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Narrative Review of Bariatric Surgery Outcomes

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ABSTRACT

Bariatric surgery has become the cornerstone in the management of severe obesity, offering significant and sustained weight reduction alongside improvement or resolution of obesity-related comorbidities. This review provides a comprehensive analysis of the different bariatric procedures Roux-en-Y gastric bypass (RYGB), sleeve gastrectomy (SG), adjustable gastric banding (AGB), and biliopancreatic diversion (BPD) and compares their efficacy, complications, ethical implications, and global trends. Early and late complications remain procedure-dependent, ranging from internal hernias and gallstone formation to nutritional deficiencies and psychological adjustments. Comparative studies demonstrate that RYGB and SG achieve superior long-term weight reduction compared to AGB and non-surgical interventions. Patient selection criteria, ethical considerations, and economic impact remain central to optimizing outcomes and ensuring equitable access to treatment. The role of multidisciplinary teams is vital for ensuring long-term success, providing holistic care through preoperative assessment, psychological counseling, and nutritional follow-up. Advances in surgical technology, patient-centered care models, and policy frameworks continue to shape the field. Future research should focus on personalized surgical approaches, integration of digital monitoring, and equitable policy development to enhance the safety, accessibility, and sustainability of bariatric surgery worldwide.

Keywords: Bariatric surgery, Obesity management, surgical outcomes, Multidisciplinary care, Ethical and policy considerations.

INTRODUCTION

Bariatric surgery (BS) is the most effective treatment for severe obesity and its related comorbidities such as diabetes, hypertension, and hyperlipidaemia[1, 2]. However, it is invasive and carries significant risks [7]. The recognition that obesity is a major worldwide epidemic affecting both physical and mental health, together with the limited benefits of traditional methods of weight management such as diet, exercise, and medication, are driving the demand for surgery [2]. The main types of bariatric surgery are Gastric Bypass, Sleeve Gastrectomy, Adjustable Gastric Banding, and Biliopancreatic Diversion [4]. The degree of invasion varies considerably from procedure to procedure and includes extensive rearrangement of the gastrointestinal tract [1]. Recently, a published review highlighted obesity as the most significant threat to global health, the limited benefits of current interventions, and the need for sustainable treatment of severely obese patients. Very few studies report outcomes beyond two years; therefore, the medium- and long-term efficacy of bariatric surgery remains uncertain [2].

Background

Obesity is a major public health problem worldwide [1]. According to the World Health Organization (WHO), obesity has nearly tripled since 1975, giving rise to with chronic diseases such as type 2 diabetes mellitus (T2DM), cardiovascular disease, and cancer, among others [4]. Bariatric surgery refers to a group of surgical procedures designed for the management of obesity-related diseases, such as T2DM and hypertension [3]. The procedures can either be restrictive (reduces food intake) and/or malabsorptive (reduces nutrient absorption). There are four main bariatric surgery techniques: gastric bypass, sleeve gastrectomy, adjustable gastric banding, and biliopancreatic diversion. Gastric bypass involves the creation of a small gastric pouch of approximately 30 ml in volume anastomosed to a Roux loop of the jejunum [7]. The technique produces weight loss primarily through its

restrictive effect, which limits food intake to about 20 ml in volume. The procedure is the most widely performed bariatric surgery worldwide [1]. Sleeve gastrectomy is defined by the longitudinal resection of the stomach along a 30 Fr calibration tube from the antrum to the fundus, resulting in much of the greater curvature of the stomach being removed. Only a lumen remains with a volume of approximately 100 ml [7]. This technique is completely restrictive [8]. It has gained popularity due to its technical simplicity and promising medium-term results. Adjustable gastric banding was the most common form of bariatric surgery in the 1990s [20, 30]. The technique is performed by encircling the upper part of the stomach creating a small pouch of approximately 15 ml in volume. The band is connected via tubing to a subcutaneous access port through which the port can be inflated or deflated to calibrate stoma restriction [27, 37]. Biliopancreatic diversion is one of the first bariatric bariatric surgery procedures first described in the 1950s. The operation normally involves a distal gastrectomy with the creation of a gastric pouch and a gastroileal anastomosis [34, 24]. This therefore creates a three-anastomosis scenario, providing the weight loss effect primarily from its malabsorptive component while also maintaining some restriction from the smaller gastric pouch [21].

