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Long-term complications and side effects of bariatric surgery: a systematic review

Complicaciones a largo plazo y efectos secundarios de la cirugía bariátrica: una revisión sistemática

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Abstract

Background and objective: Bariatric surgery is a procedure that has gained popularity in the last decades as a treatment for obesity and is generally regarded as safe and effective in the short term, though the complications on the long term have been poorly described. We aim to review studies with long term follow-up reporting complications after a bariatric procedure.

Method: A search was conducted on the data bases MEDLINE, EBSCO, Cochrane Library, and Google Scholar, and also scanning through references list in publications. We included cohort studies and clinical trials published from January 1st 2014 to April 15th 2017 with a follow up ≥ 5 years, retention rate above 50%, written in the following languages; English, Spanish, or Portuguese. We conducted qualitative bias assessment and analysis of heterogeneity.

Result: Only four studies met the inclusion criteria, all of them were conducted with different bariatric procedures (vertical sleeve gastrectomy, laparoscopic sleeve gastrectomy, laparoscopic adjustable gastric banding, and billiopancreatic diversion with or without duodenal shift). Study design, outcome assessment, and complication definition were highly heterogeneous. The most frequent long term complications were gastroesophageal reflux disease, several nutritional deficits, incisional hernias, and failure to weight loss.

Conclusions: There is insufficient evidence to ensure the quantity and severity of long-term complications of bariatric surgery.

Keywords

Bariatric surgery; long-term complications; systematic review

Resumen

Antecedentes y objetivo: La cirugía bariátrica es un procedimiento que ha ganado popularidad en las últimas décadas como tratamiento para la obesidad y generalmente se le reconoce como seguro y efectivo a corto plazo, aunque las complicaciones a largo plazo han sido pobremente descritas. Nuestro objetivo fue hacer una revisión de estudios con seguimiento a largo plazo que reportaran las complicaciones después de la cirugía bariátrica.

Métodos: Realizamos una búsqueda en las bases de datos MEDLINE, EBSCO, Cochrane Library, and Google Scholar, además de revisar la lista de referencias en las publicaciones. Incluimos estudios de cohorte y ensayos clínicos desde el 1 de enero del 2014

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hasta el 15 de abril del 2017 con un seguimiento ≥ 5 años, con una retención mayor al 50% y que fueran escritos en inglés, español, o portugués. Llevamos a cabo un análisis cualitativo de sesgo y heterogeneidad.

Resultados: Solo cuatro estudios cumplieron con los criterios de inclusión, cada uno con un procedimiento bariátrico diferente (gastrectomía vertical en manga, gastrectomía laparoscópica en manga, banda gástrica ajustable laparoscópica y diversión biliopancreática con y sin cruce duodenal). El diseño de los estudios, la evaluación de resultados y la definición de complicaciones fueron altamente heterogéneos entre los estudios. Las complicaciones a largo plazo más frecuentes fueron: reflujo gastroesofágico, varias deficiencias nutricionales, hernias incisionales y la falta de pérdida de peso.

Conclusiones: Las evidencias son insuficientes para asegurar la cantidad y severidad de las complicaciones a largo plazo de la cirugía bariátrica.

Palabras clave

Cirugía bariátrica; complicaciones a largo plazo; revisión sistemática

Introduction

Obesity worldwide prevalence has been increasing in the last decades [(1)]. Lifestyle changes have been proposed to reduce this epidemic, which includes a low-fat diet, a low-carbohydrate diet and physical activity [(2, 3)]. However, due to biologic, psychological and social factors [(4)] lifestyle changes have rarely been effective on long-term weight loss [(5, 6)].

Bariatric surgery has been the only treatment which has resulted in long term weight lost. In 2014, it was estimated that the total number of procedures performed was 579 517 with a 68% increase in number of procedures from 2011 to 2014; the most common procedures were Roux-en-Y gastric bypass (40%), vertical gastric sleeve (46%), adjustable gastric banding (7.4%), and biliopancreatic diversion with duodenal switch (1.1%) [(7)].

Pooled mortality of 0.28% in the first 30 days after surgery, and 0.35% for >30 days and within two years after surgery have been reported [(8)]. In 2009, the Longitudinal Assessment of Bariatric Surgery 1 (LABS-1) study showed a prevalence of 4.1% for major adverse outcomes during the first 30 days after surgery, which included death, venous thromboembolism, reintervention (percutaneous, endoscopic or operative), or failure to discharge from the hospital within the first 30 days [(9)]. However, long-term follow up on mortality and long-term side effects has rarely been reported. Among the long-term complications it has been reported incisional hernia, internal hernia, vitamin or micronutrients deficiency (mostly iron and B12 leading to anemia), reoperation (mostly due to weight loss failure) and psychological problems (including depression and suicide) [(10, 11)].

