

Modern management of obesity

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The obesity epidemic

The prevalence of obesity is rapidly increasing worldwide, reaching epidemic proportions. About 1.6 billion people in the world today are overweight and 400 million are obese.¹ In England, about a quarter of adults are obese² and if current trends continue, by 2050, 60% of adult males, 50% of adult females and 25% of children will be obese.³ This rapid increase is closely linked to the rising prevalence of co-morbidities such as type 2 diabetes and obstructive sleep apnoea (OSA). Obesity and related diseases place a significant burden on the NHS, a burden which is expected to double in the next few decades.³ Healthcare professionals and managers need to seriously focus on tackling this enormous public health problem.

Obesity prevention and management infrastructure

Health authorities are beginning to recognise the scale of the challenge and several public health interventions are being implemented to prevent obesity (for example the Change 4 Life campaign, www.nhs.uk/Change4Life). Table 1 summarises some of the strategies that are required at various levels. There is an increasing demand for specialist obesity services due to the complexities involved in the management of obesity and the limited availability of specialists with experience in the medical and surgical management of the condition. Effective obesity management requires a multidisciplinary team involving physicians with specialist interests (endocrinologists, general practitioners), specialist nurses, dietitians/nutritionists, physiotherapists/exercise therapists, occupational therapists, behaviour therapists, psychologists and an experienced bariatric surgical team.

Assessment of an obese individual

The aetiology of obesity is complex and multi-factorial and therefore a

detailed assessment of an obese individual is an essential first step in successful management. Consideration of secondary causes and contributory factors, such as endocrine conditions (hypothyroidism, Cushing's syndrome, acromegaly, growth hormone deficiency), rare genetic causes (for example, Prader–Willi syndrome, Bardet–Biedl, MC4 receptor mutations, leptin deficiency), neuroendocrine causes (hypothalamic obesity with possible pituitary dysfunction) and drugs (anticonvulsants, antipsychotics, antidepressants, β -blockers, steroids, many oral hypoglycaemic agents, insulin, sex hormones and contraceptive preparations) is essential. Details of family history, lifestyle changes concurrent with onset of weight gain (for example marriage, divorce, employment and childbirth) and psychosocial factors are helpful. In addition to assessment of obesity-related co-morbidities, a thorough assessment of dietary habits and physical activity is essential. Details of previous attempts (successes and failures) offer valuable insight into the causes of relapses and problems with weight maintenance. Reasons for wanting to lose weight, expectations, motivation and readiness for change significantly influence the level of intervention.

Table 1. Strategies for obesity prevention and identification of high-risk population.

Individual	Maintaining energy balance – making healthy dietary changes and increasing physical activity – by focusing on long-term behavioural changes
	Seeking help early
Family	Interactions among family members often influence dietary habits (eg children) and leisure time activities
Workplace	Providing a safe environment to increase physical activity and access to healthy and balanced food choices, and limiting the availability of vending machines, etc
Educational institutions	Educating children at an early age about healthy lifestyle can significantly influence the larger community and can pave the way for a healthier future
Healthcare network	Identification and early treatment of overweight individuals by general practitioners and other specialists involved in management of obesity-related co-morbidities is needed. There should be a clear focus on lifestyle education and highlighting the benefits of weight loss. Access to specialist obesity services should be improved
Community	Neighbourhood planning to improve access to healthy leisure time activities and opportunities to access lifestyle advice and support
Regional/national	Impact of urbanisation, transport facilities, healthcare and socioeconomic policies that influence lifestyle choices, media (advertising regulations and public health education) and regulation of food industry are some key areas where public policies could impact obesity
Global/international	Urbanisation and movement of masses across regions, racial, ethnic and socioeconomic variations, globalisation of markets and complex restrictions on the import and distribution of food products and agricultural policies all have a significant impact on lifestyle choices at a population level. Information industry and media advertising can influence population approaches to a healthy lifestyle (eg smoking, alcohol)

Lifestyle interventions

Education of an obese patient about healthy diet and eating habits is an essential component of any weight loss treatment. Commercial diets and dietary intervention-based programmes (including ad-libitum diets, very low calorie diets, low glycaemic index diets, high protein diets and meal replacement diets) have gained a lot of popularity and acceptance in recent years. These dietary interventions are usually effective in the short term but their lack of effectiveness in the long term is documented.^{4,5} Programmes involving significant calorie restriction or manipulation can sometimes be harmful without appropriate monitoring. Adherence to long-term healthy dietary changes causing modest calorie restriction is more likely to be successful in weight loss maintenance than 'yo-yo dieting' which often involves people adopting an 'all-or-nothing' attitude.

