



Research Paper

Minimally invasive management of obesity: Pearls, pitfalls and experience in the Caribbean

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ABSTRACT

Obesity is an epidemic with a worldwide distribution, which affects all ages. This lifestyle disease co-exists with other conditions such as diabetes, hypertension, hypercholesterolemia and obstructive sleep apnoea. The surgical management of obesity has gone through several significant modifications and it is well accepted as a viable modality of treatment. The approach to the obese patient is multifaceted and as such a multidisciplinary approach is advocated. In the first world setting the holistic method is commonplace and easily facilitated, as these procedures are performed in high volume centres. In the Caribbean, there are many factors which have impeded the concept of surgical management of obesity. These include cultural attitudes toward obesity, economics, health care priorities in developing countries and patient compliance. Additionally, there is a lack of adjunct facilities which aid in the early detection and management of complications encountered after metabolic surgery. Despite these challenges there has been several publications documenting acceptable outcomes. The development of a Centre of Excellence for Bariatric Surgery is accompanied by numerous benefits and has the potential of overcoming obstacles encountered in the past.

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The problem of obesity is not a new development, however its persistence over time has resulted in recognition by the medical fraternity as a serious condition with detrimental complications. Obesity is an epidemic affecting both the developed and developing nations worldwide. Amongst OECD (Organization for Economic Corporation and Development) countries an estimated 19.5% of the adult population was found to be obese in their 2017 report. Similarly, the prevalence of childhood and adolescent obesity has also increased worldwide with nearly 1 in 6 children being obese or overweight (ranges 10–31%) [1]. The Caribbean region is no exception and is also plagued by the obesity epidemic. The PAHO (Pan American Health Organization)/WHO (World Health Organization) estimates that 50% of the Latin American and the Caribbean population is overweight, with obesity affecting 23% of this population. Countries such as Bahamas, Barbados, Jamaica, Trinidad and Tobago are ranked highest in the region.

Surgical interventions directed toward weight loss has been documented as far back as the 10th century. This was performed on the king of Leon by suturing his lips together allowing only the

passage of liquids [2]. The ileal bypass documented by Kremen in 1954 opened the door to the concept of anatomical reconfiguration of the gastrointestinal system with the primary goal of weight loss. Aside from significant weight loss, associated hypercholesterolemia was noted to also improve after ileal bypass (Buchwald's modification) [3,4].

An alternative concept to allow malabsorption, introduced by Scopinaro was the bilio-pancreatic diversion procedure [5,6]. Modifications of this procedure by Hess and Marceau lead to the duodenal switch procedure [7,8]. Performing a staged procedure was proposed by Gagner initially for duodenal switch and even for gastric bypass later [9]. A vertical sleeve gastrectomy, the first stage procedure has evolved to and is now considered as a stand-alone procedure [10–13]. Furthermore, laparoscopy revolutionized the surgical approach to bariatric surgery; Wittgrove performed the first laparoscopic gastric bypass in 1994 [14]. The use of laparoscopy enables the surgeon to safely perform the technical aspects of the procedure thereby reducing the complications associated with open operations on obese patients [14,15].

Obesity is known to have a significant impact on both physical and psychological health and is implicated as the causative factor for many chronic, debilitating diseases including type 2 diabetes mellitus, cardiovascular disease, renal failure and hypertension.

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Diabetes remains a predominant problem in the Caribbean with an increasing incidence [16–19]. This disease carries extremely high morbidity, mortality and accounts for a significant portion of the healthcare budget.

Lifestyle modification and medical treatment are not usually independently successful for the treatment of morbid obesity. The 5-year results of the Surgical Treatment and Medications Potential Eradicate Diabetes Efficiently (STAMPEDE) trial has demonstrated superior outcomes in the surgical arm compared to the best medical therapy for obese patients with Diabetes. Statistical significance was seen for glycaemic control, medication use and weight loss [20]. Bariatric surgery offers a highly effective long-term solution for these patients, prevents the progression of obesity related diseases and results in the resolution of the comorbidities as well, most importantly diabetes [21,22]. Bariatric surgery can lead to improved quality of life, physical health, emotional, psychological wellbeing and also increased life expectancy of obese individuals.