The objective of this systematic review was to assess long-term complications related to bariatric surgery in studies reporting at least a 5-year follow-up period.

Methods

A literature search was performed through the electronic data bases MEDLINE, EBSCO, Cochrane Library, and Google Scholar, and scanning reference list of articles; the last search was carried on April 15th 2017. We used the following search terms in all data bases: "bariatric surgery" "complications" "weight loss". Eligibility assessment was conducted independently by two reviewers and no disagreements were found about the studies included. This review included prospective, retrospective and randomized clinical trials published from January 1st 2014 to December 31st 2017. The studies reviewed included subjects older than 18yo after bariatric procedure, which reported follow up for complications related to the intervention for at least a 5-year period. Studies with a retention rate lower than 50% were excluded. Only full-length articles written in English, Spanish or Portuguese were considered for this systematic review. Search results are shown in Figure 1.

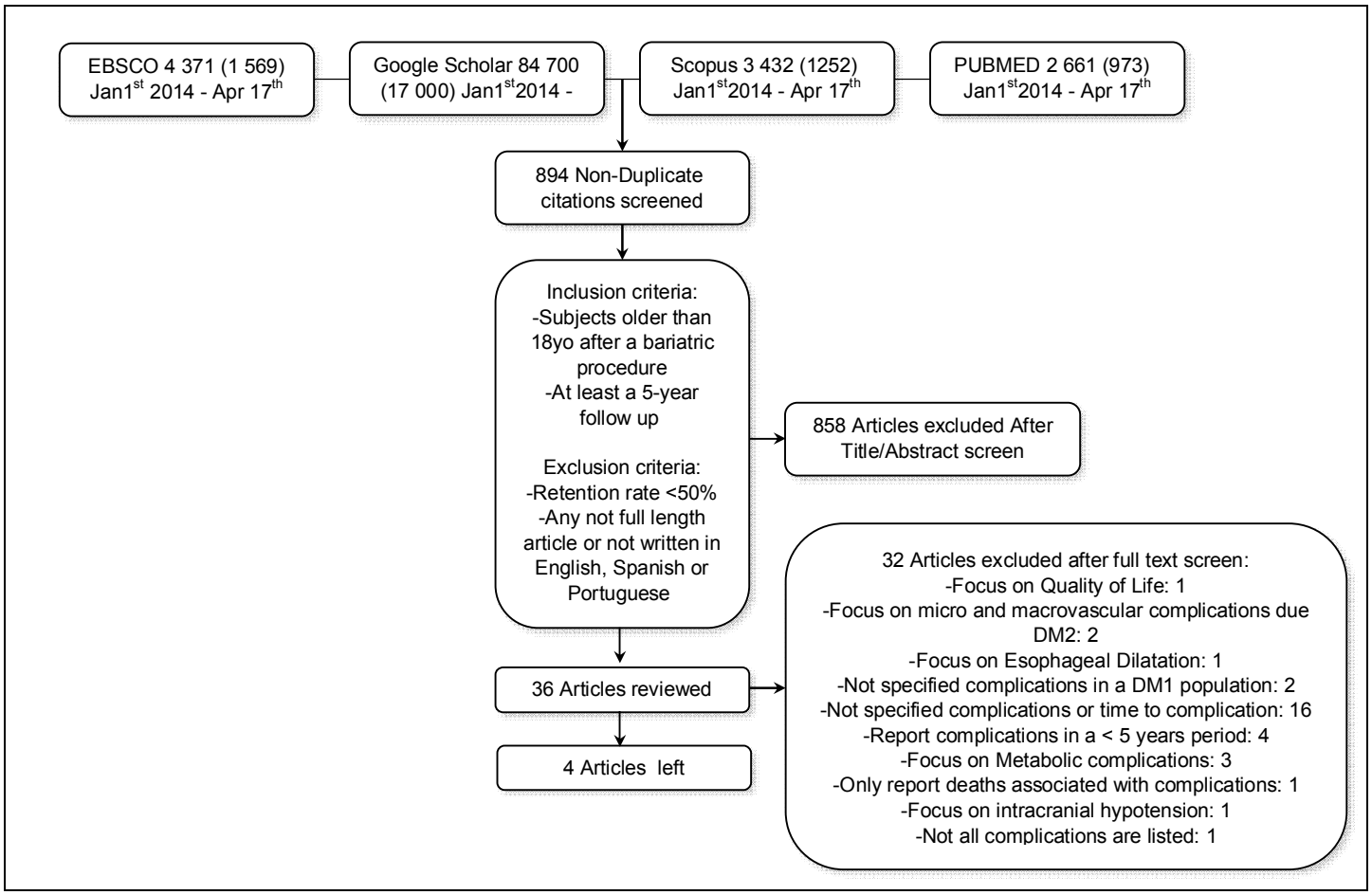

Figure 1.- Systematic search protocol.

A data extraction sheet was used to annotate relevant information from the studies by one author. Disagreements about relevant information were settled between the authors and a consensus was achieved. We retrieved data on characteristics of study subjects (age, sex, and retention rate), type of intervention (bariatric procedure), initial and final BMI, complication rate, revision surgery rate, and mortality rate. For “revision surgery” we used the definition of the 2014 American Society for Metabolic and Bariatric Surgery Revision Task Force [(12)]. Data were retrieved only from the articles, and no attempt was made to get missing data from the authors.

To ascertain the validity of eligible studies, two reviewers working independently determined the risk of bias for each individual study; whenever discrepancy occurred a consensus was achieved with a third reviewer.

The primary outcome measures assessed were complication rate after five years of surgery, revision surgery rate and mortality rate. In addition absolute BMI reduction was reported.

Results

Four studies met the inclusion criteria (Table 1). The study conducted by Sieber et al., included subjects who were not candidates for LRYGB (multiple previous abdominal surgeries, huge abdominal hernia). Therefore, the characteristic of this group was a history of failed laparoscopic adjustable gastric banding (LAGB), and the complication-related outcomes included those with primary and revision surgery. In