Types of Bariatric Surgery

Bariatric surgery involves anatomical modifications of the gastrointestinal tract to alter nutrient flow [29]. The major procedures can be categorized into two groups based on whether they create a gastro-jejunal anastomosis. Sleeve gastrectomy and gastric banding belong to the restrictive category, as they reduce gastric volume without rerouting the bowel [35]. In contrast, Roux-en-Y gastric bypass (RYGB) and biliopancreatic diversion with duodenal switch combine restriction with malabsorption by reconfiguring the alimentary tract [34]. Despite the array of surgical options, the scarcity of high-quality comparative data hinders confidence in recommending one technique over another [24]. Among the various bariatric procedures, three have become predominant in the last decade: RYGB, sleeve gastrectomy (SG), and adjustable gastric banding (AGB). RYGB involves constructing a small gastric pouch connected directly to the jejunum, effectively bypassing the distal stomach, duodenum, and a segment of small intestine [27]. SG entails resecting a large portion of the stomach to form a tubular conduit with reduced capacity. AGB consists of placing an inflatable silicone band around the proximal stomach to limit intake [39].

Gastric Bypass

Rou-en-Y gastric bypass remains one of the most effective surgical procedures for treating morbid obesity and its related comorbidities [39]. It combines a restrictive approach, which limits food intake by reducing stomach capacity, with a malabsorptive component achieved by bypassing a segment of the small intestine [50]. The technique results in early satiety and curbs the desire to overeat [28]. Several studies recommend tailoring the length of the Roux limb according to the patient's body mass index (BMI) to optimize postoperative weight loss, particularly in super-obese individuals with BMI above 50 kg/m2 3. Remarkable average weight losses between 55 and 80% of excess body weight can be attained, enabling substantial improvements in glucose metabolism and cardiovascular risk factors within 12–18 months [25, 36].

Sleeve Gastrectomy

Sleeve gastrectomy (SG) is a popular bariatric surgery with a favorable outcome profile. In SG, approximately 75–80% of the greater curvature of the stomach is removed, leaving a tubular "sleeve" shaped stomach extending from the esophagus to the pylorus [28]. In contrast to Roux-en-Y gastric bypass, the pylorus and the antrum remain intact. The degree of restriction depends on the size of the sleeve at the time of surgery and on the size of the bougie used to guide resection. Various sizes of bougies (32–60F) have been studied with good outcomes for bougies 32–40F [4]. Sleeve gastrectomy does not involve intestinal bypass or malabsorption[36]. Its efficacy and role in the treatment of obesity have been evaluated in a number of clinical studies. Twenty-three studies reporting outcomes of a total of 5764 patients undergoing sleeve gastrectomy as a primary bariatric procedure were identified [39]. The short-term outcome of the procedure with regard to morbidity and mortality was evaluated in 22 studies [36]. Twenty studies reported short-term weight loss, nine reported on remission of type 2 diabetes, and seven assessed remission of other comorbid conditions [25]. Medium- and long-term outcomes were available in seven studies comprising a total of 1384 patients [33]. For studies of 3 or more years of follow-up, percentual excess weight loss averaged 56.1% with values ranging from 47.5 to 70.3%. Resolution of type 2 diabetes (defined as complete remission of medications) was observed in 66.2% of cases. Other studies documented some degrees of remission or clinical improvement in hypertension (63.6%, n = 981), sleep apnea (66.7%, n = 150), and dyslipidemia (41%, n = 781)[23]. Two studies that investigated physiological changes before and after sleeve gastrectomy reported decreased post-operative levels of glucagon-like-peptide 1 and significant improvements in hepatic insulin sensitivity [5]. The procedure exhibits well-documented long-term beneficial effects on glucose homeostasis, even before significant weight loss has occurred [32, 28].

Adjustable Gastric Banding

The laparoscopic-adjustable gastric band, first introduced in 1993, is a minimally invasive, purely restrictive bariatric procedure [6]. Unlike roux-en-Y gastric bypass and sleeve gastrectomy, the adjustable gastric band leaves the gastrointestinal anatomy intact and preserves the natural continuity and integrity of the gastrointestinal tract. Perioperative morbidity and mortality associated with the procedure are minimal [34]. Immediate postoperative complications have been reported to occur in 1.6 to 5.5% of patients, and postoperative mortality is around 0.05 to 0.5% [31]. Longer term complications appear after 2 years and are estimated to occur at a rate of 1 to 3% per year [32]. Nevertheless, high complication and reoperation rates remain unresolved challenges that have driven surgeons to consider alternative bariatric procedures [7]. Short-to-moderate term outcomes are frequently reported, yet extended follow-up periods beyond 4 years remain less well-characterized [33]. According to documented experiences, the initial 4-year learning curve of laparoscopic adjustable gastric banding is not as steep as previously estimated by clinical trials and international registries [36].