Retrospective regional data published by Dan et al. of all obese patients with type 2 diabetes mellitus who underwent LRYGB (Laparoscopic Roux en Y Gastric Bypass) over 4-years reported complete resolution of clinically significant diabetes mellitus in 85% of patients, and significant reduction in the dosage of anti-diabetic medications in 15%. In this review 96% of patients reported drastic improvement in their quality of life. There were no mortalities and minimal surgical complications [29].

The condition of obesity complicates any surgical procedure as it affects every organ system either directly or indirectly. As such a multi-disciplinary approach is necessary in all stages of intervention inclusive of patient selection, preoperative, intra-operative, post-operative and in the surveillance periods. Additionally, it has been suggested that these complex procedures which are being performed on high risk patients should only be performed in high volume centres [23].

The American Society for Bariatric Surgery (ASBS) has proposed categorization of certain bariatric surgical practices into “Centres of Excellence” for bariatric surgery. Criteria for becoming a centre of excellence include a threshold volume of bariatric surgical cases per year, operative outcomes, and the presence of a multidisciplinary commitment to management of the morbidly obese. There are several barriers to centralization of metabolic surgery in the Caribbean territory. Cumulatively the population of obese individuals is substantive enough to mandate a high-volume centre, however each island state is governed independently with variation in health care policies and goals. Furthermore, many of these countries are considered developing countries as such issues regarding economics and efficient management of the health sector resources arise.

In another study, Dan et al. demonstrated that bariatric surgery could be safely and efficiently undertaken in a low-volume centre outside the “designated centres”. Comparable outcomes of low patient morbidity and mortality were achieved even in a third world setting. The authors proposed that although “patient numbers” imply better outcome, in an environment where these numbers cannot be achieved, patients should not be denied the access to surgery once good outcomes are achieved [26]. Another factor to consider is that a high-volume institution does not translate to a high-volume surgeon. However, Birkmeyer et al. highlighted that surgeon volume has a significant effect on hospital volume outcomes [24]. Moreover, the surgical specialty team comprised of multiple attending surgeons and therefore the individual surgeon volume is only a fraction of the entire institution volume. Many surgeons will agree that the use of a number to determine competence is arbitrary, however more important is the ability to ascend the learning curve, which varies for each individual. Regional data published by Cawich et al., for major hepatic

resection has also confirmed that it is feasible and can be performed safely with comparable outcomes in a low volume setting [25].

Apart from the number of cases performed yearly, equally important factors which influence outcomes include multi-disciplinary approach and complementary services. It is essential to have adequate support services when undertaking bariatric surgery in such a high-risk population. The availability of specialized equipment and expertise is problematic in the Caribbean setting. The recognition along with management of complications are hinged on the availability of endoscopy facilities as well as both standard and interventional radiological services in addition to intensive care unit housing. Without the facilities for the recognition and management of surgical complications, how can subjecting a patient to a procedure be rationalized even though the complication rates are actually quite low?

Atypical and non-specific symptoms can result in delayed and misdiagnosis of complications without appropriate investigations as persons on call may not know the intricacies of bariatric surgery. Hence, education of other surgeons and physicians on potential surgical complications in addition to the need for urgent referral for treatment is key. This can significantly decrease associated morbidity as most complications can easily be managed with minimally invasive approaches. Examples include laparoscopy for an internal hernia or endoscopic stenting for an anastomotic leak. Additionally, it must be reiterated that we cannot afford to delay treatment as these patients walk a thin line.

In the developed nations medical insurance is a primary route pursued by patients who qualify for surgery. However, in the Caribbean there is a lack of coverage for patients by employment as well as personal medical insurance policies. In addition, the cost of the procedure is not affordable by many in the private sector. Even if the patient can afford the procedure, there are other associated costs with vitamins and protein supplements that are key to reduce complications. Thus, the option of incurring the expense of the procedure by the patient is not feasible. Therefore, the use of the public health care system becomes the likely option for many. Health care economics once again hold an influential role in the ability of the surgeon to offer such services. The economic benefit of bariatric and metabolic surgery has been studied and although initial output is higher when compared to medical therapy the rate of revenue recovery in the short and medium term occurs after approximately 2-years [27]. Yet the insurance companies are resistant to cover the procedures and some, even if they do cover, create their own criteria for approvals.

