Plastic surgery post-bariatric surgery

Lines D
Chris Hani Baragwanath Hospital
Correspondence to: Dr Des Lines, e-mail: lines@pixie.co.za

Introduction

Bariatric surgery for the morbidly obese patient is no longer just indicated for weight reduction, but has also become an important co-morbid disease modifier in these patients. As the procedures are becoming safer to perform and better understood, more and more obese patients are turning to this therapeutic modality for a long-lasting solution to their weight and medical problems. The accreditation of “bariatric centres of excellence” throughout the country have ensured a safe environment for these procedures to take place in, and also the appropriate follow-up and support that these patients require in the years following bariatric surgery. In these centres, the mortality for bariatric surgery procedures is documented at less than 1%, and the overall morbidity at about 8%.

In the 2004 consensus guidelines published by the American Society of Bariatric Surgeons, it was stated that:
- Bariatric surgery is the most effective treatment of morbid obesity;
- Gastric bypass surgery is one of four types of surgical procedures that can be considered;
- Laparoscopic surgery is equally as effective as open procedures; and
- These patients require comprehensive preoperative evaluation and multidisciplinary support for optimum outcome.

Aesthetic and reconstructive procedures after bariatric surgery

The special group of patients who have undergone exaggerated weight loss in a very short period of time often seeks the help of the plastic surgeon to correct or improve their deteriorated, and often grotesque, body image. Consequently, a new type of patient has emerged and has become a challenge to the anaesthesiologist, yet very little attention has been given to these patients in the recent literature. Studies suggest that up to 84.5% of patients post-bariatric surgery request body contouring surgery, yet only 11% undergo this type of surgery, and 47% of these undergo multiple procedures (Gusenoff and Rubin, 2008). Socio-economic factors are generally responsible for the low numbers undergoing plastic surgery.

The body dysmorphisms observed in these patients relate to excess skin and subdermal fat accumulation. The skin that has been stretched over years does not shrink, and fat is not always uniformly lost throughout the body. Patients who have lost a large amount of weight are left with large skin folds and suffer from intertrigo, hyperkeratosis, mycosis, acanthosis nigricans and cellulitis. This can impact on the patient’s social and personal life, and may result in severe depression, social isolation and poor compliance with dietary and exercise programmes and, ultimately, in the patient falling back into old behaviours.

Aesthetic and reconstructive procedures after bariatric surgery are multiple and diverse (Table I), and are tailored to suit each particular patient. The goal is to design a new body contour that will drastically improve his or her body image.

Patients who have undergone massive weight loss requiring body contouring surgery should be approached with the co-morbidities of morbid obesity in mind (Table II). Obesity is associated with many serious life-threatening co-morbid diseases. Bariatric surgery is known to resolve, or at least partially resolve, many of these conditions. Gastric
Table I: Aesthetic and reconstructive procedures requested after bariatric surgery

| Surgery                          | Brief description                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------|
| Face, neck, forehead            | Face/neck lift.                                                                   |
| Brachioplasty                   | Resection of excess tissue with or without liposuction. Usually encompasses the upper arm, but may include the whole limb. |
| Mastopexy                       | Resection of excess tissue, with relocation of nipple with or without implants.    |
| Torsoplasty                     | Resection of excess skin of the upper back and subaxillary region.                 |
| Abdominoplasty ± panniculectomy | Surgical resection of excess skin and abdominal fat. May be limited to the anterior abdominal wall, extend to the flanks, or be circumferential. Invariably involves plication of rectus muscle. |
| Thigh lift                      | Skin resection with or without liposuction, with regional pexy.                    |
| Gluteus                         | This region begins at the iliac crests. Pexy is performed with or without autologous fat injection. |
| Liposuction                     | Percutaneous extraction of fat. Ultrasound or laser may be used as adjunct. It is a complementary procedure during other surgeries and, in rare occasions, is the only surgery performed in the previously obese patient. |
| Upper body lift                 | Combined procedure involving arms, breasts and torso. Brachioplasty and mastopexy often combined in single procedure. |
| Lower body lift                 | Combined procedure involving abdominoplasty ± panniculectomy, thigh lift and buttock lift. |

Bypass surgery is typically associated with rapid weight loss and, eventually, patients may lose up to 85% of excess body weight, depending on the type of procedure performed.

Malabsorptive procedures generally lead to greater weight loss than the restrictive procedures. A meta-analysis from University of California, Los Angeles (Maggard et al, 2005) reports the following weight loss at 36 months:
- Biliopancreatic diversion: 53 kg
- Roux-en-Y gastric bypass (RYGB): 41 kg
  - Open: 42 kg
  - Laparoscopic: 38 kg

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A study done in Sweden by Sjöström et al showed a 23.7% reduction in mortality in a prospective matched controlled trial over an 11-year period.