Increasing energy expenditure by daily physical activity is as important as energy restriction in achieving a balance. There are also weight loss independent benefits of exercise; several obesity-related comorbidities can be improved by modest exercise. The role of physical exercise in obesity prevention and long-term weight loss maintenance cannot be over emphasised. Obese subjects should be educated on the importance of improving cardiovascular 'fitness' rather than just focusing on bodyweight and dress size. Moderate intensity physical activity for 30 minutes daily or 45 to 60 minutes three times a week is recommended for weight management.⁶

The common problem in any lifestyle-based weight loss programme is compliance. Behaviour therapy, which includes strategies such as self-monitoring, record keeping, problem solving, contingency management, stimulus control, stress management, social support and cognitive restructuring, can improve outcomes when combined with lifestyle, medical or surgical therapy.⁷ People with clear-cut eating disorders (binge eating, bulimia) are best managed by psychologists as they often require prolonged and individualised cognitive behaviour therapy,

but any successful weight management plan should involve at least some degree of behavioural modification.

Obesity pharmacotherapy

Weight loss drugs should only be used in combination with lifestyle education and careful monitoring. There are currently two drugs that are licensed for prolonged use. Orlistat (Xenical® – 120 mg tds on-prescription, Alli® – 60 mg tds over the counter) inhibits pancreatic and intestinal lipases, resulting in inhibition of absorption of about 30% of dietary triglycerides. It cannot be used in the presence of chronic malabsorption syndrome or cholestasis and a significant proportion of subjects are unable to tolerate orlistat due to gastrointestinal side effects. When combined with dietary and behaviour modification, it causes a modest weight loss of 3.5 kg over placebo; 58% achieve 5% weight loss (32% with lifestyle alone) and 39% achieve 10% weight loss.⁸ Orlistat modestly reduces cholesterol and blood pressure, can contribute to improvement in glycaemic control in diabetes and may slow progression of impaired glucose tol-

erance to diabetes.^{9,10} Current evidence supports use for up to 48-months duration, but it should not be considered for weight maintenance as there is a risk of weight regain on completion of therapy.

Sibutramine (Reductil® – 10 mg daily, which can be increased to 15 mg if less than 2 kg weight loss in the first four weeks of treatment) is a centrally acting inhibitor of serotonin and noradrenaline reuptake. It limits food intake by enhancement of the natural satiety process. It should not be used in patients with severe hepatic/renal impairment, major eating disorders or psychiatric illness, vascular disease, heart failure, uncontrolled hypertension, arrhythmias, concomitant administration of antidepressants and antipsychotic agents or in thyrotoxicosis. Blood pressure (BP) and heart rate should be monitored every two weeks in the first three months of treatment and periodically thereafter and treatment stopped if there is a persistent rise in either (10 mm Hg systolic or diastolic BP, or a 10 bpm rise in heart rate). When combined with lifestyle advice, mean weight loss after 24 weeks treatment is 6.1% with 10 mg and 7.4% with 15 mg (1.2% with placebo).¹¹

Key Points

Obesity prevention strategies and lifestyle education are essential in tackling this serious public health concern. All healthcare professionals should offer appropriate support and highlight the benefits of weight loss and healthy lifestyle

Detailed history and assessment of an obese patient is vital. Failure to recognise an underlying psychosocial problem (for example eating disorder, perceptions, motivation or socio-economic limitations) could seriously hinder any weight loss intervention

Any medical or surgical intervention should be combined with lifestyle and behaviour modification to improve outcomes and long-term weight maintenance

Surgical treatment should be offered to those who are very obese (at greater risk) and have failed to achieve meaningful and sustained weight loss with lifestyle and medical intervention

Restrictive surgical procedures are relatively safe but require a very motivated individual who is able to make strict lifestyle changes. Malabsorptive procedures offer better weight loss and significant improvements in obesity-related co-morbidities. Any surgical intervention requires access to a highly skilled surgical team and careful long-term monitoring

KEY WORDS: bariatric surgery, gastric band, gastric bypass, obesity prevention, orlistat, sibutramine

Recommended duration of treatment is 12 months but current evidence supports use for up to two years. Sibutramine appears to have beneficial effects on lipids (particularly increasing high-density lipoprotein cholesterol and lowering triglycerides), and may improve glycaemic control in diabetes.^{11,12} Further research data (SCOUT trial – four years) are awaited to support longer duration of use and for use in patients with established vascular disease.