Biliopancreatic Diversion

The biliopancreatic diversion (BPD) procedure has shown long-term effectiveness in the treatment of obesity, with clinical series reporting good outcomes and nutritional complications [21]. Studies have examined the impact of BPD with duodenal switch on obesity-related comorbidities, gut hormone secretion, and the nutrient status of surgically treated subjects several years after surgery [29]. Vitamin and mineral deficiencies are the most common nutritional complications after biliopancreatic diversion, requiring regular monitoring and appropriate delivery to prevent the occurrence of severe and irreversible clinical outcomes [8]. Malabsorptive bariatric procedures are increasingly performed in the revisional setting [22]. An analysis of prospectively recorded data for all patients who underwent a revisional biliopancreatic diversion with or without duodenal switch over a 17-year period has been conducted to assess whether the benefits outweigh the risks [9].

Indications for Bariatric Surgery

Bariatric surgical procedures are indicated for patients with a body-mass index (BMI) > 40, or BMI > 35 when combined with other significant comorbidities [10]. Despite intense medical therapy and rehabilitation, obesity and its related health risks often remain inadequately controlled [30]. Appropriate patient selection and indications for bariatric surgery will therefore remain key elements in achieving maximal benefits [6]. The current accepted criteria were provided by the National Institute of Health in 1991 and there continues to be widespread consensus. Surgery should be reserved for patients with a BMI greater than 40 or a BMI over 35 with at least one or more associated comorbidities including hypertension, obstructive sleep apnoea, obesity-related cardiomyopathy, obesity-related mobility issues, infertility related to BMI or diabetes mellitus [38]. Patients should have a history of failure with conservative management such as diet, physical activity and behavioural modification [37]. There should be no known endocrine or other disorder that might be causing the weight gain and patients should be able to comprehend the risks and benefits of the surgery and follow the postoperative programme[32]. It is estimated that between 1 and 3% of the population meets these criteria, whereas surgery is only performed in 0.001% of the population [11].

Preoperative Assessment

Patient eligibility for bariatric surgery hinges on a comprehensive preoperative assessment covering medical, nutritional, and psychological dimensions [13]. The evaluation aims to identify morbid obesity cases, uncover hormonally related or syndromic obesity, and detect preexisting conditions that might complicate surgery or influence outcomes [12]. After a detailed medical history and physical examination, preoperative tests focus on assessing diabetes status, cardiovascular disease, smoking habits, severe endocrine dysfunction, portal hypertension, and the presence of Helicobacter pylori infection [26]. Detection and management of existing lipid metabolism disorders are essential before proceeding with surgery [29].

Postoperative Care

Bariatric surgery has become a widely accepted intervention for patients with severe or medically complicated obesity [13]. Indications are not standardized but generally align with the 1991 National Institute of Health Consensus Conference, which recommended considering surgery for individuals with a BMI greater than 40 or greater than 35 with significant obesity-related comorbidities [15]. Postoperative care represents the surgical care immediately following the procedure [12]. Enhanced recovery after surgery (ERAS) guidelines advocate for multimodal approaches including early mobilization, early feeding, and perioperative fluid management [14]. The consistent application of ERAS protocols for bariatric surgery has become a global priority [13]. Multiple meta-analyses of randomized clinical trials have repeatedly demonstrated the efficacy and safety of these protocols. (See "Preoperative assessment" and "Short-term outcomes")[15].

Short-term Outcomes

Bariatric surgery is an effective treatment for obesity [1]. Over 50% excess weight losses is achieved following Gastric Bypass (GBP)[31]. The majority of the published literature reports on short-term outcomes. Identification of post-operative weight regains and re-emergence of comorbidities requires medium- and long-term follow-up [2]. Measurements of early weight loss and improvement in comorbidities post-surgery can be by-products of reduced oral intake and often improvement in quality of life are unreliable predictors of long-term success and satisfaction [32].

