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REVIEW ARTICLE

Quality of Life and Gastrointestinal Symptoms Following Laparoscopic Roux-en-Y Gastric Bypass and Laparoscopic Sleeve Gastrectomy: a Systematic Review

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Abstract
Laparoscopic Roux-en-Y gastric bypass (LRYGB) and laparoscopic sleeve gastrectomy (LSG) are the most common bariatric operations performed worldwide. Quality of life (QoL) is a crucial outcome metric. An electronic systematic search using PubMed, EMBASE, and Web of Science of studies comparing QoL after LSG and LRYGB was performed. QoL after both LSG and LRYGB considerably improves regardless the type of surgery. The QoL has a slight downward trend from the second to the fifth year postoperatively, but it remains higher than the baseline. LSG patients are more likely to suffer from gastroesophageal symptoms (GES). GES represent the only significant difference between the two procedures. A routine screening with gastroscopy and 24 h pH metry to help tailor the most appropriate surgical approach is advised.

Keywords Quality of life · Bariatric surgery · Laparoscopic Roux-en-Y gastric bypass · Laparoscopic sleeve gastrectomy

Introduction

Morbid obesity is challenging and is exponentially increasing across the western countries. According to a national study of the USA, the prevalence of obesity and extreme obesity among children and adolescents in 2011–2014 was 17.0% and 5.8%, respectively [1, 2]. It is well-established that obesity leads to a spectrum of comorbidities such as type II diabetes, hypertension, hyperlipidemia, and ischemic heart disease. All of these have a significant burden to health and quality of life (QoL) [3, 4]. To date, QOL is widely accepted as the third element of the bariatric "triple assessment" along with weight loss and comorbidity improvement/resolution.

Bariatric surgery represents the only management approach that has resulted in long-term weight loss and a durable improvement in health status. As a result, the number of bariatric procedures has substantially increased over the last decade [5, 6].

Laparoscopic Roux-en-Y gastric bypass (LRYGB) and laparoscopic sleeve gastrectomy (LSG) are the most common bariatric surgical procedures performed worldwide. Historically, LRYGB has been considered the gold standard, but in recent years, LSG has gained more popularity, due to its being technically less demanding [7].

The positive impact of bariatric surgery on QoL and difference between the various surgical approaches have been debated [8, 9]. LSG and LRYGB are a durable method of weight loss, but its impact on comorbidities rate, abdominal pain, gastroesophageal reflux disease (GERD), and irritable bowel is still contended [10, 11]. In addition, recent focus on impact to QoL as a pivotal metric in treating bariatric patients has been raised. With this in mind, we performed a systematic review to appraise the current evidence on QoL following LRYGB and LSG.

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Material and Methods

Search Strategy

A systematic review was carried out according to the guidelines from the preferred reporting items for systematic reviews and meta-analyses checklist (PRISMA) [12]. Institutional review board approval was not required. We conducted an electronic systematic search using MEDLINE databases (PubMed), EMBASE, and Web of Science. Last date of research was July 30, 2018.

We used the following search headings: bariatric surgery, laparoscopic Roux-en-Y gastric bypass, laparoscopic sleeve gastrectomy, vertical sleeve gastrectomy, quality of life, weight-related quality of life. All titles were initially screened and suitable abstracts were reviewed (Fig. 1).

Inclusion/Exclusion Criteria

The articles had to meet the following criteria publication and report in order to be included in the analysis: (a) comparing QoL following LRYGB and LSG, (b) written in English, and (c) have clear research methodology.

Data Extraction

The following data were retrieved from the selected publications and entered in a data extraction form by two investigators (EG, ER): author, study year, country, study design, patients, gender, age, body mass index (BMI), comorbidities, surgical outcomes. All data were entered independently by both investigators in two separate databases and only compared at the end of the reviewing process to reduce the selection bias. Finally, a third person (GS) reviewed the database. Duplicates were erased and the discrepancies were clarified.

Outcomes of Interest

Gender, age, BMI, surgical indication, GERD, and comorbidities were assessed to determine their impact on QoL scores in patients undergoing either LRYGB or LSG.