The selective cannabinoid type CB1 receptor antagonist, rimonabant, was recently withdrawn due to the risk of psychiatric side-effects.

Surgical management of obesity

Until recently, surgical treatments for obesity were not widely adopted due to concerns over complication rates, including death, need for intensive post-operative management, lack of long-term outcome and safety data and perceived

high cost. In recent years, this has changed dramatically. The use of minimally invasive laparoscopic approach has drastically reduced the incidence of peri-operative complications, published outcome data show reduced morbidity and mortality compared to non-surgically treated patients and surgery is now considered a cost-effective option for the treatment of severe obesity.^{6,13} Careful selection of people who are likely to benefit from surgical intervention is important. Current National Institute for Health and Clinical Excellence guidelines recommend surgery for people with body mass index (BMI) >40 (>35 with serious co-morbidities) if all other measures have been tried unsuccessfully or as the first-line intervention if BMI >50.⁶ However many commissioners in the UK use modified criteria (higher thresholds) based on availability of resources and surgical centres.

Surgical procedures can be broadly classified by the underlying mechanism

of weight loss. Malabsorptive procedures cause more weight loss than restrictive procedures but tend to have a higher morbidity and mortality risk. However the dramatic improvements in metabolic co-morbidities that are seen with malabsorptive procedures clearly outweigh the risk in the very obese subjects and those with serious co-morbidities. Table 2 summarises the types of bariatric procedures and Figs 1(a)–(c) describe the common procedures used today.^{14,15}

Current evidence confirms sustained weight loss up to 15 years along with remission or durable improvements in diabetes, dyslipidaemia, OSA, cancer risk, cardiorespiratory function, fertility, mobility, psychosocial performance and quality of life.¹⁶

Future of obesity management

Advances in genetic research, availability of novel animal models and functional neuroimaging techniques are improving

Table 2. Weight loss procedures.

Mechanism of weight loss	Common procedures (other less common procedures in brackets)	Excess weight* loss (%) ¹⁴	Diabetes remission (%) ¹⁴	Complications	Mortality (%) ¹⁵ (laparoscopic)
Purely restrictive	LAGB (Gastroplasty, gastric balloon)	46.2	56.7	Low perioperative morbidity, but higher incidence of postoperative complications – band slippage, pouch/oesophageal dilatation, erosion, infection, leakage. Higher re-operation and failure rates. Nutritional deficiencies less common	0.06
Restrictive with some malabsorption	RYGB	59.7	80.3	Higher perioperative morbidity; postoperative complications, eg hernia, anastomotic leakage, stomal ulcers, stricture and obstruction. Chronic nausea, diarrhoea, 'dumping syndrome', hair loss and gallstones. Nutritional deficiencies, such as iron, magnesium, zinc, copper, vitamin D and B12 deficiency less common than BPD-DS. About 10% risk of weight regain	0.16
Malabsorptive	BPD-DS (BPD – Scopinaro type, duodeno-jejunal bypass)	63.6	95.1	Highest perioperative morbidity and complication rates. High incidence of long-term gastrointestinal side effects, severe nutritional deficiencies and protein malnutrition	1.11

*Excess weight = actual body weight — ideal body weight (body mass index of 25).

BPD-DS = bilio-pancreatic diversion with duodenal switch; LAGB = laparoscopic adjustable gastric banding; RYGB = Roux-en-Y gastric bypass.

