

Bariatric surgery is an effective treatment for morbid obesity

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ABSTRACT

The global obesity epidemic is also affecting the Netherlands, paralleled by a proportional increase in the number of morbidly obese persons. Bariatric surgery has been included as a treatment for morbid obesity in the Dutch Guideline for Obesity (2008). Nonetheless, bariatric surgery is applied in only a limited number of morbidly obese subjects in the Netherlands. Based on the most recent literature and Dutch statistics, this review provides a summary of current knowledge on the impact of obesity on health and health care and highlights the effective role of bariatric surgery in reducing this threat to public health.

KEYWORDS

Bariatric surgery, morbid obesity, treatment

INTRODUCTION

The obesity epidemic is growing and a call for action was recently launched.^{1,4} Overweight/obesity means disproportionately more weight in relation to body height and is quantified by the body mass index (BMI; weight in kilograms divided by length in squared meters, kg/m²). A BMI >25 kg/m² represents overweight, >30 kg/m² obesity, and >40 kg/m² morbid obesity.⁵ The prevalence of obesity is expected to increase further.⁶ Standard primary treatment of obesity consists of diet and lifestyle interventions.⁷ Medical therapies are not widely used due to their modest effect.⁸ A relatively novel

treatment option is bariatric surgery, which consists of several surgical procedures aimed at losing weight. Bariatric surgery is currently the only effective treatment for morbid obesity and leads to relevant sustained weight loss as well as a decrease in the prevalence and incidence of comorbidity.⁹⁻¹¹ Nonetheless, bariatric surgery is only available for a limited proportion of patients with morbid obesity. Although the number of subjects who were eligible for bariatric surgery in the Netherlands was 220,000 in 2007,¹² only 3500 patients underwent surgery in 2008.¹³ Moreover, within the public debate, the notion often prevails that the complications resulting from surgical intervention outweigh the positive results of bariatric surgery.^{14,15}

Obesity benefits from a multidisciplinary approach, which should include bariatric surgery.^{16,17} The aim of this article is to review the possibilities of surgical treatment of morbid obesity. For specific patients the health benefit is clear and it is of importance that these patients are being informed of this effective and safe treatment of their obesity.

PREVALENCE, INCIDENCE, AND TRENDS OF OBESITY

Dutch data from the Central Organisation of Statistics (Centraal Bureau voor de Statistiek; CBS) show a twofold increase in the number of adults with obesity (BMI > 30 kg/m²) during the past 20 years.¹⁸ In the period 1981-2009 the number of obese men increased from 4.0% to 11.2%, and the number of obese women increased from 6.2%

to 12.4%. It is unknown how many adults are morbidly obese, but in a report in 2003 from the Health Council (Gezondheidsraad) the number of morbidly obese adults was estimated at 1-1.5% after extrapolation of US and UK statistics.¹⁹ In comparison, in 2007 in the US, 4% of men and 6% of women had a BMI >40 kg/m² which, according to forecasts, will increase to 5% and 10%, respectively, in 2030.²⁰ The UK population shows a similar trend with an increase from 1% to 3% in male adults, and from 3% to 6% in female adults.²⁰ Some other extrapolations show even worse scenarios.²¹

COMORBIDITY AND MORTALITY ASSOCIATED WITH OBESITY

The relative risk for coronary heart disease with a BMI of 26 kg/m² compared with a BMI of <21 kg/m² is 2 and 1.5 times higher in women and men, respectively.²² The relative risk for diabetes mellitus type 2 (T2DM) is fourfold increased in men and eightfold in women and for hypertension about 2-3 fold in both men and women comparing a BMI of 26 kg/m² with <21 kg/m². These relative risks increase further when the BMI increases to >29 kg/m².²²

Obesity and morbid obesity are associated with increased mortality amongst both men and women. A BMI of 30-35 kg/m² decreases median survival by 2-4 years, and a BMI of 40-45 kg/m² by 8-10 years.²³

Furthermore, quality of life in patients with morbid obesity is decreased compared with patients with other chronic diseases. The occurrence of psychological problems such as depression, somatisation, inter-personal problems, low social adaptation, and low self-esteem seems to be higher in obese individuals.²⁴

COSTS RELATED TO OBESITY

The overall costs related to morbid obesity consist of both costs for health care (direct) as well as absenteeism (indirect). Specific financial data related to morbid obesity in the Netherlands are not available, but, in general, health care expenses increase proportionally to the increase of bodyweight.²⁵ The most recent statistics from the Netherlands show significantly higher sick leave percentages (both related to frequency and duration of sick leaves) in employees with obesity (BMI >30 kg/m²) compared with non-obese employees.²⁶