Generic and Disease Specific Quality of Life Instruments

It is widely accepted that the personal burden of disease cannot be entirely evaluated using traditional clinical symptoms and signs because they only partially correlate with patients' perceptions. Therefore, generic and specific tools assessing QoL have been designed to quantify the assessment. Generic instruments are broad-based measurements that can assess general QoL over different disease states and conditions, or treatment approaches (surgical/medical treatment).

Generic tools allow the comparison of QoL for different comorbidities, such as type II diabetes, hypertension, and

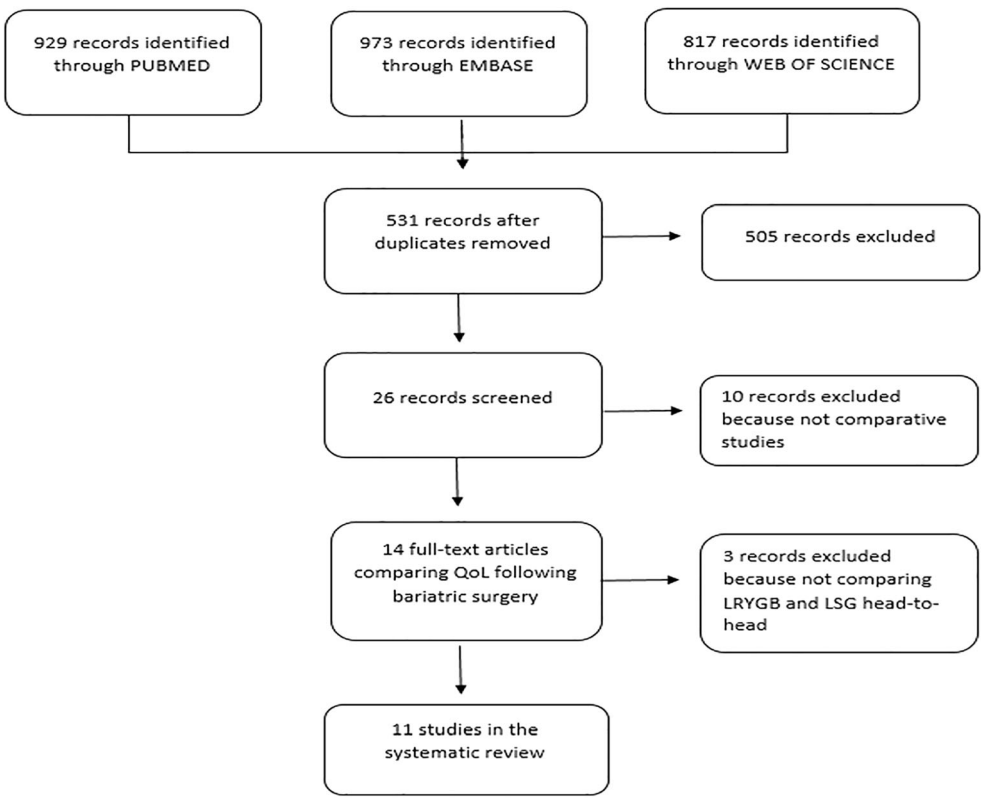

Fig. 1 Flowchart of studies retrieved from literature search

hyperlipidemia. Typically, they include consideration of physical functioning, ability for self-care, physiological status, level of pain or distress, and amount of social integration.

The major disadvantage of generic instruments is the inclusion of items not relevant to the disease in question, and thus, limiting their sensitivity [13]. For instance, the Short Form 36 Health Survey (SF-36) is a generic QoL assessment tool. Patients reported survey of patient health consisting of eight sections which are vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional role functioning, social role functioning, and mental health. The result of each section is reported on a 0–100 scale with each question carrying equal weight [14].

More recently, specific instruments have gained more popularity as they assess outcomes specific to a disease or treatment. These instruments are more responsive to changes in particular disease-related aspect of the patients' QoL. The main disadvantage of specific instruments is that they cannot be used to compare the QoL across different diseases or patient cohorts and therefore cannot be used to compare the relative effectiveness and cost-effectiveness of programs that affect several health domains [15]. For instance, the gastrointestinal quality of life (GIQLI) consists of 36 multiple choice items, divided into five categories (scored from 0 to 4). The five domains are digestive symptoms (divided into core and disease specific), physical function, emotional condition, social function, and effect of medical treatment. This questionnaire has been shown to have good validity for use across different countries and within different gastrointestinal surgical procedures [16].