Weight Loss

Moderate to severe obesity reduces life expectancy by approximately 5 to 20 years and is associated with several disease comorbidities [13]. These comorbidities adversely affect patient quality of life and increase the medical and economic burden [1]. Furthermore, obesity is a significant clinical challenge, as most patients with moderate to severe obesity do not achieve long-term weight loss with conventional, nonsurgical interventions, including lifestyle modification and pharmacotherapy [11]. Bariatric surgical procedures currently offer the most effective weight loss treatments for patients with severe obesity [12]. Furthermore, bariatric surgery is associated with improved quality of life, remission, or reduction in the risk of diabetes, hypertension, cardiovascular disease, sleep apnea, nonalcoholic fatty liver disease, and other obesity-related comorbidities and is associated with reduced mortality [27]. Such metabolic improvements can be achieved rapidly, occur before substantial weight loss, and are mediated by mechanisms including bile acid flow and gut–brain axis signaling [18]. Surgical options include Roux-en-Y gastric bypass, sleeve gastrectomy, adjustable gastric banding, and biliopancreatic diversion with duodenal switch [34].

Resolution of Comorbidities

Table 3 summarizes data from four of the more common bariatric surgery procedures [11]. Both gastric bypass and sleeve gastrectomy are generally more effective at inducing weight loss and resolving obesity-related comorbidities than adjustable gastric banding [33]. Nevertheless, the band is a safer choice for patients who are considered high risk because it is less invasive and easier to revise. Comorbidities associated with obesity, especially type 2 diabetes (T2D), refractory hypertension, and obstructive sleep apnoea, have all been shown to resolve after bariatric surgery. Data gathered from the United States National Bariatric Surgery Registry indicate a resolution rate of 70% for T2D[31]. Other conditions that also resolve include hyperlipidaemia, non-alcoholic fatty liver disease (NAFLD), cancer, and functional impairment [15]. A randomized study of 150 diabetic patients showed that of four types of bariatric surgery laparoscopic adjustable gastric band (LAGB), Roux-en-Y gastric bypass (RYGB), bilopancreatic diversion (BPD) and laparoscopic sleeve gastrectomy (LSG) bilopancreatic diversion produced the best results, with remission rates of the order of 95% compared with 75% for gastric bypass and 50% for LAGB and sleeve gastrectomy[17]. The superiority of BPD on T2D has also been confirmed in other studies, although it is rarely undertaken because of the greater risk associated with this procedure [16].

Quality of Life

Best treatment of obesity remains bariatric surgery, which is most effective option to achieve weight loss and reduction of obesity-related comorbidities [23]. It also leads to improvement of health-related quality of life and physical activity. It should be noted that risk of death is extremely low, and quality of life is improved for most patients [17, 18]. Bariatric surgery results in greater weight-loss magnitude than dietary and behavioural treatments and use of medications. It improves many obesity complications, generally more than can be achieved with nonsurgical therapies alone [39]. Psychological factors or 7emotional eating7 can limit and undermine treatment in nonsurgical approaches [37]. Surgery may reduce psychological distress in some patients. Few large-scale long-term prospective randomized trials have been published [34]. Postoperative compliance with behavioural, nutritional, and medical regimens appears most critical in influencing outcome [35]. Long-term patient follow-up is essential to ensure continued patient well-being by identifying psychosocial problems, behavioural deviations, and medical complications[37].

Long-term Outcomes

Bariatric surgery leads to significant improvements in excess body weight, obesity-related illness, and health-related quality of life in the short-term [2]. In contrast, the analysis of long-term outcomes is challenging, with most studies reporting on follow-up periods of less than 5 years [3]. The most common long-term adverse events are nutritional deficiencies, necessitating daily supplementation, and the potential for weight regain [17]. The psychological impact may be beneficial or harmful, highlighting the benefit of comprehensive preoperative psychological assessment and postoperative support [19].

Sustained Weight Loss

Bariatric surgery generates a level of weight loss unmatched by any nonsurgical intervention; however, the extent of weight loss varies considerably within and between the surgical procedures [19]. Despite initially impressive reductions in body weight, weight regain emerges as a troubling issue for many patients [30]. Factors predictive of weight regain following surgery include losing more than 15-30% of initial weight, early weight gain, and a lack of response to early regain [20]. Predicting this regain prior to surgery remains challenging, so current surgical approaches emphasize the selection of the procedure with the highest potential for sustained weight loss. Bariatric procedures are classified as either restrictive reducing food volume intake or malabsorptive bypassing portions of the digestive tract to diminish nutrient absorption [31]. Restrictive operations generally exhibit higher rates of failure and weight regain compared to malabsorptive techniques; accordingly, Roux-en-Y gastric bypass (RYGB) tends to produce superior sustained weight loss relative to gastric banding. Behavioral interventions that target diet, physical activity, and other lifestyle factors are also beneficial, supporting maintenance of long-term weight loss [39]. Notably, engaging in physical activity at moderate or higher intensities correlates with greater weight loss and improved outcomes, rendering exercise an important consideration following bariatric surgery [21].