In various countries obesity accounts for 2-6% of the total budget available for health care.¹ These costs are related to medical treatment of diseases such as T2DM and cardiovascular disease, and to the use of non-steroidal anti-inflammatory agents and other analgesics (relative

risks vary from 4.1 to 9.2). These prescriptions result in a doubling of the total amount spent in obese versus normal weight subjects.²⁷ The association between BMI and coronary heart disease, hypertension, and diabetes largely explained these increased costs. The annual rates of inpatient days, number and costs of outpatient visits, costs of outpatient pharmacy and laboratory services, and total costs are related to obesity as well, with mean annual total costs being 25% higher among those with a BMI of 30 kg/m² to 34.9 kg/m² (rate ratio 1.25; 95% confidence interval 1.10-1.41), and 44% higher among those with a BMI of 35 kg/m² or greater (rate ratio 1.44; 95% confidence interval 1.22-1.71), compared with a BMI between 20 kg/m² and 24.9 kg/m².²⁵

In the Netherlands, the yearly expenses related to obesity are estimated to be approximately 505 million Euros. This represents 1.6% of the total health care budget for adults of ≥20 years of age.²⁸ In 2002 the Public Health Council (Raad voor de Volksgezondheid en Zorg) estimated the indirect costs related to overweight and obesity as being 2 billion Euro per year. These costs will increase over time if the current trend in increasing prevalence in obesity mimics the situation in the US, resulting in a threefold increase per generation, consisting of 20 years each.²⁹ Already in 2000, the World Health Organization (WHO) declared that 'surgery is now considered to be the most effective way of reducing weight, and maintaining weight loss (BMI >35 kg/m² or above)', and that on the basis of cost/kg of weight lost, 'surgical treatment has been estimated, after four years, to be less expensive than any other treatment'.³⁰

TREATMENT OF MORBID OBESITY

Dutch guideline on obesity³¹

Treatment of obesity aims at restoration of energy balance, i.e. a decrease in energy intake and an increase in energy expenditure. The Dutch guideline on obesity established in 2008 (Centraal Begeleidings Orgaan, CBO) recommends combined lifestyle interventions in order to lose weight and maintain weight loss eventually resulting in a clinical benefit on general health. The duration of this intervention should be at least one year. The composition of the energy-restricted diet should reflect a healthy balanced diet according to current guidelines on healthy food. Expertly guided and supervised physical activity programs are part of the intervention. Furthermore, cognitive behavioural therapy may be considered in addition to the treatment. Lastly, the role of medical treatment is limited. Only when conventional therapy fails, bariatric surgery may be considered in persons with a BMI >40 kg/m² or >35 kg/m² with comorbidity such as T2DM and/or hypertension (table 1).³²

Table 1. Criteria for bariatric surgery in the Netherlands³¹

BMI > 40 kg/m ² or >35 kg/m ² with comorbidity such as T2DM and/or hypertension
Prior intensive treatment in a specialised obesity clinic/program
The patient is physically suitable for anaesthesia and surgery
The patient is willing to take vitamin preparations life long
The patient is willing to cooperate in long-term follow-up and understands the necessity for this

Effects on weight loss and comorbidity: conventional versus surgical treatment

A recent Cochrane review concluded that bariatric surgery results in more weight reduction than conventional treatment, and that the results will sustain for at least ten years.³³ The results of the landmark follow-up study conducted in Sweden, the Swedish Obese Subjects (SOS) study, documented lower morbidity and mortality rates as well as a sustained weight loss of on average 16% after ten years in favour of bariatric surgery. Furthermore, the prevalence of T2DM, dyslipidaemia, and hypertension was lower after two and ten years. Lastly, bariatric surgery is associated with a decreased number of people suffering from cardiovascular disease.^{10,34} Two and six years after surgery, surgically treated patients needed less medication for cardiovascular disease or diabetes.³⁵

In two recent studies, different types of bariatric surgery in severely obese patients with T2DM were compared with medical therapy. These two randomised controlled trials provide further evidence that surgery can be more effective than either standard or intensive medical treatment alone. After two years, rates of complete remission of diabetes were 75% for gastric bypass and 95% for biliopancreatic diversion (partial gastrectomy and gastroileostomy with a long segment of Roux limb and a short common channel), as compared with no remissions for medical therapy. In addition, dyslipidaemia improved significantly.³⁶ After one year, a glycated haemoglobin level of ≤6%, was achieved in 12% of patients in the medical therapy group versus 42% in the gastric bypass group and 37% in the sleeve gastrectomy group.³⁷ Finally, quality of life improved in subjects after bariatric surgery compared with a non-surgically treated group. Despite some weight regain after ten years, the score for quality of life remained higher in surgically treated patients.³⁸⁻⁴⁰

