The obesity epidemic: Is bariatric surgery the antidote?

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EPIDEMIOLOGY AND IMPACT OF OBESITY

We live in a supersized world, where big is small, huge is medium and enormous is large. A recent addition to this environment was the Hardee's "Monster thickburger" boasting a gargantuan 1420 calories and 107 g of fat. Not only has this product taken off, customers have been literally devouring it, leading to a 20% increase in sales at Hardee's stores since its 2003 debut (1). Therefore, it is not surprising that in the United States, at least 131 million adults are overweight or obese, and obesity is the second most common cause of death in the United States (2). In Canada, the situation is similar, with almost 31% of Canadian adults classified as obese (3); indeed, obesity has doubled over a 13-year period from 1985 to 1998 (4). The health consequences of obesity are devastating and expensive, accounting for 2.4% of the total Canadian health care expenditures for all diseases and a direct cost of \$1.8 billion in 1998 (4). Furthermore, obesity is associated with many comorbid illnesses such as hypertension, hypertriglyceridemia, hyperlipidemia, hyperinsulinemia, coronary artery disease, stroke, osteoarthritis, sleep apnea, gastroesophageal reflux disease, pancreatitis and steatohepatitis, as well as breast, endometrial, prostate and colon cancer. These alone account for an additional 2.5 million deaths per year worldwide (5). Thus, organizations such as the National Institutes of Health and the Surgeon General of the United States have acknowledged the importance of the problem and have urged the development of public health strategies to curb the epidemic (6).

CONSERVATIVE APPROACHES TO MANAGE OBESITY

Many conservative approaches have been undertaken to reduce weight and, thus, ameliorate the detrimental effects of an excessive amount of body fat. Medical treatments for obesity seek to either decrease energy intake or increase energy expenditure. Those that decrease energy intake have a greater potential for causing acute weight loss than those that attempt an increase in energy expenditure. There are three key modalities: dietary intervention, physical activity and behaviour modification. Dietary intervention represents the cornerstone of

conservative weight loss therapy, where the ultimate goal is to achieve negative energy balance by decreasing food intake. The second modality is physical activity (three to seven sessions 30 min to 60 min each) and aims to increase net energy expenditure. Most regimens combine dietary interventions and exercise in some fashion. The third modality is behaviour modification and is based on the classical conditioning principle that behaviours are often prompted by an antecedent event, and the link between the antecedent event and the behaviour becomes stronger with repetition. Disconnecting the triggers within this chain helps to diminish the strength of each trigger over time. However, even when combined, these first-line medical strategies may only be effective in some patients. The fact is, weight loss is frequently unsustainable, with only 5% to 10% of patients maintaining the lost weight for more than a few years (7). Additionally, such conservative measures do not sustain the improvements in obesity-related comorbidities such as hypertension, dyslipidemia, hyperinsulinemia and the progression to diabetes (8).

In situations where lifestyle changes (ie, diet, exercise and/or behaviour modification) are ineffective in yielding sustained weight loss, physicians often resort to drug therapy as a second-line conservative approach for weight reduction. Currently, the United States Food and Drug Administration has approved drugs in two classes for weight control. The first is an anorectic agent (sibutramine [9]) which acts a serotonin and norepinephrine reuptake inhibitor. The second is a malabsorptive agent (orlistat [10]) which inhibits gastric and pancreatic lipase. Although most patients lost 1.8 kg to 4.5 kg over one year using these agents, weight regain was high once these drugs were discontinued (11). Moreover, the risk-to-benefit ratio of drug therapy is still not predictable because sufficient long-term studies (greater than one year) are not yet available (12).

The conservative options outlined remain disappointing, with most patients either losing an inadequate amount of weight or (for those able to lose a significant amount of weight) experiencing total weight regain within a few years, an outcome termed the 'yo-yo' phenomenon (13).

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SURGICAL MANAGEMENT OF OBESITY

As a result of the overall failure of conservative treatments, particularly for the severely obese, there has been a resurgence of surgical approaches to managing the obese patient. In the United States, the number of patients undergoing bariatric surgery has increased almost exponentially in the past four years; approximately 100,000 weight reduction surgeries were performed in the United States in 2004 (14). Current surgical techniques for severe obesity are best classified as those that primarily effect restriction of the stomach size and hence provide early satiety (restrictive operation)' and procedures that primarily cause maldigestion and malabsorption (malabsorptive operations).

Restrictive operations serve primarily to limit food intake and do not interfere with the normal digestive processes. These procedures act to reduce gastric volume and, thereby, create a mechanical barrier to the ingestion of food, producing early satiety. Vertical banded gastroplasty, adjustable gastric banding and gastric bypass are the three restrictive options. Gastric banding and vertical band gastroplasty are technically simpler and have fewer complications than bypass, but are less effective in achieving and sustaining significant weight loss (15-18).

Malabsorptive operations act predominantly by reducing the absorption of calories and nutrients, and to a lesser extent by restricting food intake. Biliopancreatic diversion is the primary operation in this category. Malabsorptive operations cause a greater degree of weight loss (approximately 75% excess weight) than gastric restrictive procedures, but are associated with abnormalities of malnutrition and complications (ie, stoma ulcers; flatulence; and loose, foul-smelling stools). The addition of a duodenal switch decreases protein deficiency and gastrointestinal side effects.

In the past five years, the laparoscopic approach has become increasingly available, with surgeons gaining more

experience using these techniques. The benefits of such an approach are a decreased wound complication rate, a shorter hospital stay, less postoperative discomfort, higher patient acceptance and similar weight loss results compared with the open technique (19,20). There is a steep learning curve in performing these operations, necessitating advanced laparoscopic skills (21).

The current consensus is that surgery is the only proven method of long-term weight loss for the large majority of morbidly obese patients (body mass index greater than 40 kg/m²). It has the advantage of being a long-term treatment for a chronic health problem. This contrasts with the short-term benefits offered by medical management or lifestyle alterations. Bariatric surgery is associated with more substantial weight loss than conventional medical management (22). The outcome categories of hyperlipidemia, hypercholesterolemia and hypertriglyceridemia are significantly improved across all surgical procedures, with approximately 70% of patients exhibiting improvement (23,24).

CONCLUSIONS

With the boom of 'monster burgers' and the desire to 'super-size', obesity has reached epidemic proportions in the western world and is beginning to be evident in developing countries. Conservative medical and behavioural interventions to date have been largely ineffective in this growing problem. Bariatric surgery is steadily becoming the most effective intervention in severe obesity for both weight loss and treating the perilous comorbidities associated with a markedly elevated body mass index. Faced with a growing legion of patients with extreme obesity, bariatric surgery may soon be the only cure for the 'battle of the bulge' pandemic.

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