this study all subjects were submitted to abdominal ultrasound, upper gastrointestinal series, gastroscopy, manometry, dual-energy x-ray absorptiometry, and indirect calorimetry. Individuals with gallstones had a simultaneous laparoscopic cholecystectomy. Thus, the complication rate included those with LAGB and those with LAGB plus cholecystectomy. An additional procedure was conducted for patients with previous LAGB, such as removing foreign material and scar tissue resection. Moreover, revision bariatric

surgery (conversion to BPD/DS) was offered to patients with insufficient weight loss (defined as <25% BMI loss). However, there was not report of the number of patients undergoing to revision bariatric surgery. Outcomes were reported for those undergoing to primary procedure and those with revision surgery for patients with previous LAGB. Complications rate and specific complications were not reported as separate groups. Data reported included subjects with the primary LSG, secondary LSG after a failed LAGB, and subjects who also had a cholecystectomy [13].

Table 1. General characteristics of the studies.

Author	Procedure	n	Inclusion criteria	Exclusion criteria	Age mean ±SD (years)	Women %	Follow-up period (months)	Retention (%)	Initial BMI±SD (kg/m^2)	Final BMI±SD (kg/m2)	Deaths (%)	Revision surgery after procedure (%) (%conversion|%corrective|%reversal)	Complications
Fløjo (2017)	VSG	168	BMI>40kg/m^2 or BMI>35kg/m^2 with obesity-related comorbidities.	Active psychosis, current alcohol or drug abuse	40 ±10.5	71	60	82	46±6.3	32.9±6	NA	4.2 (86|14|0)	New onset GERD, 26%; major complications (requiring >7 days of hospital care): 7.3%; failure to weight loss: 40%; excessive weight gain (>10kg): 44%
Sieber (2013)	LSG	Primary surgery: 47, Revisional surgery: 27	BMI>40kg/m^2 or BMI>35kg/m^2 with obesity-related comorbidities, failure of conservative management for >2 years	N/A	43 ±11.4	79	60	91	46±7.1	NA	NA	11.8 (89|11|0)	New onset GERD, 16%; recurrent incisional hernia, 1.4%; vitamin-D deficiency, 78%; iron deficiency, 41%; zinc deficiency, 40%; vitamin B12 deficiency, 40%; folic acid deficiency, 25%; anemia, 10%
Juodeikis (2016)	LAGB	103	BMI>40kg/m^2 or BMI>35kg/m^2 with obesity-related comorbidities.	Previous bariatric procedure, pregnancy, contraindications for laparoscopic surgery	46 ±11.7	67	60	87	47.5±7.3	37.1±8.3	3,8	15.5 (0|63|37)	Band Erosion, 5%; Band Slippage, 7%; Band Intolerance, 3%; port related, 4%
Sethi (2016)	BPD; BPD/DS	56	BMI>35kg/m^2	N/A	42.3 ±NA	84	120	58	51.8±8.6	31.4±7.3	4	5.3 (0|33|67)	Internal hernia, 13%; incisional/umbilical hernia, 2%; hiatal hernia, 4%; small bowel obstruction, 5%; severe malnutrition, 5%; weight loss failure, 13%.