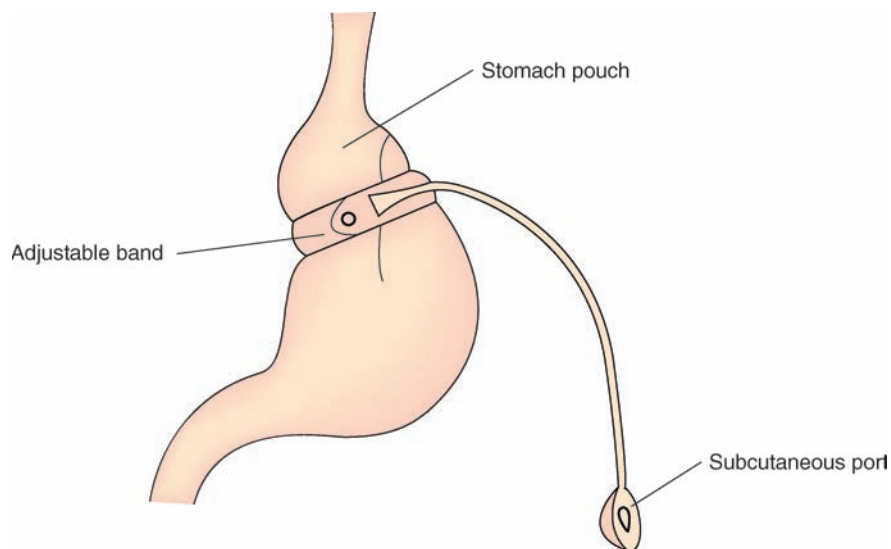
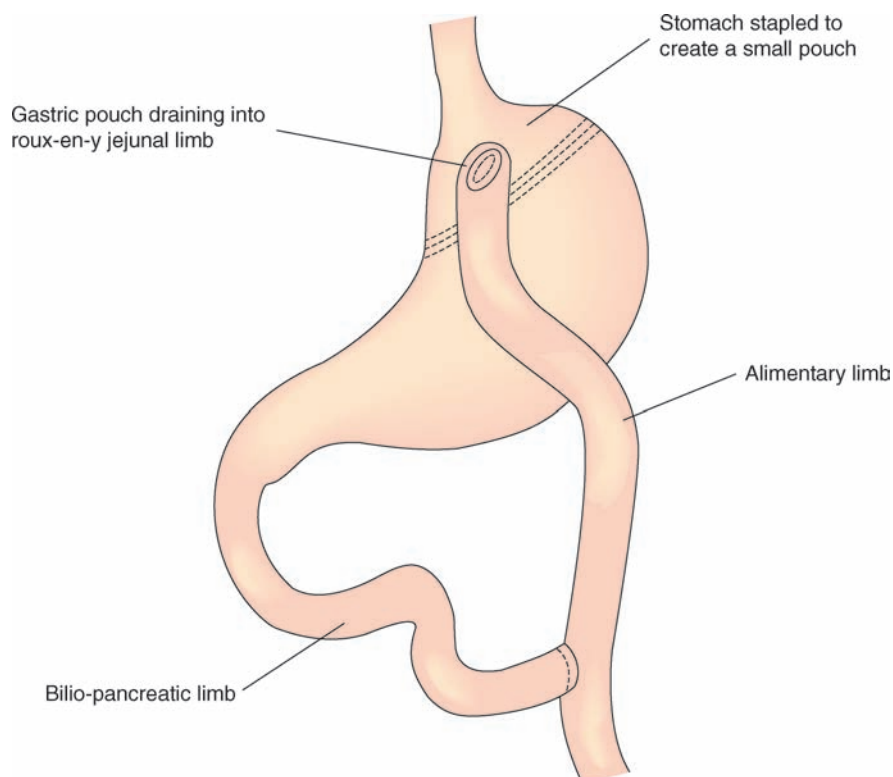


Fig 1(a). Laparoscopic adjustable gastric banding (LAGB): this is a purely restrictive procedure which involves placing an adjustable band in the upper part of the stomach, just distal to the gastro-oesophageal junction. The amount of restriction can be altered by injecting or withdrawing saline from the band through a subcutaneous port. Although this procedure has the lowest mortality risk, the weight loss achieved is lower (with lower co-morbidity improvement rate) and there is a high complication and failure rate requiring re-operation or conversion to other procedures. It is fully reversible but the success of this procedure is highly dependent on the patient's ability to stick to a healthy lifestyle and the availability of a skilled bariatric team.

our understanding of the pathophysiology of appetite regulation and obesity. There are several pharmacotherapeutic agents in development,¹⁷ including centrally acting agents such as serotonin-noradrenaline-dopamine reuptake inhibitors (for example tesofensine¹⁸), selective serotonin receptor agonists, neuropeptide-Y antagonists, melanocortin receptor agonists and combination treatments with analogues of peripherally-acting satiety signals such as amylin, peptide YY, leptin and glucagon-like peptide-1, which could greatly improve medical management options. Newer surgical procedures (for example sleeve gastrectomy and ileal interposition) and improved surgical techniques (for example robotic surgery) are promising to improve efficacy with lower risk. In particular, natural orifice transluminal endoscopic surgery is an exciting development which could offer the benefits of bariatric surgery with significantly lower risk.¹⁹ Endoscopic restrictive procedures such as balloon insertion, gastric partitioning and malabsorptive procedures (insertion of polyethylene duodeno-jejunal tube) are currently being studied with encouraging results.