TYPES OF BARIATRIC SURGERY

At present, bariatric surgery is mainly performed laparoscopically, and consists of restrictive and/or malabsorptive components. The most frequently performed procedures are: 1) laparoscopic Roux-en-Y gastric bypass (LRYGB) which combines restrictive

and malabsorptive components, 2) sleeve gastrectomy, which induces food restriction only and often serves as a bridge to a gastric bypass, and 3) adjustable gastric band (laparoscopic adjustable gastric band; LAGB) which is purely restrictive (figures 1-3).

Figure 1. Gastric bypass



Figure 2. Gastric sleeve

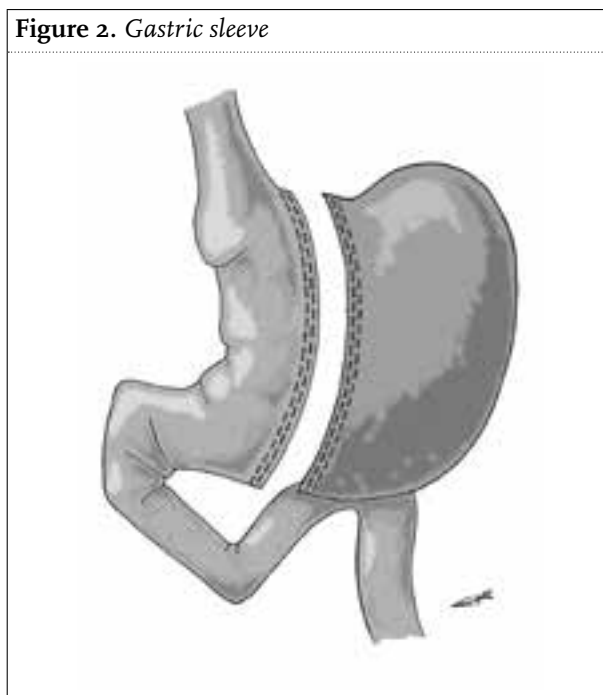


Figure 3. Gastric banding



bariatric procedure.⁴⁸ Therefore, LAGB is currently not the preferred treatment option. The sleeve gastrectomy is relatively new as a primary bariatric intervention. Initially this type of surgery was performed specifically as an alternative to patients with extreme obesity (BMI >60 kg/m²) or if LRYGB was not technically feasible. Short-term results are good,⁴⁹ but long-term results are still awaited.

COMPLICATIONS OF BARIATRIC SURGERY

In general, 30-day mortality after bariatric surgery is low, ranging from 0.09% to 0.3%.⁵⁰⁻⁵² The 30-day mortality of laparoscopically performed bariatric surgery is 0.07% versus 0.3% for open procedures.⁵¹ The presence of cardiac, pulmonary, vascular, metabolic, and inflammatory comorbidity renders the patient more susceptible to complications such as fluid imbalances, complicated intubation, myocardial ischaemia, venous thrombosis, pulmonary embolism, and wound infection.⁵³⁻⁵⁴ Anastomotic leakage is a severe complication and occurs in 0-5.4% of cases and strongly depends on the experience of the surgeon.⁵⁵⁻⁵⁶ In general, the duration of hospital admission is usually short with a median duration of 1-2 days.⁵⁷ In order to prevent long-term complications of bariatric surgery, such as weight regain, nutritional and vitamin deficiencies, and glycaemic disorders, the Endocrine Society has provided a practical guideline with recommendations.⁵⁷

VOLUME AND QUALITY OF BARIATRIC SURGERY

Approximately 40,000 bariatric procedures were performed in 1998 worldwide. This increased by 266% in 2003 and even increased further to 345,000 bariatric procedures in 2008. In the Netherlands an estimated 3500 patients were operated on in 2008.¹³ However, in the Netherlands more people are eligible for bariatric surgery and it is estimated that the number of patients eligible for bariatric surgery will increase from 220,000 in 2007 to as many as 336,000 in 2012.¹² In the Netherlands, 16 hospitals perform bariatric surgery on a regular basis. The Dutch Society of Surgery (Nederlandse Vereniging voor Heelkunde; NVvH) has recently determined that bariatric surgery belongs to the category of 'both high-complex and low-complex, high-volume surgical interventions to which qualitative conditions for the health care institution apply'. To be eligible as a centre for bariatric surgery, a hospital has to fulfil 15 criteria (table 2). This quality standard demonstrates the specific and multidisciplinary nature of this type of care.⁵⁸

