

## Bariatric Surgery for Treatment of Type 2 Diabetes and Prevention of CVD



**David E. Harris, BSc, MD, FRCPC; Nam Nguyen, BSc, MD, FRCSC;  
Sharadh Sampath, BSc, MD, FRCSC**

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The Canadian epidemic of obesity and type 2 diabetes (DM2) as risk factors for CVD and mortality is influencing physicians to consider bariatric surgery when medical therapy is deemed ineffective. Bariatric surgery, first developed in the 1950s, was generally an esoteric weight loss procedure considered effective by only a handful of Canadian surgeons. Multidisciplinary bariatric medical-surgical programs are now mainstream in Alberta, Ontario, and Québec.

The epidemic of obesity has been present for many years; the Public Health Agency (PHA) of Canada reports measured adult prevalence of obesity (defined body mass index [BMI]  $\geq 30.0$  kg/m<sup>2</sup>) was 13.8% in 1978, and this increased to 24.2% of the population in 2005.<sup>1</sup> Prevalence is higher in the USA and is estimated at 35% of the adult population.<sup>2</sup> The obesity epidemic has been correlated with many life-threatening comorbidities, such as DM2, hypertension, dyslipidemia, CV and cerebrovascular disease, arthritis, obstructive sleep apnea, and cancer, to name a few. The Canadian PHA reports the expense of all obesity-related, chronic conditions to be in excess of 4.3 billion dollars for direct and indirect related costs. This obesity-related economic burden is catastrophic.

Various behavioural interventions (dieting and nutritional strategies, physical activity sessions, etc.) have been reported and are associated with



Figure 1: Image of the Stomach Right after Completion of Laparoscopic Sleeve Gastrectomy

6% baseline weight loss (5% baseline weight loss is clinically important); however, sustainability of these interventions is variable.<sup>2</sup> Medication-induced weight loss (5 to 10% baseline weight loss) has a history of prevalent, adverse, and potentially life-threatening side effects,<sup>3,4</sup> yet this weight loss therapy is often nonsustainable upon discontinuation of the medication. Overall, high rates of study drop-out and therapeutic attrition result from this approach. As a result, many studies for these medications lack long-term follow-up data.<sup>4</sup>

Bariatric surgery was a specialty that was initially criticized, due to lack of long-term outcome data for weight loss. Recent total long-term efficacy data for laparoscopic gastric



banding, sleeve gastrectomy or Roux-en-Y gastric bypass demonstrated baseline weight loss of 23%, 17%, 16%, and 18% at 2, 10, 15, and 20 years, respectively, in the Swedish Obese Subjects (SOS) study.<sup>5</sup>

Bariatric surgery has demonstrated excellent efficacy in the treatment of DM2. The SOS group reported incident DM2 rates were 6.8/1,000 persons (bariatric subjects) as compared with 28.4/1,000 persons (nonsurgical matched controls).<sup>6</sup> Two landmark randomized-controlled trials, published in 2012 in the *New England Journal of Medicine*, demonstrated improved treatment of DM2 beyond medical therapy. In the first study, DM2 remission — defined as HbA<sub>1C</sub> < 6% and no pharmacologic therapy — was achieved in 75% of patients who underwent gastric bypass after two years as compared to 0% of conventional DM2 controls.<sup>7</sup> A second study compared intensive medical therapy alone to medical therapy with gastric bypass or sleeve gastrectomy after one year to achieve HbA<sub>1C</sub> < 6% in DM2 subjects. The results were impressive, as 42% of bypass surgery patients and 37% of sleeve gastrectomy patients achieved the endpoints as compared to 12% in the intensive medical therapy group.<sup>8</sup> Recent observational reports also demonstrate improvement in retinal and renal microvascular disease.<sup>9</sup>

Further analysis of the SOS cohort also demonstrates CV risk is attenuated with bariatric surgery. This 14.7-year prospective, nonrandomized, controlled trial<sup>5</sup> reported 28/2,010 total CV mortality events for bariatric surgery subjects as compared to 49/2,037 total events in the nonsurgical control group, resulting in a relative risk reduction of 53%. First time fatal and nonfatal CV events were also reduced with relative risk reduction of 33% in this study.

Long-term studies demonstrating the efficacy of bariatric surgery for the treatment of many chronic medical conditions, not just obesity, is now widely available. Provincial governments in Alberta, Ontario, and Québec have recognized the urgency to address the evolving obesity epidemic and related comorbidities with wide scale bariatric multidisciplinary surgical programs — we anticipate these initiatives will spread to other provinces.

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**Dr. David E. Harris** is an Endocrinologist and General Internist practicing at Richmond Hospital in Richmond, British Columbia.

**Dr. Nam Nguyen** is a General Surgeon practicing in Richmond, British Columbia.

**Dr. Sharadh Sampath** is a Clinical Instructor at the University of British Columbia and Chair of the British Columbia Obesity Network. He practices General Surgery in Richmond, British Columbia.

