

## CLINICAL QUESTION

# Nutritional follow-up of patients after obesity surgery: best practice

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## Summary

Obesity surgery is an appropriate treatment option for patients with severe and complex obesity and helps in the improvement of comorbidities. In the first 2 years following surgery, follow-up is provided by the obesity surgery centre. Ongoing care is then usually returned to the general practitioner. Patients need access to ongoing support and monitoring otherwise may be at risk of developing nutritional deficiencies such as anaemia or protein malnutrition. The British Obesity and Metabolic Surgery Society have developed guidelines on nutritional monitoring and nutritional supplements to support both bariatric centres and general practitioners. The Royal College of General Practitioners and BOMSS have worked collaboratively to develop Ten Top Tips for the management of obesity surgery patients to aid with the long-term management in primary care. Women, planning to get pregnant, need access to preconception advice and additional monitoring during pregnancy. It is essential that long-term data are collected and inputted into the National Bariatric Surgery Register. Obesity surgery improves comorbidities; however, patients must have access to long-term nutritional monitoring.

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## Clinical scenario

Mrs Smith is a 35 year female who has just had obesity surgery. She has a past medical history of depression, type 2 diabetes mellitus on no medication and polycystic ovary syndrome (PCOS). She does not have sleep apnoea or hypertension. She attended a weight management programme for 12 months prior to surgery with changes to her diet and physical activity and lost 3 kg. She had a Roux-en-Y gastric bypass and now wishes to become pregnant. How should she be followed up?

## Introduction

Obesity surgery is an appropriate treatment option for patients with severe and complex obesity (NICE).<sup>1</sup> Prior to surgery, patients should have the appropriate assessment and support in a specialist obesity service.<sup>2</sup> This gives an opportunity to optimize the management of comorbidities and prepare the patient for surgery. After surgery, patients need regular surgical review, support to make the necessary dietary and lifestyle changes and have access to medical review of comorbidities and psychological support. For NHS patients in England, this should be provided in the first two years by the obesity surgery centre. Usually, after this period, the patient’s care is returned to the general practitioner (GP). Whilst obesity surgery does help improve comorbidities in the short to medium term, it may be complicated in the long term by anaemia or malnutrition if the patient is not appropriately monitored.<sup>3,4</sup>

## Nutrition and obesity surgery

Although bariatric surgery aids weight loss, it does impact on the dietary and nutritional intake.<sup>5</sup> Patients are encouraged to gradually introduce foods and textures progressing through a liquid and blended diet before moving onto solid food. They have to learn to consume food slowly and chew it well. They may find some food textures difficult to eat and therefore need support to widen their food choices and consume a balanced diet. The protein intake may be adversely affected as many patients find roasted meat and poultry difficult to eat and will need advice about alternatives. Regurgitation of food can occur if the food is not chewed well or the wrong texture is eaten. This unpleasant experience may result in the development of food aversions with the patient eating soft food only.<sup>6</sup>

Patients need support in adapting their eating behaviour following bariatric surgery. Whilst the gastric band does not affect absorption, an overinflated band will affect the nutritional quality of the diet as the patient will struggle to consume a balanced diet.<sup>6</sup> In addition, the gastric bypass and sleeve gastrectomy procedures result in decreased absorption of iron, calcium, vitamin D and vitamin B12.<sup>7,8</sup> The duodenal switch also results in the malabsorption of protein, fat and fat soluble vitamins. Consequently, all patients are advised to take vitamin and mineral supplements for life. The vitamin and mineral regimen recom-

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mended will be procedure specific. Patients should also have access to lifelong nutritional monitoring. A recent survey of British Obesity and Metabolic Surgery Society (BOMSS) members demonstrated that there was no consistent approach to nutritional monitoring before and after surgery.<sup>9</sup> This led to the development of BOMSS Guidelines on perioperative and postoperative biochemical monitoring and micronutrient replacement for patients undergoing obesity surgery.<sup>10</sup>

### Obesity centre follow-up of obesity surgery patients

Following her surgery, Mrs Smith's GP should be sent a comprehensive discharge summary containing details of the surgical procedure and the vitamin and mineral supplements required. The obesity dietitian should make initial contact to check the dietary and fluid intake focussing on protein, calorie and fluid intake. Usually at around 6 weeks, there would be a face-to-face surgical and dietetic review.