Results

Literature Search and Study Characteristics

Two thousand seven hundred and nineteen publications were found by using the aforementioned search criteria. After removing duplicates, 531 publications were further examined. Of this, 11 studies [10, 17–26] met the inclusion/exclusion criteria. The PRISMA flow process is reported in Fig. 1. Among the included articles, three were a randomized controlled trial (RCT) [18, 19, 23, 26], three were a prospective study [10, 20, 22], and four were a retrospective study [17, 21, 24, 25]. Two RCTs reported the same cohort of patients but examined different factors at different time points [18, 19]. Table 1 depicts study findings and QoL assessment tools. Three studies compared LSG and LRYGB with a third bariatric procedure such as laparoscopic adjustable gastric banding (LAGB), bilio-pancreatic diversion with duodenal switch (BPD-DS), and one anastomosis gastric bypass (OAGB) [18, 20, 24].

Patient Characteristics

A total of 3145 patients underwent either LSG or LRYGB for management of morbid obesity. One thousand six hundred twenty-three had a LSG while 1522 had a LRYGB. Two thousand one hundred forty were female (73.8%) and 760 were male (26.2%). Median age was 43.2 years, and median (range) preoperative body mass index (BMI) was 44.2 (33 to 66). Only three studies recorded the presence of comorbidities at baseline [18, 21, 25].

Quality of Life

In the included studies, there were five generic tools to assess QoL (SF36, Euro Qol 5D, Body Image Questionnaire, General Self-efficacy (GSE scale), Hospital Anxiety and Depression Scale (HADS)). QOL related to the gastrointestinal tract was assessed using GIQLI, Moorehead–Ardelt II (MA-QoLQII), Bariatric Analysis and Reporting System (BAROS), Food Tolerance Questionnaire, and GERD Questionnaire. Last, the Dutch Sweet Eating Questionnaire (DSEQ) was used to evaluate the amount of carbohydrates consumed. The most common used questionnaires were the GIQLI and the SF-36. The median (range) time to follow-up was 18 months (6 months to 5 years). Study findings and QoL assessment are outlined in Table 1. All studies showed considerable improvements in QoL following both LSG and LRYGB, regardless the surgical technique [10, 17–26]. However, the QoL trajectory following both LSG and LRYGB tended to slightly deflect at long term [10, 20, 24].

Though postoperative overall QoL scores were similar between the two groups, some authors did observe differences in specific items. Overs et al. showed a significantly higher score in cumulative digestive symptoms (65 vs 58), digestive symptoms (27 vs 23), and physical function (22.5 vs 20) at year 3 postoperatively in the LSG group when compared to LRYGB [10]. Nickel et al. also noted that LSG group had higher scores in "social function" at 6 months, but LRYGB had better scores in physical and emotional function at year 2 [22].

Macano et al. noted that those in the LRYGB group had significantly improved emotional role at year 2 postoperatively [17]. Versteegden et al. [21] observed that LRYGB had a better physical functioning compared to LSG (43 points vs 40), whereas Mohos et al. observed that the difference between the two procedures was more remarkable in physical activity [25]. Biter et al. showed that patients undergoing LSG were more likely to suffer from gastroesophageal reflux symptoms, but this did not impact their overall QoL score when compared with LRYGB [26].

Interestingly, Peterli et al. found that overall scores in QoL decreased at the second year postoperatively. However, they still remained considerably improved from preoperative baseline [19].