As previously mentioned, bariatric surgery and subsequent weight loss may completely or partially resolve many of the co-morbidities associated with obesity:
- Type 2 diabetes may be completely or partially reversed in up to 90% of patients, sometimes within days of surgery. There is better resolution with malabsorptive procedures.
- Dyslipidaemia is corrected in up to 90% of patients.
- Essential hypertension is relieved in up to 80%, and medication reduced in the remainder.
- Obstructive sleep apnoea is markedly improved in most patients.
- Gastro-oesophageal reflux disease is relieved in almost all patients.
- The risk of venous thromboembolism is improved.
- Back and joint pain is improved or relieved in nearly all patients.

A variable percentage of patients presenting for body contour surgery will continue to suffer the consequences of the co-morbidities, as well as some of the side-effects of the bariatric surgery itself.

When planning these procedures, it is essential to establish a surgical plan according to the physical condition of the patient. In healthy patients, a combination of procedures may be done in one sitting whereas, in others, the procedures may be staged...
over several months or years. Body contour surgery in these patients generally takes place 12-18 months after bariatric surgery, once weight loss is stable and the patient is on appropriate nutritional, mineral and vitamin supplementation and has received the appropriate psychological support.

Important facts to consider when anaesthetising these patients are:

- Surgery may be prolonged (5-7 hours), particularly with combined procedures.
- Patients are often in unusual positions, which may compromise blood supply and damage nerves.
- Patients may be in the prone position for an extended period of time.
- Patients may be turned during the procedure, which can result in endotracheal tube dislodgement or displacement.
- Blood loss can be substantial, and the fluid balance can be problematic if combined with large volume liposuction.
- Hypothermia is a major problem in procedures where large areas are exposed.

Pre-anaesthetic evaluation

The preoperative evaluation of these patients is generally similar to that for the morbidly obese (Table III). Bariatric surgery may result in a reversal or amelioration of co-morbid disease, but the damage caused by these conditions may still be evident. This aesthetic and reconstructive surgery is elective, and patients need to be fully evaluated and optimised prior to surgery.

**Previous and current medication**

- Anticoagulants, particularly if neuraxial blocks are considered.
- Antidiabetic agents.
- Antihypertensive agents, beta blockers and aspirin.
- Antidepressants: Depression is common in these patients after bariatric surgery, particularly if their psychological wellbeing has not been appropriately managed.
- Weight reduction aids and appetite suppressants: Particularly drugs with serotonin-releasing properties, when combined with noradrenergic drugs. These combinations may have previously caused cardiac valve lesions and pulmonary hypertension. Many of these offending agents have been withdrawn from the market.

**Cardiovascular system**

Hypertension is common. An ECG is mandatory and should be done, regardless of age.

| Parameter                        | Observations                                                                 |
|----------------------------------|-----------------------------------------------------------------------------|
| History and physical examination | A general clinical review with physical examination by the anesthesiologist allows anticipation of problems like difficult airway, vertebral abnormalities, mental disorders, and familial disorders. |
| Consultation with another specialist | It is prudent to know the opinions of the bariatrician, pulmonologist, cardiologist, endocrinologist, surgeon, and psychologist in the search for, for example, poly-pharmacy and drug interactions. |
| Electrocardiogram                | Arrhythmias, ischaemia, enlargement or dilatation. Stress ECG often difficult to perform. |
| Chest X-ray                      | Useful in smokers, emphysema, kyphosis, pulmonary hypertension.             |
| Echocardiogram                   | Mandatory study in patients with severe arterial hypertension, ischaemia, dilated cardiomyopathy. Interested in ejection fraction, regional wall motion abnormalities and pulmonary artery pressures. |
| Spirometry                       | Utility has not been demonstrated; however, it is recommended in chronic lung disease and smokers. |
| Full blood count                 | Diagnosis of subclinical anaemia.                                           |
| Coagulation tests                | PTT, INR and bleeding time are mandatory in all patients, especially those using anticoagulants, those with hepatocellular damage and those with malnutrition. |
| Special blood tests              | Evaluation of kidney, liver and metabolic function, electrolytes and vitamin deficiencies. |
| Urinalysis                       | Haematuria, proteinuria and changes in urine density.                       |
| Hepatitis, drugs, pregnancy      | Order based on data in the history and previous experience.                 |

Echocardiography is done to assess ejection fraction and look for regional wall motion abnormalities.