The mechanisms explaining the sustained weight loss and metabolic improvement induced by RYGB have not been fully elucidated. The restrictive nature of this procedure only explains in part the lower caloric intake. The anatomical changes induced by bariatric surgery alter the secretion of classical hormones and gut peptides involved in food intake, satiety, reward and metabolic handling of nutrients.⁴¹⁻⁴⁴ Improvement of the features of the metabolic syndrome are mainly correlated to excess weight loss⁴⁵ but may be partly induced by these neuroendocrine changes occurring after bypass surgery. In addition, weight loss after surgery is associated with a lower inflammatory status that might contribute to the metabolic improvement after bypass surgery.⁴⁶

The effectiveness of bariatric surgery is usually measured by means of the amount of weight loss. The most commonly used outcome parameter is the percentage loss of the overweight expressed as % excess weight loss. A meta-analysis, in which the two most commonly performed surgical procedures were compared (LAGB vs. LRYGB), showed that the median % excess weight loss 1 year after LRYGB was 26% higher than LAGB, with a more favourable effect on comorbidity.⁴⁷ After LAGB, weight regain might occur with the necessity to perform a second

Table 2. Criteria for hospitals performing bariatric surgery in the Netherlands⁸

1. Presence of a department of Internal Medicine (Endocrinology) and Gastroenterology, with specific knowledge of morbid obesity and surgical treatment options
2. Presence of a department of (interventional) Radiology
3. Presence of an endoscopy unit
4. Presence of specifically trained anaesthesiologists with experience in the treatment of bariatric surgical patients
5. Presence of a multidisciplinary team (consisting of at least an internist/endocrinologist, dietician, psychologist, surgeon and nurse specialist) to take care of the intake procedure, needs assessment and counselling of patients
6. Within the clinic all relevant disciplines must agree on the classification and treatment of different patient categories
7. Presence of protocols for the surgical treatment of morbid obesity
8. Presence of basic facilities, materials and tools used for morbid obese patients, such as waiting rooms, chairs, beds, scales, and recovery room and intensive care facilities
9. Presence of an established contact with a reference centre for referral or consultation
10. Acute surgery and surgical interventions for complications related to bariatric surgery are performed by surgeons from the clinic with sufficient experience in elective bariatric surgery, or arrangements with the centre for referral or consultation about these interventions must be defined
11. The surgical department maintains a digital database in which treatment data and outcomes of treatment and complications of all patients are registered
12. At least 100 primary bariatric procedures a year are performed
13. It is recommended that departments that start with bariatric surgery shall initially be limited to simple procedures (laparoscopic gastric band placement) in low-risk patients. This includes patients with an ASA rating ≤ 3 , no major abdominal surgery in the medical history, age < 60 years, and a BMI ≤ 45 kg/m² for men and ≤ 50 kg/m² for women
14. It is recommended not to treat super obese patients (BMI > 50 kg/m²) nor to perform technically complex operations in the first 1 to 2 years until sufficient experience (at least 75-100 LAGB procedures) has been gained
15. Complex bariatric procedures such as laparoscopic gastric bypass procedure, duodenal switch and sleeve resections are carried out only after sufficient experience with simpler procedures (minimum of 100 LAGB) and adequately trained professionals

CONCLUSION

Obesity is a major health problem with serious medical, psychological and socioeconomic consequences. Reduction of excessive body weight is associated with a decreased prevalence and incidence of obesity-related health problems such as diabetes, cardiovascular disease and psychological health. Bariatric surgery is a very effective treatment for morbid obesity with relatively limited complications, if performed by experienced surgeons. However, the number of potentially eligible patients with morbid obesity by far exceeds the current availability of bariatric surgery in the Netherlands.

Multidisciplinary teams, consisting of internists, gastroenterologists, surgeons, dieticians, nurse specialists and psychologists, should carefully select patients eligible

for bariatric surgery and guarantee long-term structured follow-up. Studies that identify which subgroups of obese subjects will clinically benefit the most and which determinants predict clinically significant weight loss should be undertaken by performing multicentre studies nationwide. This will enable us in the future to perform these surgical procedures only in patients in whom a clear clinical benefit can be expected.

In the Netherlands bariatric surgery is performed in non-academic hospitals. Commitment of university hospitals to develop research programs in close collaboration with these bariatric centres is necessary to gain more insight into the long-term consequences of bariatric treatment. A national prospective registry and database of all patients who underwent bariatric surgery is another tool to monitor safety.

CONFLICT OF INTEREST

None to declare.

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