Bariatric surgery and remission of diabetes

Hollywood actress Angelina Jolie underwent a double mastectomy to reduce her chances of getting breast cancer after she tested positive for the *BRCA1* gene mutation (Breast Cancer Campaign, 2014). Women with the *BRCA1* gene mutation have an 85% chance of developing breast cancer and a 50% risk of developing ovarian cancer. Jolie was proactive and has reduced her risk of developing breast cancer (Stanford Cancer Institute, 2014).

People who are obese are at risk of developing type 2 diabetes, and that risk can be reduced with weight loss (NICE, 2012). Weight loss can even lead to remission of the condition in people diagnosed with type 2 diabetes (Spanou and Tziomalos, 2013). However, unlike with breast cancer, we still do not have a precise figure for the percentage reduction in risk of developing type 2 diabetes (or percentage chance of remission). There is no definite known marker, like the *BRCA1* and *BRCA2* genes in breast cancer, which could predict people who will experience remission following weight loss. There is, however, some research currently being conducted in an attempt to identify such markers.

The World Health Organization (WHO) predicted that by 2015, 2.3 billion adults worldwide will be overweight and over 700 million will be obese (WHO, 2009). In 2013, according to the International Diabetes Federation, an estimated 381 million people had diabetes (Ramachandran et al, 2014). This condition's incidence is increasing rapidly: by 2030, the number is estimated to be almost double that of the figure in 2000 (Wild et al, 2004). Overlaying the two trajectories indicates that by 2030 there could potentially be 700 million people worldwide who have diabesity.

What is the role of bariatric surgery?

People develop type 2 diabetes for a variety of reasons, which include insulin resistance and relative decrease in insulin secretion. However, not every obese person develops type 2 diabetes. Those with obesity and diabetes may benefit from weight loss. Weight loss could be achieved either medically or through bariatric surgery. Several studies have shown that bariatric surgery and very-low-calorie diets can help induce remission of type 2 diabetes (Davies and Efthimiou, 2012; Kenkre et al, 2013). Remission has been defined as an HbA_{1c} of less than 48 mmol/mol (6.5%), with a fasting plasma glucose of less than 7 mmol/L (Pinkney and Kerrigan, 2004).

The field of weight-loss surgery is rapidly expanding, with newer devices and techniques introduced every year. Key questions are: Can bariatric surgery or a device to help lose weight tackle this global epidemic of diabesity? Is this the most cost-effective way? If so, should it be used for remission of diabetes, for prevention or for both?

Bariatric procedures can be divided into three main categories: predominantly restrictive procedures; predominantly malabsorptive procedures; and a combination of the two. Predominantly restrictive procedures, including gastric band surgery and sleeve gastrectomy, limit the capacity of the stomach, thereby reducing food intake. There is no malabsorption of food and hence the chance for nutritional deficiency is minimal. In contrast, gastric bypass surgery involves both restriction and malabsorption, and consequently there is a higher incidence of nutritional deficiency in people who undergo this procedure (Keidar, 2011).

Weight loss and remission of diabetes following these procedures is not just due to weight loss and calorie restriction. There are

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potential effects on the action of incretins, which, combined with calorie restriction, can lead to improved glycaemic control (Thomas and Schauer, 2010). However, not everyone with diabetes who has undergone bariatric surgery experiences remission, and even if this does occur, a substantial proportion go back on to treatment for diabetes owing to worsening glycaemic control, which may or may not be related to weight regain (Arteburn et al, 2013).

We do know that bariatric surgery is the most effective means of sustained weight loss, and that remission of type 2 diabetes is significantly more likely if its duration is less than 5 years and the individual has good glycaemic control and is not being treated with insulin (Pinkney and Kerrigan, 2004).

For whom is bariatric surgery most appropriate?

Whether bariatric surgery should be offered to anyone with an unhealthy weight and type 2 diabetes is a contentious topic. NICE (2006) guidelines recommend dietary advice, exercise, lifestyle modifications and medications as the first step in the management of obesity in type 2 diabetes. Bariatric surgery may be considered as a suitable option if these measures have failed and the individual has shown behavioural modifications.

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Minimally invasive options

There are now several devices for weight loss that are currently under research or being used in clinical practice for people with diabesity. The two devices that have already gained particular prominence in the field of diabesity are EndoBarrier™ (National Obesity Surgery Centre, Sale, Cheshire) and AspireAssist (Aspire Bariatrics, King of Prussia, PA, USA).

EndoBarrier is a duodenal–jejunal bypass sleeve (DJBS), or "gastrointestinal liner", with a nickel–titanium anchor and a 60 cm impermeable sleeve, which is open at both ends. The device is placed endoscopically in the duodenum in a reversible procedure. Food absorption is reduced as a result of the sleeve, and small studies have shown a change in gut hormones, which is known to help improve glycaemic control in people with diabetes (Patel et al, 2013). NICE recommended in 2013 that the evidence available at the time on the safety and efficacy of implantation of a DJBS for managing obesity was limited in quality and quantity and, therefore, that the procedure should only be used in the context of research (NICE, 2013).

The AspireAssist is another new device for weight loss for people with obesity. It is now commercially available in selected regions in Europe (not including the UK). This device involves placing a tube in the stomach, with a set-up that has similarities to percutaneous endoscopic gastrostomy. According to the manufacturer's website (http://aspirebariatrics.com/about-the-aspireassist/ [accessed 28.03.14]), the AspireAssist "allows patients to remove about 30% of the food from the stomach before the calories are absorbed into the body, causing weight loss." In addition, "the aspiration process is performed about 20 minutes after the entire meal is consumed and takes 5 to 10 minutes to complete."

Only time will tell if the AspireAssist represents an effective method for long-term weight loss and improvement of diabesity. In the meantime, various questions spring to mind: What would happen to medications, especially slow-release pills and insulin? Would we need to discontinue long-acting insulin and rely only on short-acting insulin in those with AspireAssist? Would hypoglycaemic episodes be more frequent, resulting in an increased occurrence of snacking? Would people on AspireAssist need vitamin B_{12} supplements? These are some of the questions we will need to answer before we adapt such an intervention for the treatment or prevention of diabetes in people with an unhealthy weight.

Post-operative management

There are currently no guidelines on the post-operative management of diabetes. Patient selection and regular follow-up by a specialist multidisciplinary team is crucial in achieving positive long-term outcomes (Rajeswaran et al, 2013). The team should comprise a diabetologist, diabetes specialist nurse, dietitian, physiotherapist and clinical psychologist.

Conclusion

There is increasing pressure, both from the health system and people with type 2 diabetes, for healthcare professionals to be able to reliably achieve permanent remission of type 2 diabetes. However, not everyone with type 2 diabetes is suitable for surgical interventions. For one thing, surgical procedures and device implantations are not free of side effects and complications. Bariatric surgery as an approach to treating type 2 diabetes needs to be individualised, and a collective decision must be made by a multidisciplinary team with a stringent follow-up plan so as to ensure cost-effectiveness and long-term success. ■

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