**Respiratory system**

Undiagnosed pulmonary hypertension can cause major complications during the procedure. A history of dyspnoea, fatigue and syncope with exercise may be clues.
Obstructive sleep apnoea (OSA) should be sought out and investigated. OSA usually improves markedly after weight loss. Pickwickian patients with hypoxia and hypercarbia also need to be identified, as they are more likely to suffer from pulmonary hypertension and right heart failure. The presence of these conditions has important bearings on the type of anaesthesia and drugs chosen, and on the level of postoperative care required. Patients with OSA are extremely sensitive to opiates and benzodiazepines.

The difficulty anticipated in maintaining an open airway and of intubation should be assessed in the usual way. Obesity per se does not significantly increase the difficulty of intubation, except in the case of morbid obesity. Patients who have undergone significant weight loss have not been studied with respect to difficult intubation. In my experience, they are not significantly more difficult to intubate. In the morbidly obese or the anticipated difficult intubation, it is prudent to have difficult intubating aids available.

**Nutrition, vitamins and mineral assessment**

Dietary deficiencies post-bariatric surgery depend on the type of procedure, with the malabsorptive procedures having a much higher incidence of nutritional, mineral and vitamin deficiencies:

- **Iron**: Very common in malabsorptive procedures, as iron normally is absorbed in the duodenum. In a study by Vargas-Ruiz et al, 54.5% of the patients became iron deficient, with 63.6% presenting with anaemia.
- **Calcium**: Also absorbed in the duodenum. Common, particularly in biliopancreatic diversion procedures. Evident in up to 50% of these patients. If left unchecked, they may develop secondary hyperparathyroidism.
- **Vitamin B12**: Requires intrinsic factor produced by the stomach for absorption. In the study by Vargas-Ruiz et al, 27.3% of patients became B12 deficient.
- **Thiamine (vitamin B1)**: Normally absorbed in the jejunum. Deficiency is rare.
- **Protein malnutrition**: Some patients are unable to take in the daily requirement of 80-100 g.
- **Fat-soluble vitamins**: More common in biliopancreatic diversion procedures. Vargas-Ruiz et al reported the following deficiency percentages: vitamin A = 11%, vitamin C = 34.6%, vitamin D = 7%, and vitamin B6 = 17.6%.

After bariatric surgery, these patients need to be closely followed up by an endocrinologist and dietitian to prevent and monitor dietary deficiencies.

**Considerations for anaesthetic management**

- Avoid opiates and benzodiazepines as much as possible. Preferably use alpha-2 agonists.
- Premedicate with agents to prevent the consequences of aspiration. Jean et al looked at 66 patients, who underwent gastric banding and vertical gastroplasty, who showed an increased risk of broncho-aspiration (6%). The four patients who aspirated belonged to the gastric banding group. It is advised to empty the expandable chamber prior to induction.
- Blood pressure monitoring may be difficult with a cuff, particularly in patients with gynaecoid obesity. Invasive monitoring may be indicated in prolonged procedures, or where the condition of the patient dictates it.
- Drug dosing may be challenging.
- In lower extremity surgery, neuraxial anaesthesia may be employed with its advantages of reduced bleeding, deep vein thrombosis (DVT) and pulmonary atelectasis. The choice of the procedure is often dictated by the length of surgery and the position of the patient.

**Complications**

These occur more frequently than anticipated, and are related to:

- The patient’s physical condition and the presence of co-morbidities;
- Prolonged anaesthesia;
- Positions which impede circulation and ventilation;
- Hypothermia.

**Pulmonary embolism**

There is a major risk for pulmonary embolism in these patients. A prospective study by Gravante et al investigated 103 patients undergoing abdominoplasty and flank liposuction. All patients were on thromboprophylaxis and, despite this, 2.9% still developed thrombosis. The risk of developing DVT increases with duration of surgery (i.e. general anaesthetic longer than 140 minutes), large-volume liposuction (more than 1 500 g), and plication of abdominal muscles. It is mandatory to use elastic stockings, pneumatic compression pumps and heparin thromboprophylaxis in these patients.

**Conclusion**

The popularity of bariatric surgery has created this new group of patients with massive weight loss requiring body contouring surgery. Anaesthesia for previously obese patients has special risks, due to the unresolved problems of obesity, physical
changes, co-morbid medical conditions and changes related to bariatric surgery, as well as the plastic/reconstructive procedures themselves. Teamwork is the cornerstone of success in the treatment of these patients. The anesthesiologist-surgeon-patient interaction should be scrupulously planned, and alternatives should always be considered for the safety of the patient.

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