Nutritional Deficiencies

Long-term nutritional deficiencies are a common consequence of restrictive and malabsorptive bariatric surgery techniques [22]. Among the most frequently reported micronutrient deficiencies are anaemia caused by vitamin B12 and iron depletions; other commonly inadequate micronutrients include magnesium, phosphate, folate, calcium, fat-soluble vitamins, thiamin, vitamin C, and zinc, which remain low for several years after surgery [23, 24]. Bariatric patients are therefore usually submitted to systematic assessment and supplementation of micronutrients before and after intervention [21]. Nutritional support for comorbid patients is crucial to enhance early liver recovery before surgery and to reduce the risk of post-surgical complications [24].

Psychological Impact

The psychological impact of bariatric surgery is widely acknowledged, with reports of both positive and negative outcomes on patients' mental well-being [25]. Weight loss and the resolution of comorbid conditions can contribute to alleviation of symptoms related to depression and anxiety. However, psychological distress may emerge or even worsen following bariatric procedures, particularly in relation to body image and adjustment to rapid changes in weight and lifestyle [28]. Quality of life before and after surgical weight loss is an important factor influencing post-operative psychological state [26]. Group psychotherapy has been advocated as an effective means of supporting bariatric patients through the complex emotional process of adjustment, contributing to improved mental health and weight management outcomes [25]. Despite the potential for beneficial psychological changes, serious concern remains regarding increased suicide rates observed after long-term follow-up; the underlying mechanisms for this trend have yet to be fully elucidated [29].

Complications of Bariatric Surgery

Owing to the complex pathology of obesity, including the burden of excess adipose tissue and a higher prevalence of common comorbidities such as cancer, diabetes and hypertension, bariatric surgery may be associated with a wide range of complications [27]. Initial side-effects following bariatric surgery typically include excessive vomiting, reflux and bile regurgitation [28]; these can generally be prevented or alleviated by introducing the patient to solid foods gradually. The topic of early post-operative effects on bariatric patients is still being investigated; an increased risk of venous thromboembolism and lung infections have been observed but require further study before any relationship with specific surgical procedures can be identified [23]. In the longer term, bariatric patients may be affected by nutritional deficiences as a consequence of the surgery; much of the information currently available on this topic comes from the study of gastric bypass patients, with additional research needed to fully characterize processes following other procedures [27]. Calcium deficiencies resulting in osteoporosis have been identified in patients who have been denied access to recommended supplements, and even in those who comply with post-surgery protocols [28]. Iron deficiency is commonly observed among post-operative bariatric patients, with factors including inadequate intake, reduced absorption, insufficient production of transport proteins and blood loss potentially responsible; optimal strategies for supplementation are yet to be established and research into the underlying mechanisms is ongoing [29]. As first-line support, many research groups advocate a multi-disciplinary approach designed to encourage greater insight and promote healthier eating habits during follow-up [30]. Some studies also suggest that the use of micronutrient pre-supplementation may serve a preventative role for individuals entering surgery having already developed deficiencies [35]. Concerns have been raised regarding occasional increases in vulnerability to obsessive-compulsive tendencies following bariatric surgery, although the associated literature is largely limited to studies on the use of implantable devices for the treatment of obesity [39].

Early Complications

Early complications are those occurring in the first 90 days following operatively induced physiological insult and are generally related to technical difficulty, perioperative medicine, and unanticipated anatomical events [14]. The variety in terminology used to describe complications and complications grading precludes easy comparison between studies [23]. Nevertheless, the authors believe that outlining common concepts on compensation may have some practical benefit before discussing outcome analysis of specific techniques [17]. The term "compensation" is readily dismissed when used to describe early response to injury, because disturbing a homeostatic state would seem to lead quickly to catastrophic failure [18]. The human physiological response to operatively induced insult, however, is an orchestrated and sequential reaction predicated on the expectation of continued blood loss and further insult [25]. An innate presumption exists that safeguards should not be exceeded unless more structure is taken away, as might usually happen with further bleeding [26]. Because early damage frequently stems from failure to anticipate or understand physiological reaction, consequent hypoxia alters relationships toward widespread injury, and greater of insult, escape, or hypoxia brings overt failure [25].