The Caribbean and its population have had various influences from a historical standpoint. There are several cultural perceptions which may hamper bariatric surgery and potentiate the obesity epidemic. Firstly, accepting that obesity is in fact a significant concern with potential for a domino effect on health is not widespread. Conversely, in some circles obesity in the female population is desired [28]. Furthermore, appropriate referral from colleagues in the medical sub-specialties also plays a vital role. It is essential that General Practitioners as well as Internists are familiar with the criteria for, benefits of and understand that surgery allows for potential improved glycemic control.

Long term follow-up amongst all bariatric patients is mandatory for several reasons, including surveillance for nutritional deficiencies, evaluation of outcomes as well as providing support. These strategies attempt to ensure compliance and discourage relapsing behaviour which can contribute to weight gain. However, in the Caribbean defaulting from any form of follow-up occurs frequently. Additionally, many of the islands consist of relatively small populations and these are broken into several closely related communities. Therefore, the perception of any form of new

intervention for a non-existence problem can be easily swayed in a negative direction. Even a small number of adverse outcomes has the potential to tarnish the image of bariatric surgery and the reputation of the surgeon.

Despite the various challenges highlighted the effectiveness of bariatric surgery has been documented by Dan et al. In this four-year observational study one hundred and forty-six patients underwent LRYGB. Roughly 25% of this cohort were diabetic and 60% were females. Statistical significance was seen for several outcomes including body weight, body mass index (BMI), number of patients on insulin, number of patients on metformin and quality of life. Significantly decreased body mass index was seen across all classes of diabetics (1–5), ranging from impaired fasting glucose tolerance to combined insulin and oral medication use. Furthermore, 75% of diabetics exhibited complete resolution in the immediate post-operative period, with an additional 10% within 6 months. This resulted in an overall complete resolution of diabetes in 85%, with the remaining 15% requiring lower doses and control with a single oral hypoglycaemic agent [29]. Moreover, Dan et al., in 2012 reported outcomes for patients undergoing LRYGB, sleeve gastrectomy and gastric banding. Complete resolution of obstructive sleep apnoea, diabetes mellitus and hypertension occurred in 92.8%, 85.2% and 80.1% respectively. The overall complication rate was 9% (18/196), with the gastric banding procedure having the highest complication rate. The LRYGB had the lowest complication rate of 6.5% [26].

The number of cases performed in Trinidad by Dan, since 2003 is as much as 1050 (unpublished data). These included a number of patients with a BMI below 30 kg/m² with uncontrolled diabetes, for which surgery was being done purely for metabolic purposes. A smaller number of patients with a BMI less than 35 kg/m² also had a Roux en Y Gastric Bypass for severe reflux disease. Overall, the 30-day mortality stands at 2/1050. The first mortality was a 480 pound, male who after walking on post-operative day one suddenly experienced cardio-pulmonary arrest. Autopsy was non-contributory as to the cause of death. The other patient was bed bound, weighing 550 pounds with an ejection fraction of 30%, severe sleep apnoea and Pickwickian syndrome. The surgical procedure was uneventful and though she remained in hospital for a week, she was eventually discharged to home. The patient experienced cardio-pulmonary arrest suddenly at home, an autopsy was not done. In terms of complications, there were no reported leaks, however re-laparoscopy was required in eight patients for bleeding and transfusion required in five of these. Reoperation was required for bowel obstruction in ten patients. The pathological conditions included a small bowel tumour, another for intussusception, one for a perforated jejuno-jejunal anastomosis due to a foreign body bezoar and seven for internal herniation. All but one of these cases were managed with laparoscopy. Several patients also developed gallstones which required cholecystectomy. An unknown number of patients (usually due to non-compliance) developed iron deficiency anaemia for which further supplementation, inclusive of intravenous iron infusion and even blood transfusions were required. Two cases of malignancy were seen including one low rectal cancer and another distal oesophageal cancer, both of which were managed with surgery in addition to chemo-radiation therapy. Weight regain was by far the biggest bug-bear with up to 20% regaining significant weight. Approximately 5–10% of these were revised with lengthening of the bypass limbs and transection of the candy cane at the gastro-jejunostomy. Those patients who had a sleeve gastrectomy or bands were converted to gastric bypass.