The study conducted by Juodeikis et al., (Table 1) included patients who requested a bariatric surgery, although the inclusion criteria were similar to other studies; thus, the sampling method was biased towards subjects requesting bariatric surgery. Initial assessment of all subjects included upper gastrointestinal endoscopy, abdominal ultrasound, and upper gastrointestinal radiography. This study diagnosed preoperative gastroesophagic reflux disorder (GERD) with upper gastrointestinal endoscopy. In most studies diagnoses were done by symptoms or as a previous history of GERD; thus in this study a higher proportion of baseline GERD would be reported and a lower rate of new-onset postoperative GERD was expected [14].

In the study conducted by Fløjo et al. (Table 1), the outcomes at 5 years after VSG were shown. Complications, revisions, weight change, obesity related diseases and quality of life were included. Selection procedure of the participants was not reported. Medical treatment or preexisting conditions were used as comorbidity assessment. Revision surgery was performed in seven patients, one due to GERD and six due to inadequate weight loss between 1 and 3 years after the original operation. As revision surgery, BPDDS, re-sleeve surgery and gastric bypass (GBP) were

conducted; however, two out of these seven patients were lost at 5-years follow up. The weight loss failure rate at 5 years was 39% and patients with excessive (>10kg) regain at 5 years was 44% (60 out of 137 available at the follow up) [15].

Sethi et al., in 2016 conducted a retrospective review of individuals who had BPD with or without DS, in which long-term weight loss, co-morbidity remission, complications, and quality of life were assessed. A follow up of one to 15 years was observed. All patients received oral multivitamin supplementation. For patients who had insufficient weight loss, and to achieve a weight loss success a frequent follow-up with physicians, nutritional counseling, decrease carbohydrates, and increase protein intake was done. Comorbidities status was defined as the presence or absence of diseases already diagnosed or current medical treatment for a condition. Complications within 30 days of postoperative period were excluded as well as those complications that did not require surgical management. Twenty two percent of individuals had secondary BPD or BPD/DS. Causes of these conversions were not stated. At follow up, some individuals were considered not eligible and were excluded; however, causes for these exclusions were not reported. Nutritional deficits were assessed by laboratory reports; however, period of nutritional deficit was not specified. Mortality of four subjects was reported; one of them due to severe malnutrition in a patient with BPD/DS, and the other three were reported as unrelated to the surgery (two for unknown causes, and one was reported as "unrelated") [16].

Discussion

In this review we found that only four studies reported bariatric surgery complications at or after a five year follow up. The study design were two retrospectives, one prospective and one randomized clinical trial.

All four studies were heterogeneous on individual selection criteria, technical procedure, initial comorbidity, outcome assessment, criteria for revision surgery, definition of complications, post-surgical nutritional supplementation, and follow-up nutritional and medical support; therefore, the evidence for long term complications is insufficient. Inconsistences on the complications were also found.

Although all the studies analyzed reported positive results on weight loss, the lack of adequate follow-up of complications and the low retention rate in the study with a follow-up up to 10 years limit the risk-benefit analysis for bariatric procedures in the long term.

The limitations of this review include the reduced number of published studies reporting long term complications after a 5 year follow up, the heterogeneity in procedures and outcome measures, the design of the studies (pre post treatment), the low number of participants, and a serious risk of reporting bias. The revision is also limited to publications written in English, Spanish or Portuguese, to those found in Pubmed, Cochrane, EBSCO, Google Scholar, and Scopus; and the selection of studies was limited to those published from January 2014 to April 2017.

In conclusion, the evidence for long term complication of bariatric surgery is insufficient and the results were inconsistent; this limit the risk-benefit analysis and shows lack of systematic evidence of long-term follow up for side effects and complications in these individuals, which makes recommendation of bariatric surgery uncertain on the long term.

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Conflicts of interest

The authors declare no conflicts of interest

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