ABSTRACT

Background: An estimated 1.7 billion people worldwide are affected by obesity-related comorbidities such as cardiovascular disease and diabetes. Bariatric surgery is recognized as an effective treatment for morbid obesity. A study of patients at a BC clinic was undertaken to determine if combining bariatric surgery with comprehensive care provided by a multidisciplinary team improves postoperative outcomes.

Methods: Patients were observed prospectively from a preoperative baseline and throughout 1 year of postoperative follow-up. Before surgery, patients participated in a comprehensive, structured, multidisciplinary program with a focus on education and counseling. Patients underwent either Roux-en-Y gastric bypass or sleeve gastrectomy. Close postoperative support was provided on an ongoing basis. Outcomes investigated included weight loss (excess weight loss, absolute weight loss, BMI) and improvements related to type 2 diabetes, hypertension, and quality of life. Results were stratified and compared based on the type of laparoscopic surgery performed.

Results: Results were similar for both types of bariatric surgery performed. The mean excess weight loss for all patients was 43.0 kg or 74.2% of excess weight. Beginning with a mean BMI of 49.7, patients in the study achieved a mean BMI of 33.3 at 1 year. Many patients experienced improvements in obesity-related comorbidities: 34 of 35 patients with type 2 diabetes were able to reduce or cease treatment, and 27 of 44 patients with hypertension were able to reduce or cease treatment. Responses to the Impact of Weight on Quality of Life questionnaire showed significant postoperative improvement in patient quality of life.

Conclusions: Patients who received laparoscopic bariatric surgery after intensive preconditioning had superior outcomes for weight loss, comorbidity, and quality of life when compared with patients from similar studies with similar time frames. Furthermore, with the use of intensive preconditioning and close, multidisciplinary follow-up, the outcomes were nearly identical for patients receiving gastric bypass and sleeve gastrectomy. This finding differs from those obtained in the majority of previous studies, which have demonstrated superiority for gastric bypass. We postulate that the multidisciplinary focus of our program improves outcomes of surgery generally and also reduces the discrepancy between outcomes for the two bariatric surgery options. Long-term follow-up is required to ascertain the durability of the weight loss and comorbidity and quality-of-life improvements from bariatric surgery with intensive preconditioning and multidisciplinary follow-up.

The effect of intensive preconditioning and close follow-up on bariatric surgery outcomes: Does multidisciplinary care contribute to positive results whether a gastric bypass or sleeve gastrectomy is performed?

Study results indicate that supporting patients who receive laparoscopic bariatric surgery can help with excess weight loss and improve both medical comorbidities and quality of life.

This article has been peer reviewed.
Background

An estimated 1.7 billion people worldwide are affected by obesity (BMI greater than 30 kg/m²). In Canada, 59% of adults are overweight and 25% of these adults are obese. In British Columbia, 59% of adults are overweight and 20% of these are obese. Morbid obesity (BMI greater than 40) is associated with comorbidities such as cardiovascular disease, diabetes, hypertension, hypercholesterolemia, hypercoagulability, cancer, and obstructive sleep apnea. The total direct cost of obesity and related comorbidities in Canada in 2005 was estimated to be over $4.3 billion, or 2.4% of total health care expenditures. The main contributors to this cost were hypertension, coronary artery disease, and type 2 diabetes.

Bariatric surgery is recognized as effective for managing morbid obesity and improving obesity-related comorbidities. Multiple studies in North America and Europe have demonstrated sustainable excess weight loss from bariatric surgery, along with mortality reduction from cardiovascular events, and improvement or resolution of obesity-related comorbidities.

The two bariatric surgery options available to patients at the Richmond Metabolic and Bariatric Surgery clinic are Roux-en-Y gastric bypass (RYGB) and sleeve gastrectomy (SG). Both surgery types are performed using laparoscopic technique. Studies have demonstrated an average percentage excess weight loss of between 38% and 62% and an improved BMI of 35 to 37 following these bariatric procedures. Similarly, obesity-related comorbidities have been shown to improve following surgery in 80% of patients with type 2 diabetes, 70% of patients with hypertension, and 44% to 67% of patients with obstructive sleep apnea.

While many bariatric surgery clinics use a multidisciplinary team approach, surgery is often the primary focus. At the Richmond Metabolic and Bariatric Surgery clinic, patients receive intensive, focused multidisciplinary care before, during, and after surgery. After initial assessment, patients participate in coursework and counseling (preconditioning) in order to prepare them for successful and durable outcomes after surgery. Counseling is provided by a dietitian, an occupational therapist, an exercise physiologist, a psychiatrist (as needed), and a surgeon in both group and individual settings. Patients are required to read bariatric literature written by team members and successfully complete focused coursework before they are cleared for surgery. Three separate courses have been designed for the program. The first is a basics of nutrition course. The second is a bariatric cooking course. The third is a group cognitive behavioral therapy course.