Late Complications

The incidence of late complications varies according to the bariatric procedure performed [29]. A 10-year follow-up of 485 patients compared the health benefits and risks of Roux-en-Y gastric bypass and an age- and sex-matched non-operated control population [29]. Fifteen patients experienced small-intestinal obstruction more than 1 month after surgery, and in 87% the cause was internal hernia. The risk of small-intestinal obstruction was increased about 13-fold compared with the control group [27]. A group of 260 patients who underwent laparoscopic sleeve gastrectomy was compared with a control population that was waiting for the procedure. A significant increase in the formation of gallstones was described 6 months after the surgery [28]. According to the current literature, the highest rate of late complications occurs after biliopancreatic diversion [8].

Comparative Effectiveness

A recent meta-analysis has pooled data from randomized controlled trials (RCTs) that directly compare bariatric surgery with non-surgical treatment strategies for obesity, integrating these findings with data evaluating relative effectiveness of particular surgical interventions [20]. Patients undergoing laparoscopic Roux-en-Y gastric bypass (RYGB) and laparoscopic sleeve gastrectomy (SG) both reduce body weight substantially more than patients randomized to either adjustable gastric banding or non-surgical interventions [23]. Patients undergoing RYGB achieve a larger long-term weight reduction than patients randomized to SG [30]. In the meta-analysis, surgeries are compared with each other and the systematic review indicates that RYGB and SG are associated with a greater reduction in body mass index than adjustable gastric banding [31].

Different Surgical Techniques

Bariatric surgery represents the most effective intervention for severe obesity, entailing various surgical modifications of the gastrointestinal tract to alter nutrient flow and affect gastrointestinal biology [31]. Procedures have evolved from initial approaches in the 1950s involving small intestine resection, often associated with nutritional deficiencies, to modern techniques combining reduced stomach capacity with altered digestion [8]. Current bariatric operations achieve weight loss and metabolic improvements through mechanisms beyond mere restriction or malabsorption [1]. The most commonly performed procedures include Roux-en-Y gastric bypass, sleeve gastrectomy, adjustable gastric banding, and biliopancreatic diversion [31, 1]. Roux-en-Y gastric bypass creates a small gastric pouch and bypasses a portion of the small intestine; sleeve gastrectomy involves resection of a large portion of the stomach, leaving a tubular remnant; adjustable gastric banding places a band around the proximal stomach to restrict intake; and biliopancreatic diversion comprises a distal gastrectomy with a long Roux-en-Y reconstruction to limit nutrient absorption [8]. These procedures differ in technical complexity, invasiveness, and mechanisms of action, yet all generally produce substantial weight loss and amelioration of obesity-related comorbidities [13]. Understanding these distinctions illuminates the varied long-term outcomes observed among bariatric surgery patients.

Non-surgical Interventions

Non-surgical interventions in obesity, targeting energy intake and expenditure, encompass lifestyle modifications, pharmacology, and device implantation [17]. These strategies are often considered for patients outside the criteria for bariatric surgery and recommended after unsuccessful lifestyle intervention [30]. Lifestyle interventions centre on calorie restriction via increased physical activity, dietary changes, or a combination of both [19]. The latter approach tends to promote greater short-term weight loss [16]. Among diets, very low-calorie regimens emphasising rapid weight reduction prove most effective, although maintenance remains challenging owing to compensatory homeostatic mechanisms that favour weight regain [1]. Weight-loss medications, such as

liraglutide, phentermine, or bupropion, yield modest improvements in weight loss but are associated with adverse effects including psychiatric, gastrointestinal, and cardiovascular disorders [6]. Their use is therefore confined to specific populations. Devices like the intragastric balloon reduce gastric space but have fallen out of favour due to complications and weight regain following removal [7].

Patient Selection Criteria

Baros assessment score evaluation shows that 48.3% of patients achieved excellent results, 37.9% very good, and 13.8% good [4]. Bariatric surgeries have become indispensable in the treatment of obesity. Patient selection must be judicious, based on clinical parameters and a thorough preoperative evaluation [8]. Weight loss results are significant in physical, biochemical, and psychological improvements, with a low rate of comorbidities. The Bariatric Analysis and Reporting Outcome System (BAROS) application provides an adequate classification of postoperative patients, enhancing clinical decision-making [8]. The inherent risks of obesity are substantial, and despite the high frequency of obesity, bariatric surgery is reserved for severely obese individuals [32].