Patients should have access to ongoing support from a specialist dietitian experienced in obesity surgery and weight management. The initial focus will be on food progression and achieving an adequate protein intake. Patients may struggle with the introduction of foods caused by a fear of vomiting or weight regain and so be over-restrictive with the diet. Compliance with vitamin and mineral supplements should be checked.

Some patients may have difficulty in adapting the diet or chewing food, and so food may become lodged in the gastric pouch causing the patient to regurgitate or vomit.<sup>6</sup> This can also occur if the patient develops an anastomotic stricture or if the gastric band is overinflated. With prolonged vomiting, patients may be at risk of developing thiamine deficiency. It is imperative that patients are treated as if at risk of thiamine deficiency; otherwise, there can be irreparable brain damage.<sup>11</sup>

The patient will continue to have support from the obesity dietitian and centre over the next two years. Regular nutritional monitoring should be carried out with nutritional problems being addressed as they arise. A summary of the blood tests is contained in Table 1 with full details being available in the BOMSS guidelines.<sup>10</sup>

In Mrs Smith's case, potential nutritional deficiencies would include anaemia (iron, folate and vitamin B12), vitamin D deficiency and protein malnutrition. All are preventable with good patient compliance, nutritional monitoring and specialist support. Following the gastric bypass, sleeve gastrectomy and duodenal switch, BOMSS guidelines recommend that all patients receive a comprehensive vitamin and mineral supplement, iron, calcium and vitamin D, and have regular intramuscular vitamin B12 injections.<sup>10</sup> If Mrs Smith presents with megaloblastic anaemia, it is essential that vitamin B12 levels are checked before supplementing with additional folic acid as folic acid can mask vitamin B12 deficiency leaving the patient at risk of developing neuropathy.<sup>12</sup> Unexplained anaemia should always be investigated and may be a symptom of zinc or copper deficiency.<sup>7,8</sup> Vitamin D deficiency is more prevalent in morbidly obese than nonobese population.<sup>13</sup> Pre-operatively, many patients may require high doses of vitamin D replacement therapy.<sup>14,15</sup> Post-

**Table 1.** Postoperative blood tests following bariatric surgery (summary of BOMSS guidelines)<sup>10</sup>

Blood test	Gastric band	Gastric bypass/Sleeve gastrectomy	Duodenal switch
Liver function test	Yes	Yes	Yes
Full blood count	Yes	Yes	Yes
Ferritin	(i)	Yes	Yes
Folate	(i)	Yes	Yes
Vitamin B12	(i)	Yes	Yes
Calcium	(i)	Yes	Yes
Vitamin D	(i)	Yes	Yes
Zinc, copper	(i)	Yes	Yes
Vitamin A	No	(i)	Yes
Vitamin E, K	No	(i)	(i)
Selenium	No	(i)	(i)
HbA1c and/or fasting blood in patients with pre-operative diabetes	(i)	(i)	(i)
Lipids in patients with dyslipidaemia	(i)	(i)	(i)

(i) If clinically indicated.

operatively, vitamin D levels should continue to be monitored and suboptimal levels corrected to ensure the prevention of metabolic bone disease.<sup>10,14,15</sup> In addition, it is advisable to check which vitamin and mineral supplements (including over-the-counter preparations) that the patient is taking. Zinc and copper levels may be adversely affected following obesity surgery.<sup>16</sup> There have been cases of zinc-induced copper deficiency as both zinc and copper share a common absorption pathway.<sup>17</sup> In addition to prescribed supplements, zinc is present in many of the over-the-counter preparations for hair and nails. The ratio of 8–15 mg zinc per 1 mg copper should be maintained.<sup>8</sup>

Vitamin A deficiency is rare but should be investigated if the patient experiences night blindness.<sup>18</sup> If there is unexplained anaemia, fatigue, metabolic bone disease, chronic diarrhoea or heart failure, selenium levels should be checked.<sup>8</sup>

The full recommendations for nutritional monitoring and vitamin and mineral supplementation can be found in the BOMSS guidance.<sup>10</sup>

Progress against the expected weight loss should be monitored. The patient may need to be reminded that the expectation of surgery is to improve their metabolic health and relieve comorbidities and not a BMI of 25 kg/m<sup>2</sup> or less.