Perioperatively, patients are followed closely by an inpatient medical team, including an ICU specialist, an internal medicine physician, an anesthesiologist, and a bariatric surgeon.

From March to June 2013 research was undertaken to determine if combining bariatric surgery with preconditioning and comprehensive multidisciplinary care improves postoperative outcomes.
Methods
Ethics approval was obtained from the University of British Columbia Clinical Research Ethics Board and the Vancouver Coastal Health Richmond Research Advisory Committee. To be included in the study, patients had to be 19 years of age or older, have a preoperative BMI of 40 or higher, have demonstrated a baseline capacity to participate in preconditioning and multidisciplinary assessment, and have received either a RYGB or SG laparoscopically at the Richmond Hospital. Patients who had received a laparoscopic gastric band previously were excluded from the study. All patients recruited for the study signed consent forms allowing access to their anthropometric information, laboratory tests, medication records, and quality-of-life questionnaire results. All data were collected retrospectively from a patient chart review.

Preoperatively, all patients received multidisciplinary preconditioning care, which included individualized dietary counseling and group nutrition counseling, group cooking classes, group cognitive behavioral therapy, occupational therapy counseling, and activity counseling from a certified exercise physiologist. All patients were required to maintain a daily food and activity journal and attend all appointments. All patients were assessed by a respiratory therapist and internal medicine specialist. Referral to the team bariatric psychiatrist was made if the mental health screening questionnaire indicated this was needed. All patients were required to be nonsmokers and to sign a contract of commitment to this and other lifestyle modifications prospectively for treatment regimen changes. Patient quality of life was measured using the Impact of Weight on Quality of Life (IWQOL-Lite), a validated obesity-specific questionnaire that determines how obesity affects self-esteem, work, physical function, sexual life, and public distress. Patients were asked to complete the IWQOL-Lite before surgery and at 6 months after surgery. Results were compared using the IWQOL-Lite scoring manual.

From 44 patients requiring medical management of hypertension, 22 patients (50%) were able to completely cease treatment with oral antihypertensives and a further 5 patients (11%) were able to reduce treatment at 1 year.

Anthropometrics and quality of life (baseline)
Before surgery, patients had a mean BMI of 49.7 (range 35.9 to 70.9). Patients who underwent either a Roux-en-Y gastric bypass (42 patients) or a sleeve gastrectomy (49 patients) had...
The effect of intensive preconditioning and close follow-up on bariatric surgery outcomes

Medical comorbidities (baseline)
The medical comorbidities found on enrollment and followed in this study were type 2 diabetes (34 of 91 patients) and hypertension (52 of 91 patients). No patients with a diagnosis of type 1 diabetes were included in the study.

Of 34 patients with diabetes, 33 required treatment at baseline with at least one antihyperglycemic agent (biguanides or sulfonylureas), 7 required treatment with both insulin and antihyperglycemic agents, and 1 patient was treated solely with insulin. Baseline glycolated hemoglobin (HbA1c) levels were also recorded for all patients participating in the study, whether they were diagnosed with diabetes or not. The mean HbA1c level for the entire study cohort at baseline was 7.7% (RYGB 7.5%, SG 7.9%). The mean HbA1c level for all patients with diabetes at baseline was 8.3% (RYGB 8.2%, SG 8.5%).

Of 52 patients with hypertension at baseline, 8 patients were managed conservatively with diet and lifestyle modifications, while 44 required pharmaceutical management and had been prescribed at least one antihypertensive agent (ACE inhibitor/ARB, diuretic, beta-blocker, or calcium-channel blocker).

Anthropometrics and quality of life (follow-up)
All study participants had postoperative follow-up visits with a surgeon, dietitian, occupational therapist, and certified exercise physiologist. These follow-up visits occurred at 2 weeks, 1 month, 3 months, 6 months, and 1 year after surgery. Results were reviewed at 1 year postoperatively for all the measures except the IWQOL-Lite, which was completed by patients at the 6-month visit. The postoperative results for weight, BMI, and excess weight loss showed significant reductions for both groups (Table 2). The mean postoperative weight change for both groups at 1 year was 43.0 kg, and the mean excess weight loss was 74.2%. The IWQOL-Lite results changed from a mean score of 77.8 preoperatively to a mean score of 56.5 postoperatively, indicating a significant improvement in quality of life.