Ethical Considerations

Costs, risks and benefits are relevant for ethical decision-making and policy regulation about access to bariatric surgery [33]. Ethics become particularly important in ambiguous cases, such as borderline eligibility or when treatments are not covered by insurance [34]. Decisions include those about limiting access, which procedure to perform, and timing of surgery or preoperative weight loss requirements, in addition to informed consent. Bariatric surgery involves some risk and requires long-term commitment, potentially limiting autonomy or impinging on other ethical principles [38]. Distributive justice is critical, particularly after recent size-based restrictions for public financing in some health systems [40]. The advantages of bariatric surgery must be balanced against the inherent risks associated with such complex procedures [40]. While surgery reduces the mortality risk from severe obesity, it entails a risk profile higher than alternative treatments of uncertain or rarely improved benefit [41]. The associated risks relate not only to the procedure itself but also to postoperative changes that can impact quality of life and have psychological repercussions [5]. Unfavourable outcomes due to inadequate patient selection or follow-up must be anticipated to a sufficient degree to legitimately propose or permit the intervention [6]. A further obligation concerns access to treatment; health policies must consider the costs associated with obesity both to the health-care system and to society [8]. From this perspective, neglecting to fund bariatric surgery for patients who meet established criteria could be regarded as non-maleficence, again highlighting the importance of selecting optimal candidates [8].

Economic Impact

The growing burden of obesity and its treatment costs have attracted the attention of healthcare policymakers [13]. Increased taxation combined with pressumabate easy and cheap diets has failed to address this global problem [34]; [35]. Although bariatric surgery is more invasive than alternative weight loss methods, the risk–benefit ratio and cost-effectiveness suggest that it is generally preferable [36].

Future Directions in Research

Despite advances in the field, there is a need to optimize the selection of patients that will develop long-term complications with bariatric surgery [13]. A better understanding of such factors should allow the development of tailored recommendations in surgical procedure, nutritional supplements and follow-up [16]. Further technological developments such as wireless monitoring of the nutritional status in individuals could also play an important role in moving the field forward [2].

Patient Experiences and Testimonials

Three key concepts, control, normality and ambivalence, encapsulate patients' experiences of outcomes following bariatric surgery [12]. These are illustrated in relation to impact on weight, activities of daily living, physical health, psychological health, social relations, sexual life, body image and eating behaviour. Adolescents are primarily positive or ambivalent about their personal outcomes following bariatric surgery [18]. Most report improvements in body image and confidence but some struggle with internal identity and external perceptions. Body dissatisfaction is common among those with unrealistic weight-loss goals. Better outcomes are linked to having realistic expectations prior to surgery [15]. Weight loss slowing at 24 months can be discouraging, and worries about weight regain arise [13]. Postoperative support from a multidisciplinary team is critical for addressing the challenges to maintaining routines, problematic eating behaviours and social support[11]. Developing self-management skills is important for normalizing setbacks and pursuing long-term goals [19, 37]

Public Perception of Bariatric Surgery

Bariatric surgery is an effective intervention for morbid obesity that can improve quality of life; however, patients often anticipate dramatic lifestyle and health changes that do not always materialize [19]. Qualitative

investigation of individuals in the preoperative phase can inform anticipatory guidance and identify support needs before, during, and after surgery [33]. Candidates commonly view surgery as a last resort after the failure of alternative weight-loss methods; thus, they expect sufficient weight loss to alleviate comorbid conditions and facilitate the maintenance of a healthy lifestyle. Contrary to expectations, moderating daily eating processes can prove challenging for some [38]. In contrast, postoperative patients often report fewer difficulties controlling eating behavior. Anticipation of the operation elicits a spectrum of excitement, anxiety, and fear. Despite positive perceptions of surgical outcomes, some candidates express concern regarding the inherent risks and potential long-term complications [37]. Many remain uncertain about the permanence of lifestyle changes. Unrealized expectations can negatively affect the experience of surgery and postoperative adjustment [35]. Screen-based interventions tailored to the preoperative stage have the potential to provide support, information, and appropriate referral, thereby alleviating uncertainty during the waiting period [34].

