Debate & Analysis

Biting off more than we can chew:

is BMI the correct standard for bariatric surgery eligibility?

BACKGROUND

In the UK, the proportion of adults with obesity has been increasing significantly, with no signs of any reversal;[1] this is despite the UK government ambitiously announcing in 2007 that England was to be the first country to reverse the trend in rising rates of obesity and the introduction of public health programmes such as *Healthy Lives, Healthy People*, and *Change4Life*.

One reason why obesity has proved difficult to control is due to the limited impact of pharmacological interventions. Adverse effects such as valve disease and pulmonary hypertension (as a result of fenfluramine and dexfenfluramine treatment), psychiatric disorders (associated with rimonabant) and increased risk of myocardial infarcts or stroke (due to sibutramine) forced withdrawal of drugs by regulators or resulted in voluntary withdrawal by manufacturers. Of those drugs for obesity that remain, many are short-term and only give modest results (<4 kg weight loss) while only one (orlistat) is licensed for long-term management; all are associated with common and unpleasant side-effects.[2]

BARIATRIC SURGERY: THE PANACEA?

Bariatric surgery, whatever method is used, is superior to non-surgical techniques for the management of obesity.[3] There are several types of bariatric surgery; restrictive procedures (such as sleeve gastrectomy and gastric banding) aim to produce satiety earlier, whereas bypass procedures (Roux-en-Y or biliopancreatic diversion with duodenal switch [BPDDS]) have both an element of restriction and malabsorption.

In one systematic review comparing outcomes between procedures, the mean percentage excess weight loss (%EWL) was greatest for BPDDS at 72% (62–75%), followed by Roux-en-Y bypass at 68% (33–77%), and adjustable gastric banding at 50% (32–70%). The associated remission rates for type 2 diabetes were 99% (97–100%) with BPDDS, 84% (77–90%) for Roux-en-Y bypass, and 48% (29–67%) for adjustable gastric banding.[4] Another review found large variations of %EWL when comparing vertical sleeve gastrectomy (49–81%) with Roux-en-Y (62–94%) and gastric banding (29–48%), with diabetes remission rates of 27–75% for sleeve gastrectomy and 42–93% for Roux-en-Y bypass.[5]

Bariatric surgery is a relatively safe procedure with 30-day mortality rates being comparable to other common operations; Roux-en-Y (0.14% and 5.9%) and sleeve gastrectomy (0.11% and 5.6%) have the highest relative rates, while adjustable gastric banding (0.05% and 1.4%) has the lowest. Nevertheless, re-operation rates do appear to be high; with estimates for Roux-en-Y ranging 8–38% and adjustable banding 8–60%, with indications mainly due to weight regain or failure to lose weight.[3]

BMI AS A MARKER FOR MORTALITY

The value of Body Mass Index (BMI) as a marker for mortality is a contentious one;[6] nevertheless it is used worldwide as an eligibility measure for bariatric surgery. Population level data suggests that as BMI increases, so do years of life lost, with proportionally more years of life lost as age increases.[7] Furthermore, data from a recent meta-analysis has shown that compared to the normal BMI range (18.5–24.9), those who were considered obese (BMI ≥30) had an all-cause mortality hazard ratio (HR) of 1.18 (95% confidence interval [CI] = 1.12 to 1.25), while for those with class 2 or 3 obesity (BMI≥35 and BMI ≥40 respectively) had a HR of 1.29 (95% CI = 1.18 to 1.41).[8] However, these studies failed to control for comorbidities, thus all mortality was attributed to obesity alone.

When taking into account comorbidities, using similar population level data, a different picture has emerged.[7] While obesity is still a risk factor for mortality, it is very weak; increasing obesity in the absence of complicating conditions had little influence on mortality rates. The presence of diabetes (HR 2.29, 95% CI = 2.28 to 2.29) and hypertension (HR 1.35, 95% CI = 1.34 to 1.35) however showed a significant adverse effect. Many studies have also indicated that in the context of hypertension and BMI, it appears that lean (lower BMI) patients with hypertension are more at risk than obese (higher BMI) patients; with a similar trend appearing to exist with relation to diabetes and BMI as well, although far less reported.[9] The mechanisms for these phenomena have not been elucidated, although it is thought to be due to the underlying aetiological differences in hypertension between the lean and obese individuals.

BMI: TIME TO RECONSIDER?

Proponents of BMI eligibility may point to data showing that high BMIs (≥35) were still associated, independently, with increased mortality (hence in the populations that would be eligible for bariatric surgery) and therefore it would be an appropriate measure. However, a recent study in a representative UK population provided the first robust evidence that even among a population eligible for bariatric surgery, BMI by itself is essentially insignificant in predicting mortality.[10] In this cohort, the 10-year mortality was 2.1% and similar to the studies quoted earlier, the presence of type 2 diabetes (odds ratio [OR] 2.25, 95% CI = 1.76 to 2.87) was the single most important predictor of mortality, followed by smoking (OR 1.62, 95% CI = 1.28 to 2.06), male sex (OR 1.50, 95% CI = 1.20 to 1.87) and age (OR 1.09, 95% CI = 1.07 to 1.10). A 4-point clinical prediction rule was

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produced, assigning a 10-year mortality risk based on the score derived from the weighted significance of these risk factors.

Using BMI as an indicator for eligibility also raises problems with respect to capacity and access. The proportion of people with class 3 obesity (BMI≥40) who are automatically eligible for surgery, has been steadily increasing in the UK for many years and currently stands at 1.7% of males and 3.1% of females, with one projection indicating that this could reach 3% of males and 6% of females by 2030;[11] furthermore recent work has demonstrated that the number of people eligible for bariatric surgery in the UK is also likely to have been underestimated.[12]

Canada employs the same eligibility guidelines as the UK and has a population with similar demographic variables; recent data has revealed that their bariatric surgery service not only has the longest wait times of any common surgically-treated condition,[13] but that there are also 600 times more procedures required than there is capacity to deliver.[14] Given the similarities; it would not be unreasonable to expect a similar situation developing within the UK over the next few years.

CONCLUSION

Obesity or BMI as a marker for mortality is at best weak when compared to other factors in a population level setting, or at worst, insignificant in a population eligible for bariatric surgery. If the aim of bariatric surgery is to reduce mortality and morbidity in obese patients then perhaps the focus should be on managing the conditions that have a definite and highly detrimental impact on health status. Previous research has already demonstrated that improvements in mortality and morbidity are not tied to pure weight loss.[6] It may therefore be appropriate to reconsider the importance of BMI as a simple predictor of mortality and put more emphasis on the presence of comorbidities when assessing eligibility for a treatment which is finite, in high demand, and has its own inherent risks. Given the significant type 2 diabetes remission results that bariatric surgery offers and the resulting major improvement in mortality as a result, we believe type 2 diabetes should be considered as the preferred indicator.

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