Medical comorbidities (follow-up)
Medical comorbidity status was also recorded during follow-up visits, and ultimately reported at 1 year postoperatively. Medical comorbidities were

<table>
<thead>
<tr>
<th>Anthropometric measures</th>
<th>Roux-en-Y gastric bypass (n = 42)</th>
<th>Sleeve gastrectomy (n = 49)</th>
<th>Both groups</th>
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</thead>
<tbody>
<tr>
<td>Enrollment BMI (kg/m²)</td>
<td></td>
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<tr>
<td>Mean</td>
<td>49.7 ± 2.8</td>
<td>48.8 ± 3.4</td>
<td>49.7 ± 3.1</td>
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<td>Range</td>
<td>35.9–65.6</td>
<td>37.5–70.9</td>
<td>35.9–70.9</td>
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<td>Enrollment weight (kg)</td>
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<tr>
<td>Mean</td>
<td>136.6 ± 12.6</td>
<td>143.1 ± 11.3</td>
<td>140.1 ± 12.5</td>
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<tr>
<td>Range</td>
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<td>100.0–223.0</td>
<td>92.0–223.0</td>
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<tr>
<td>Weight 1 week before surgery (kg)*</td>
<td>126.5 ± 11.4</td>
<td>122.3 ± 10.1</td>
<td>129.7 ± 9.7</td>
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<tr>
<td>Mean</td>
<td>89.0–182.0</td>
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<td>Range</td>
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<td>Excess weight at enrollment (kg)</td>
<td>65.8 ± 4.8</td>
<td>68.6 ± 3.2</td>
<td>67.5 ± 4.6</td>
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<td>Mean</td>
<td>30.0–101.0</td>
<td>27.0–130.0</td>
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*2 patients had no weight change

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<tr>
<td>BMI (kg/m²)</td>
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<tr>
<td>Mean</td>
<td>32.7 ± 2.8</td>
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<td>Weight (kg)</td>
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<tr>
<td>Mean (%)</td>
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<tr>
<td>Mean (kg)</td>
<td>43.4</td>
<td>42.8</td>
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**Table 1.** Enrollment and preoperative anthropometric measures for 91 bariatric surgery patients.

**Table 2.** Postoperative anthropometric measures for 91 bariatric surgery patients at 1 year.
classified based on the status of treatment at follow-up: no change, treatment reduced, or treatment ceased. Of 27 patients with diabetes treated only with oral antihyperglycemic agents, 21 patients (78%) were able to completely cease treatment after 1 year (RYGB 10, SG 11). A further level for patients with diabetes at 1 year was 6.4% (RYGB 6.4%, SG 6.2%), an improvement from the baseline level of 8.3% (RYGB 8.2%, SG 8.5%).

Improvements were also noted for patients with a diagnosis of hypertension at enrollment. From 44 patients requiring medical management of hypertension, 22 patients (50%) were able to completely cease treatment with oral antihypertensives (RYGB 13, SG 9) and a further 5 patients (11%) were able to reduce treatment at 1 year (RYGB 2, SG 3).

Conclusions
Morbid obesity and related comorbidities can be effectively treated with bariatric surgery combined with a multidisciplinary approach to preoperative and postoperative management. In addition to the improvements produced by bariatric surgery, lifestyle changes in diet and exercise routines can increase the magnitude of weight loss and the other benefits derived from losing weight. This study demonstrates the impact of combining gastric surgery with a multidisciplinary approach that includes exercise counseling, cooking classes, individual and group dietary counseling sessions, and cognitive behavioral therapy to treat obesity and obesity-related comorbidities.

A majority of the patients with diabetes and hypertension showed improvement in treatment status 1 year later. IQWOL-Lite survey results also indicated improvements in quality of life, with a 21.3-point difference between preoperative and postoperative test scores.

The overall mean excess weight loss for all patients studied was 43.0 kg or 74.2% of excess weight, and the mean BMI achieved at 1 year for both bariatric surgery types was 33.3. The results for mean excess weight loss were better than reported in previous studies with similar time frames.

A systematic review by Shi and colleagues in 2010 found 1-year excess weight loss to be 62.8% for RYGB and 59.8% for SG. A similar, systematic review by Fischer and colleagues in 2012 showed 1-year excess weight loss of 64.8% for RYGB and 56.1% for SG.

An interesting finding of the study was that the mean excess weight loss was nearly identical for both the RYGB and SG groups. Previous studies have typically identified superior excess weight loss for RYGB over SG. The results of this observational study demonstrate that supporting patients who receive laparoscopic bariatric surgery can help with excess weight loss and improve both medical comorbidities and quality of life. Improvement was found in all patient outcomes, regardless of type of laparoscopic surgery performed.

The results reported here are better than those found previously in bariatric surgery studies with similar time frames. The results were also similar regardless of the type of surgery performed. This supports our hypothesis that treating obesity and
obesity-related comorbidities is more effective using a multidisciplinary approach.

In general, the results from most observational bariatric surgery studies have been reported at the 1-year mark, and then again at the 3-year mark. Longer-term results (i.e., after 3 years or more) directly comparing outcome improvements between RYGB and SG are currently lacking. We will be following the same cohort of patients to assess longer-term outcomes. While this longer-term data will be useful, the 1-year results are already significant because they include a novel finding—a trend toward equivalence between outcomes after RYGB and SG procedures.

Competing interests
None declared.

References