Global Trends in Bariatric Surgery

Bariatric surgery has evolved markedly over recent decades [1]. In the early 2000s, Roux-en-Y gastric bypass (RYGB) constituted 70% of global procedures, whereas adjustable gastric banding (AGB) represented about 10%, with sleeve gastrectomy (SG) contributing less than 10% [32]. RYGB has traditionally been considered the benchmark surgery, given robust data delineating its weight-loss mechanisms and widely documented outcomes [1]. Trends in the United States now indicate a preference for the less invasive SG technique, accounting for nearly 60% of procedures [39].

Role of Multidisciplinary Teams

The importance of multidisciplinary teams in bariatric surgery cannot be overstated [36]. Multidisciplinary involvement can maximize and prolong the effects of bariatric surgery by addressing obesity as a chronic multicause disease and providing all-round, long-term follow-up that meets patients' varied and changing mental and physical needs at different periods [40]. Multidisciplinary approaches also improve body composition and metabolic outcomes, as demonstrated in a 2-year follow-up cohort observed by [41]. Further, the incorporation of multidisciplinary teams is associated with significantly reduced rates of early hospital readmission [12]. Bariatric surgery thus represents a clinical setting in which multidisciplinary teams contribute to enhanced quality and safety of care [37].

Regulatory and Policy Issues

Federal policy on bariatric surgery in the USA has evolved in response to both the epidemic of this treatable disease and the tremendous growth in bariatric surgery [37]. It is interesting to highlight the evolution of the Centre for Medicaid and Medicare Services (CMC) which was active until at least 2006 and which influenced access policy to bariatric surgery[41]. Not surprisingly, economic and quality-of-care criteria determined eligibility for coverage. Gained access was often coupled with extensive preparations and follow-up requirements and within the context of limited operative coverage for weight loss [32]. Despite the many years of analysis since the epidemic started, many of the policy decisions are revisited today and agreement among specialists differs widely [40]. The society was moving toward more quality assurance and less public and private coverage [38]. After six nationwide work-hour reforms by the Accreditation Council for Graduate Medical Education (ACGME), the most recent was implemented in 2011 and restricts to 80 h per week the maximum number of duty hours a resident can work as averaged over a 4-week period in USA residency training programs[39]. If this is a policy that was implemented with the intention of improving safety it may have influenced readmission rates. Significant improvements in postoperative outcomes often arise from randomized studies of a surgical technique under investigation [40]. It is difficult to quantify the economic impact of the quality processes applied to bariatric surgery in the USA since minimal data are available on the costs of care [12]. Through the constraints faced by purchasers and the maintenance of records that demonstrate quality assurance, bariatric surgery has become a clear example of the role of quality programs in mitigating costs [38]. However, bariatric surgery in terms of obesity treatment is only one, ultimately temporary, tool in the solution to the obesity epidemic and, after the 21st century, controversy will rage on at least as long as other research and developments present clinicians and patients with viable alternative interventions[41].

CONCLUSION

Bariatric surgery remains the most effective intervention for managing severe obesity and its associated comorbidities, including diabetes, hypertension, and cardiovascular disease. Among available techniques, Roux-en-Y gastric bypass and sleeve gastrostomy demonstrate superior outcomes in terms of sustained weight loss, metabolic improvement, and enhanced quality of life. However, surgical success extends beyond the operating room; it depends on meticulous patient selection, preoperative evaluation, and long-term multidisciplinary follow-up. Early complications such as hypoxia or bleeding, and late complications including internal hernias or

gallstones, highlight the need for continual monitoring and patient education. Ethical and policy considerations are equally significant, particularly regarding equitable access, informed consent, and distributive justice. The cost-effectiveness of bariatric surgery supports its prioritization within healthcare systems, yet disparities persist, emphasizing the importance of policy reform and public funding for eligible patients. Moreover, patient experiences reveal complex psychological responses ranging from empowerment to ambivalence, underscoring the need for psychosocial support both before and after surgery. Global trends indicate a steady shift toward less invasive techniques like sleeve gastrectomy and an increasing reliance on multidisciplinary care teams to manage obesity as a chronic, multifactorial condition. The integration of technological advancements, such as digital monitoring tools and telemedicine promises to enhance postoperative care and data collection. Looking ahead, bariatric surgery will continue evolving through innovations in technique, precision medicine, and policy advocacy. Success in combating the global obesity epidemic will depend not only on surgical excellence but also on sustained collaboration between clinicians, policymakers, researchers, and patients to ensure that the benefits of bariatric surgery are safe, accessible, and equitable for all.

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