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Is bariatric surgery a serious solution to the diabetes epidemic?

Matthew Haines, Dr Chinnodorai Rajeswaran, Mohan Ramasamy and Debbie Hastings provide perspective on the role of exercise science after surgical weight loss

Introduction

Obesity has increased rapidly and is now so prevalent in the UK that it is described as an epidemic. Lurking in the shadow is a tidal wave of diabetes. The expression ‘diabesity’ describes the co-existence of both epidemics. Indeed, the UK has one of the highest incidences of severe obesity in the world with more than 50% of adults who are overweight (BMI > 25) and ≥ 40 -years-old having intermediate hyperglycaemia, commonly referred to as pre-diabetes (Mainous III *et al.*, 2014). The personal and economic burdens are a challenge to the National Health Service (NHS) since both diseases are associated with significant morbidity.

In 2013–14, the number of NHS-commissioned bariatric surgery procedures performed in England was 6380 (Health and Social Care Information Centre, 2015). As advocates of the efficacy of exercise to prevent obesity and diabetes, many sport and exercise scientists might consider operative solutions to be anathema. Nevertheless, considering the challenge that diabesity poses, active management of the problem should attract equal priority. However, it is important to emphasise that bariatric surgery is not a panacea for all people with obesity. Awareness of the risks and benefits of the various procedures and the commitment required to behaviour change for a successful long-term outcome must be understood.

Surgical weight loss

Bariatric surgery is usually undertaken laparoscopically. ‘Restrictive’ procedures rely on reducing stomach volume and hence the amount of food that can be consumed, whereas ‘malabsorptive’ procedures rely on anatomical changes to the stomach and small intestines to reduce absorption of food. A range of procedures are carried out in the UK. Gastric banding is a reversible procedure whereas Roux-en-Y gastric bypass surgery is not, and because continuity of the stomach and intestines are not maintained, increases the incidence of nutritional deficiencies. Roux-en-Y gastric bypass involves creating a small pouch from the original stomach which remains attached to the oesophagus at one end, and at the other end is sutured directly to the distal portion of the small intestine, thus bypassing the remaining stomach, duodenum and proximal small intestine.

Bariatric surgery leads to significant weight loss in obese patients (de Aquino *et al.*, 2012) and is generally considered a cost effective treatment. The initial cost of surgery is approximately £6,000, but preventing the long-term complications of obesity and diabetes might ultimately save the NHS money. Surgery is recommended by The National Institute for Health and Care Excellence (NICE) as a first-line option for adults with a BMI ≥ 50 kg·m², and those with a BMI ≥ 40 kg·m² when severe obesity has been present for five years. Furthermore, since 2014, NICE has recommended that all patients with a BMI of 30-34.9 kg·m² who have recent-onset type 2 diabetes should be offered an expedited assessment for surgery. An individual risk benefit evaluation should be carried out by the bariatric multi-disciplinary team prior to surgery. Patients should have tried and failed to achieve weight loss by other appropriate non-surgical methods, generally for 12 – 24 months, and be fit for surgery.

The role of exercise after surgery

A systematic review and meta-analysis found that exercise after bariatric surgery leads to further weight loss compared to those who undergo surgery but do not exercise (Egberts *et al.*, 2012). Similarly, Livhits *et al.* (2010) found exercise was significantly associated with successful weight loss (odds ratio 3.5, $p < 0.01$). As will be well understood by BASES members, in addition to the importance of improved body composition, exercise provides other physiological and psychological benefits. Although we may recommend exercise as part of the aftercare of the bariatric surgical patient, the majority of research is observational. We do not know if current exercise guidelines are optimal or appropriate. Additionally, during rapid post-surgical weight loss, a significant amount of muscle mass is lost which has a negative influence on energy balance. The extent of this loss varies for the different bariatric procedures, with fat-free losses of 18–31% reported (Chaston *et al.*, 2007). Therefore, exercise may have an important role in parrying surgically induced sarcopenia.