There is likely to be a significant improvement in Mrs Smith's glycaemic control; however, she should remain on the diabetic register.<sup>10</sup> She is likely to find an improvement in her PCOS symptoms, and she should be forewarned that she will need to use contraception to prevent an unplanned pregnancy.

### Long-term follow-up

After 2 years, the long-term management is passed back to the general practitioner. This may present with difficulties as many primary care practitioners will have little knowledge of obesity surgery. A robust recall system is needed to ensure that patients

are reviewed annually and have a nutritional screen. There should be ongoing review of comorbidities and medications. To assist primary care, The Royal College of General Practitioners along with BOMSS have developed Ten Top Tips for general practitioners.<sup>19</sup> These include the setting up of a register of obesity surgery patients and symptoms requiring referral back to the obesity centre. BOMSS has also developed a traffic light of symptoms advising primary care of when to refer back to the obesity centre.<sup>20</sup>

Summary of RCGP Top Ten Tips is given below<sup>19</sup>

- Keep a register of bariatric surgery patients.
- Encourage patients to check their own weight regularly and to attend an annual BMI and diet review with a health professional.
- Symptoms of continuous vomiting, dysphagia, intestinal obstruction (gastric bypass) or severe abdominal pain require emergency admission under the local surgical team.
- Continue to review comorbidities postsurgery such as diabetes mellitus, hypertension, hypercholesterolaemia and obstructive sleep apnoea as well as mental health.
- Review the patient's regular medications.
- Bariatric surgery patients require lifelong annual monitoring blood tests, including micronutrients.
- Be aware of potential nutritional deficiencies that may occur and their signs and symptoms.
- Ensure the patient is taking the appropriate lifelong nutritional supplements required postsurgery as recommended by the bariatric centre.
- Discuss contraception – ideally pregnancy should be avoided for at least 12–18 months postsurgery.
- If a patient should plan or wish to become pregnant after bariatric surgery alter their nutritional supplements to one suitable during pregnancy.

There are concerns regarding the longer term management and the fact that patients may be lost to follow-up. A subgroup of the Obesity Clinical Reference Group (CRG) is currently looking at how this is best addressed with the transfer of obesity surgery services to clinical commissioning groups. (The Obesity CRG was set up by NHS England specialist commissioners to explore ways in which obesity services could be improved.)<sup>21</sup>

## Pregnancy

Weight loss improves the symptoms of PCOS and also increases fertility. Although there are no firm rules, many obesity centres recommend delaying pregnancy until 12–18 months after surgery. Delaying pregnancy ensures conception and pregnancy do not occur in a state of profound negative energy balance. This enables time for the mother's nutrition to be optimized with her being able to manage a balanced diet and so ensuring that both she and the foetus have adequate nutrition.<sup>22</sup>

Women should be encouraged to plan their pregnancy. As they are likely to still be obese, it is recommended that they take 5 mg folic acid/day before conceiving and for the first twelve weeks of pregnancy.<sup>23</sup> Vitamin and mineral supplements in the

retinol form should be avoided. Although Forceval<sup>TM</sup> capsules are suitable for pregnancy, Forceval Soluble<sup>TM</sup> (ALLIANCE, Chippenham, Wiltshire, UK) is not. Some women may wish to change to a pregnancy specific supplement. Once pregnant, women should receive specialist obstetric support with regular assessment of foetal growth. There appears to be an increased incidence of reduced intrauterine growth and an increased rate of preterm births and perinatal mortality after obesity surgery.<sup>24</sup> Women should have intensive dietetic support with nutritional monitoring every trimester.<sup>10,25</sup>

## National bariatric surgery registry

The National Bariatric Surgery Register (NBSR) is a major source of data on the effectiveness of obesity surgery in the UK.<sup>26</sup> All obesity centres are encouraged to submit their outcomes, and there needs to be a mechanism for ensuring long-term data are collected.

## Conclusions

Obesity surgery is an appropriate tool in the management of patients with severe and complex obesity. Patients need access to good long-term follow-up.

## Declarations

JHB is chair and MO'K is the British Dietetic Association representative on the clinical reference group on Severe and Complex Obesity for NHS England; MO'K is a council member of British Obesity and Metabolic Surgery Society.

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