronutrients and micronutrients was not taken in this study. Fourth, adherence data were collected using self-

reports. Patients may have reported adherence in a manner intended to please and thus, over-reporting bias cannot be ruled-out. Future studies with larger sample-sizes should be focused on the impact of this surgery on nutritional status including muscle mass and bone mineral density in the long-term.

Table 1: Demographic and co-morbidities of the study participants at baseline and 1 year post-OAGB

Parameter	Baseline (N=80)	1 year post-OAGB (N=80)
Age (in years), Mean ± SD	46.1±11.4	
Gender		
Male (%)	30	
Female (%)	70	
Married (%)	78.8	
Co-morbidities		
Type 2 Diabetes (%)	52.5	
Dyslipidaemia (%)	64	
Hypertension (%)	60	
Current Smoker (%)	8	5

Table 2: Anthropometric measurements at baseline and 1 year post-OAGB

Parameter	Baseline (N=80)	1 year post-OAGB (N=80)	t test	p value
Weight (kg), Mean±SD	114.8±18.3	77±12.7	29.11	<0.01*
BMI (kg/m^2)	41.8±4.1	26.9±3.8	34.18	<0.01*

*: statistically significant

Table 3: Nutrients at baseline and 1 year post-OAGB

Parameter	Baseline (N=80)	1 year post-OAGB (N=80)	Chi Square	p value
TC (% >200mg/dl)	56.8	14.9	26.7	<0.01*
LDL (% >130 mg/dl)	37.8	10.6	18.13	<0.01*
HDL (% <40 mg/dl)	17.90	5.68	10.17	0.02*
Triglycerides (% >150 mg/dl)	51.2	12.8	32.7	<0.01*
Glucose (% >100 mg/dl)	58.5	4.2	48.10	<0.01*
(%hypoalbuminemia, <3.5 gr/dl)	1.9	3.4	2.78	0.38
Total protein (gr/dl), (%low values)	11.9	25.4	24.29	<0.01*
Iron (%deficiency)	34.2	24.1	19.11	<0.01*
Ferritin (%deficiency)	7.9	7.9	0	1
Transferrin (%higher levels)	6.9	0	5.78	0.08
Transferrin Saturation (%, <20%)	68	43	6.71	0.07
Vitamin B12 (%deficiency)	0	4.8	4.18	0.18
Vitamin B12 (% <350 pg/ml)	49.2	28.9	9.17	0.02*
Folate (%deficiency)	30.8	11.7	15.68	0.01*
Vitamin D (%insufficiency, <30 ng/ml)	86.4	54.9	25.71	<0.01*
Vitamin D (%deficiency, <20 ng/ml)	56.2	17.4	28.14	<0.01*
Supplementation use				
Multivitamin (%)	4.9	89.4	71.4	<0.01*
Calcium (%)	1.3	76.5	68.2	<0.01*
Vitamin D (%)	22	83.8	76.10	<0.01*
Vitamin B12 (%)	8.4	63.7	67.20	<0.01*
Iron (%)	12.2	43.5	46.19	<0.01*

*: statistically significant

Conclusion

Substantial improvements in health and anthropometric parameters are found in the short-term follow-up after OAGB. However, a high prevalence of nutritional deficiencies are a matter of concern.

References

1. Christou NV, Look D, Maclean LD. Weight gain after short- and longlimb gastric bypass in patients followed for longer than 10 years. Ann Surg. 2006; 244(5):734-740.
2. Magro DO, Geloneze B, Delfini R, Pareja BC, Callejas F, Pareja JC. Long-term weight regain after gastric bypass: a 5-year prospective study. Obes Surg. 2008; 18(6):648-651.
3. Rutledge R, Walsh TR. Continued excellent results with the minigastric bypass: six-year study in 2,410 patients. Obes Surg. 2005; 15:1304-1308.
4. Bhandari M, Nautiyal HK, Mathur W, Kosta S. OAGB vs BGBP: A retrospective comparative study of a cohort of patients who had bariatric surgery in 2012 at one centre by a single surgeon. Clin Obes. 2019, e12308.
5. Georgiadou D, Sergentanis TN, Nixon A, Diamantis T, Tsigris C, Psaltopoulou T. Efficacy and safety of laparoscopic mini gastric bypass. A systematic review. Surg Obes Relat Dis Offic J Am Soc Bariat Surg. 2014; 10:984-91.
6. Mahawar KK, Kumar P, Carr WR, Jennings N, Schroeder N, Balupuri S, *et al*. Current status of mini-gastric bypass. J Minimal Access Surg. 2016; 12:305-10.
7. Parrott J, Frank L, Rabena R, Craggs-Dino L, Isom KA, Greiman L. American society for metabolic and bariatric

surgery integrated health nutritional guidelines for the surgical weight loss patient 2016 update: micronutrients. Surg Obes Relat Dis Offic J Am Soc Bariat Surg. 2017; 13:727-41.
8. Sherf Dagan S, Goldenshluger A, Globus I, Schweiger C, Kessler Y, Kowen Sandbank G, *et al*. Nutritional recommendations for adult bariatric surgery patients: clinical practice. Adv Nutr (Bethesda, Md). 2017; 8:382-94.
9. Brethauer SA, Kim J, el Chaar M, Papasavas P, Eisenberg D, Rogers A, *et al*. Standardized outcomes reporting in metabolic and bariatric surgery. Surg Obes Relat Dis Offic J Am Soc Bariat Surg. 2015; 11:489e506.
10. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. In: Vitamin and mineral nutrition information system. Geneva:World Health Organisation, 2011.
11. Tsiaras WG, Weinstock MA. Factors influencing vitamin D status. Acta Derm Venereol. 2011; 91:115-24.
12. Ben-Porat T, Elazary R, Sherf-Dagan S, Goldenshluger A, Brodie R, Mintz Y, *et al*. Bone health following bariatric surgery: implications for management strategies to attenuate bone loss. Adv Nutr (Bethesda, Md). 2018; 9:114-27.
13. Steenackers N, Van der Schueren B, Mertens A, Lannoo M, Grauwet T, Augustijns P, *et al*. Iron deficiency after bariatric surgery: what is the real problem? Proc Nutr Soc 2018:1-11.
14. Auerbach M, Adamson JW. How we diagnose and treat iron deficiency anemia. Am J Hematol. 2016; 91:31-8.
15. Mahawar K. Anaemia after one anastomosis gastric bypass. Obes Surg. 2018; 28:1777-8.