Fig 1(b). Laparoscopic Roux-en-Y gastric bypass (RYGB): this is the most common procedure performed in the world today, which relies mainly on restriction of food intake with some degree of malabsorption. The stomach is reduced to a small upper gastric pouch which drains into a Roux-en-Y limb of proximal jejunum (variable lengths used between 75 and 150 cm). RYGB causes more weight loss than purely restrictive procedures and also causes significant improvements in obesity-related co-morbidities. Nutritional deficiencies are common and require close monitoring by a multidisciplinary team. Weight regain is a concern particularly in people who do not follow dietary advice which may require intensive lifestyle modification with behavioural therapy and possibly revisional surgery.



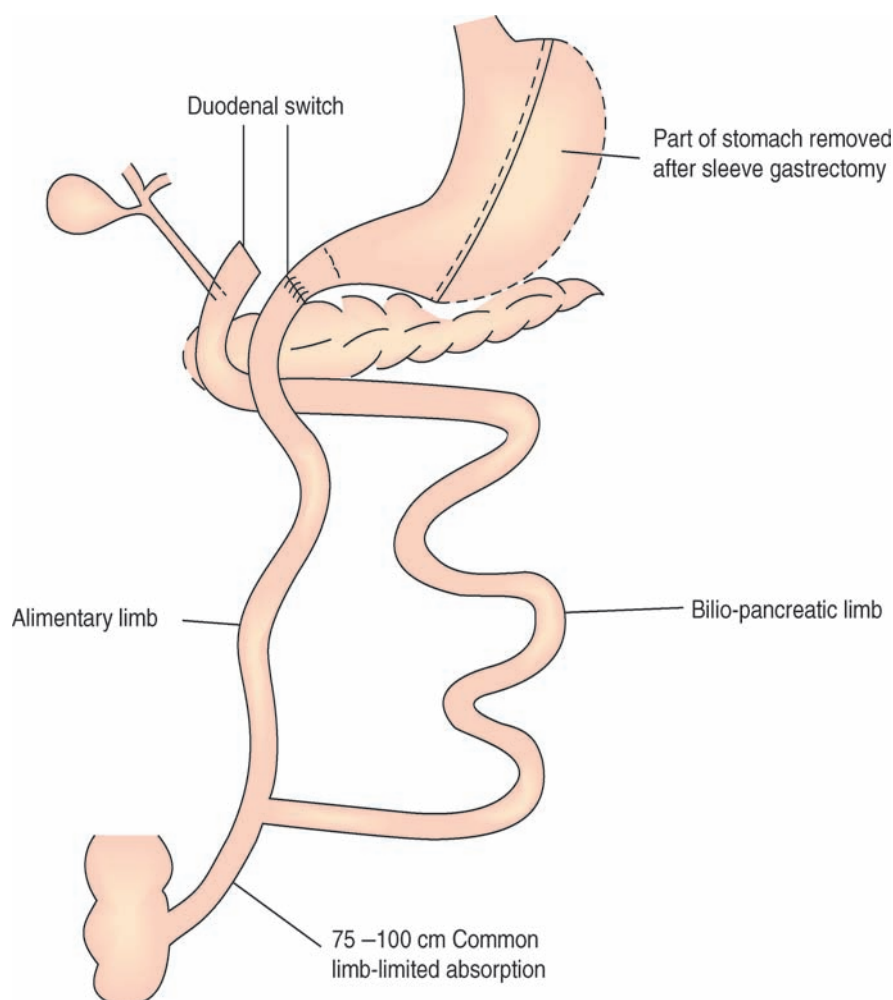


Fig 1(c). Bilio-pancreatic diversion with duodenal switch (BPD-DS): this is more complicated and a technically challenging procedure which causes weight loss mainly by malabsorption. A sleeve gastrectomy is performed (rather than the horizontal gastrectomy performed in the Scopinaro type) leaving a gastric reservoir of 150–200 ml. The duodenum is closed about 2 cm distal to the pylorus and a duodeno-ileal anastomosis is performed. The common limb is about 75–100 cm where food from the alimentary limb mixes with the biliary and pancreatic juices causing significant malabsorption. This procedure can be done in two stages in very obese subjects or patients with high mortality risk. The weight loss results are impressive with significant improvements in co-morbidities but this procedure carries a high mortality and complication risk. Protein malnutrition and nutritional deficiencies are a concern, particularly in patients who are unable to follow strict dietary changes that are required.

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