Furthermore, there are medical, functional and social complications following surgery that might prevent patients engaging with physical activity (refer to table 1). We emphasise that the challenge after bariatric surgery is significant and ongoing. It is important that patients do not see surgery as a miracle cure, and creating a degree of ambivalence to encourage patients to understand the root of the reasons that caused their obesity is important. Although complications following bariatric surgery are rare, especially for procedures performed laparoscopically, there are a range of other considerations to be aware of. Bariatric surgery patients are prone to developing some degree of nutritional deficiency and metabolic bone disease due to reduced absorption of calcium and vitamin D from the duodenum and proximal jejunum. Dumping syndrome is a further debilitating condition, caused when foods are eaten but remain undigested due to the artificially made smaller stomach. When the food is delivered to the small intestine fluid is drawn into the intestinal lumen stimulating a vagal reaction leading to symptoms of abdominal pain, sweating, nausea, diarrhoea, tachycardia and syncope.

*** *Insert box 1 near here* ***

The exercise scientist as part of the multi-disciplinary team

The role of the sport and exercise scientist within bariatric surgery is to develop research to inform practice – currently there is a dearth of research considering exercise after surgery. Randomised controlled trials are needed to investigate the optimal prescription (duration, intensity and frequency) and type (aerobic, resistance or interval training) of exercise for weight loss in surgical patients. Qualitative research relating to patient experience after surgery would also be valuable. Essential to this understanding is a multi-disciplinary approach that focuses on managing complex issues in a unified manner. The team should include specialist consultant physicians and surgeons, nurses, dieticians, physiotherapists and psychologists in addition to exercise practitioners and exercise scientists.

Summary

Obesity and diabetes are complex diseases and require a complex solution. As exercise scientists we feel promotion of long-term behaviour change and the beneficial physiological adaptations associated with an active lifestyle are our preserve. Whilst we do not question this, we advocate an acceptance that the level of diabetes has become ‘that bad’, and that bariatric

surgery has to be one of a range of approaches to weight loss. It is also important to ensure that surgery is not offered prematurely in a patient’s weight loss pathway. Patients need to be informed of the benefits and risks as well as the life-long implications of surgery. The process ultimately requires patients accepting responsibility for their own health and wellbeing. As exercise scientists and exercise practitioners, we should aim to consolidate surgically achieved weight loss to help improve patients’ post-surgical outcomes.

Table 1. Summary of commonly cited pros and cons of surgery, as reported by a range of surgical patients engaged in exercise interventions as part of follow-up care

Pros	Cons
<p>Medical</p> <ul style="list-style-type: none"> • Health benefits (reduced diabetes, heart disease, joint pain etc.) 	<p>Medical</p> <ul style="list-style-type: none"> • Tiredness (find it hard to exercise) • Having to take regular injections for energy • Post-operative complications (e.g. healing, infections) • Possible further surgeries • Alcohol issues (‘drinking’ replacing eating) • Depressive episodes (changes are difficult to deal with)
<p>Functional</p> <ul style="list-style-type: none"> • Ability to partake in exercise • Greater mobility • Easier travel • Access (e.g. seats, toilet cubicles, shower, moving through turnstiles, using lifts) 	<p>Functional</p> <ul style="list-style-type: none"> • Feeling cold • Feeling sick
<p>Social and self-efficacy</p> <ul style="list-style-type: none"> • Confident enough to go to the gym • Confidence to gain a social life and develop relationships • Increased confidence in all areas of life • Receiving compliments 	<p>Social and self-efficacy</p> <ul style="list-style-type: none"> • Not being able to enjoy a meal out (feeling awkward if not eating or having to explain to staff when ordering kids portions) • Excess skin (body image issues) • Hair loss • Relationship strain (partners and friends find it difficult to get used to the ‘new you’)
<p>Everyday life</p> <ul style="list-style-type: none"> • Fitting into ‘normal’ sized clothes • Less worry that a chair or piece of equipment might break • Ability to actively play with children • Improved employment opportunities 	<p>Everyday life</p> <ul style="list-style-type: none"> • Having to take medication • Filling the void left by eating • Having to deal with issues rather than masking them with comfort eating • Lack of enjoyment related to food • Stigma of the op’ (being called a cheat; gym staff do not advocate it as a weight loss method)

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Photo caption

Bariatric surgery should be considered as one of a range of approaches to combat hyperadiposity

Photo courtesy

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