It is therefore clear that bariatric surgery in the Caribbean setting has a significant role in the management of obesity, as well as associated conditions such as diabetes and hypertension. Furthermore, in a low volume and guarded economic era outcomes

has been proven to be acceptable. The Caribbean setup also allows for the performance of surgery for non-standard indications. An example of this is having a bariatric procedure performed in children. Until 2006 there were no reported cases of bariatric surgery in children. Dan et al. performed a sleeve gastrectomy in a 6-year old with Blount's disease and though received stinging criticism at the time, the sleeve gastrectomy has turned out to be the procedure of choice in children [30].

One of the steps in the right direction was the formation of the Caribbean Obesity Society (COS) in 2013. This group was formed with physicians, dieticians, psychologists, surgeons and other support services to attempt to educate the Caribbean public on this epidemic. Annual meetings have been held in Barbados, Curacao, Jamaica and Trinidad and the multi-disciplinary approach to weight loss is at the forefront. These meetings attract keynote speakers from all over the world. The work of the Caribbean Society of Endoscopic Surgeons and the Caribbean College of Surgeons serve to complement the COS.

The progressive future of bariatric surgery in the Caribbean and the creation of a Centre of Excellence (COE) goes hand in hand. The concept of a COE is not solely about mimicking other first world institutions regarding numbers. However, a COE has the potential to eliminate many barriers which are currently seen in the region. These can be established in the major territories and referrals from the smaller territories can be facilitated by government to government arrangements. This is easier said than done as each island is run by its own government each with its own ranking of priorities.

Benefits of Centre of Excellence

- Economically feasible in the Public Health Care System resulting in access by all patients. Having all patients referred to one institution provides the demand for the service, which in turn can serve to motivate policy makers and financiers.
- By having a designated centre, the ability to recognize early and effectively manage complications are more likely as both the human resources and infrastructure will be available resulting in a one stop shop approach in all aspects of management.
- The literature has clearly shown that superior results are obtained with more complex operations (RYGB and BPD) compared to less complex ones (sleeve gastrectomy), however they also come with a higher complication rate. In the era of evidence-based medicine the data for the region needs to be evaluated. Streamline data collection will be possible, allowing follow up of patients in the short to long term. This information can then be used to determine which procedure is most efficacious for outcomes such as sustained weight loss as well as resolution of co-morbid conditions. Moreover, this decreases the chance of patients being lost to follow up as well as non-compliance.
- A significant contributor to good outcomes is the competence of the surgical team. Surgeon training will also be enhanced by having a designated service for bariatric surgery. This will allow standardization of the technique used for the various procedures resulting in less variability. Furthermore, competence in performing all procedures will be mandatory by each attending surgeon. This avoids the one size fits all approach and allows the choice of the most appropriate procedure for the individual patient. We must also keep up with the various modifications of procedures and their outcomes. The mini-gastric bypass may become a compromise between the sleeve and the Roux en Y gastric bypass. The balloon can be used as a temporary measure to allow for a more definitive procedure later.
- Some patients having lost weight and having a reduced ability to eat, find other dependencies to replace the one for food. This

includes alcoholism, drugs and promiscuity to name a few. Also, there is an increase in the suicide rate and divorce associated with these procedures. It is thus very important to maintain long term follow up to provide psychological support for these reasons. A COE can potentially provide this.

Obesity is an epidemic affecting the entire Caribbean at all age groups. Associated diseases and complications place a significant burden on an already resource limited health system. Though this epidemic cannot be fixed with surgery, surgical intervention has been proven to be superior in the maintenance of weight loss and improve co-morbid conditions associated with obesity. Bariatric surgery must complement a regional approach in the management of obesity and must be safely performed in our low volume Caribbean institutions plagued with limited resources. We must all get together to tackle this escalating problem.

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Declaration of Competing Interest

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