Table 1 Study findings and QoL assessment

Author	Study design	Patients	QOL assessment tools	Assessment intervals	Compliance
Macano et al. 2017 [15]	Retrospective	16 (LSG) 44 (LRYGB)	SF-36	6 weeks and 2 years	60 (37.9%)
Peterli et al. 2013 [16] Peterli et al. 2017 [17]	RCT	107 (LSG) 110 (LRYGB)	GIQLI BAROS score	1, 2, and 3 years	217 (96.4%)
Schweiger et al. 2010 [18]	Prospective	56 (LSG) 99 (LRYGB)	Food tolerance questionnaire	6 months, 1 and 2 years	218 (100%)
Overs et al. 2012 [10]	Prospective	191 (LSG) 102 (LRYGB)	Food tolerance questionnaire GIQLI	2 and 4 years	116 (34%)
Versteegden et al. 2017 [19]	Retrospective	666 (LSG) 518 (LRYGB)	SF-36	1 year	1184 (55%)
Nickel et al. 2017 [20]	Prospective	36 (LSG) 73 (LRYGB)	SF-36 Body image questionnaire GSE scale	6 weeks and 2 years	30 (100%)
Murphy et al. 2017 [21]	RCT	58 (LSG) 56 (LRYGB)	SF-36 HADS	1 year	109 (95.6%)
Lee et al. 2015 [22]	Retrospective	519 (LSG) 519 (LRYGB)	GIQLI	5 years	1557 (100%)
Mohos et al. 2011 [23]	Retrospective	47 (LSG) 47 (LRYGB)	SF-36 MA-QoLQII	1 and 2 years	94 (100%)
Biter et al. 2017 [24]	RCT	74 (LSG) 71 (LRYGB)	GIQLI BAROS GerdQ ACQ EuroQol 5D SF-36 DSEQ	2 months and 1 year	110 (100%)

Lee et al. noted similar findings, with deterioration in physical, emotional, and social domains around the fifth year postoperatively in both LSG and LRYGB cohorts [24].

Discussion

This review shows that QoL following both LSG and LRYGB considerably improves regardless the type of surgery. The QoL trend improves substantially across the first year postoperatively, with a downward tread between the second and fifth postoperative year. However, overall QoL remains higher than the preoperative baseline. There was no overall difference between the two surgical approaches, but improvements in some secondary items were noted.

It is well-established that bariatric surgery is the best long-term option for obese patients to achieve sustained weight loss and improve associated comorbidities. Both LSG and LRYGB reduce weight by two different mechanisms, which are still widely debated. It seems that LSG limits the food intake given to the ghrelin reduction and incretin effect, whereas LRYGB appears to be more restrictive and based on changes in leptin and gastrointestinal hormones including glucagon-like peptide 1 [27]. Therefore, it is expected that there would be a difference in some secondary QoL measures.

Biter et al. showed that gastroesophageal symptoms (GES) represent the only significant difference in QoL between the two surgical procedures. They suggested gastroscopy or 24-h pH metry could help in identifying those patients who should not undergo LSG in order to prevent impact on QoL.

However, this study has some limitations; they did not report data about proton-pump inhibitor usage or perform pH monitoring to assess GERD pre-and post-surgery [26].

GES following LSG has been extensively debated across the literature. Recently, Thereaux et al. showed that LSG was associated with GERD symptoms in two-thirds of patients who were asymptomatic before surgery [28]. Similarly, Georgia et al. noted that the majority of patients suffered from GERD 1 year postoperatively and advocated use of pH testing and upper gastrointestinal endoscopy in order to early diagnose GERD [29].

With this in mind, some have attempted to provide a solution in order to minimize GERD rate following LSG. Hawasli et al. added an anterior fundoplication to LSG procedure, with some preliminary results showing promise [30].

This review notes that there is considerable heterogeneity in measuring QoL following bariatric surgery. We conclude that the choice of the most appropriate QoL assessment instrument remains controversial; however, it is useful to add GERD questionnaires symptoms following bariatric surgery and their impact on QoL. Fabricatore et al. [31] showed that

obesity is associated with a poorer health-related quality of life (HRQoL), that it impairs daily activities, and that generic and specific assessment tools are important to capture all aspects following bariatric surgery.

Both LSG and LRYGB significantly improve postoperative QoL, with the best results being reported at 12 months post procedure. Though there is a slight downward trend over the next 4 years, QoL stills remains higher than preoperative baseline. Interestingly, there is no difference between the two surgical procedures assessed, and therefore, patient and surgeon preference will likely play an important factor in choice of procedure.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Statement of Informed Consent Not applicable.

Statement of Human and Animal Rights/Ethical Approval Not applicable.

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