Laparoscopic Sleeve Gastrectomy and Its Effects on Hypertension

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Abstract

Obesity is a common disease affecting adults and children worldwide. Bariatric surgery currently is the only effective procedure resulting a sustainable and long-term weight loss. Laparoscopic sleeve gastrectomy (LSG) is a relatively new but effective procedure. The purpose of this review is to evaluate the current evidence on the effects of LSG on hypertension.

Keywords: Morbid obesity; Obesity surgery; Sleeve gastrectomy; Hypertension

Introduction

The prevalence of obesity has continued to rise over the last few decades. Over 300 million adults are considered clinically obese worldwide \cite{1}. In Canada an estimated 60\% of the population is considered overweight \cite{2}. Obesity is defined as a BMI \geq 30$ kg/m$^2$, and morbid obesity is defined as a BMI \geq 40$ kg/m$^2$.

Obesity is a known risk factor for development of several comorbidities. Some significant obesity-related conditions include diabetes mellitus, hypertension, sleep apnea, hyperlipidemia, gastroesophageal reflex disease, and degenerative joint disease \cite{3}. It is estimated that 1 in 10 premature deaths are directly attributable to obesity in Canadian adults aged 20 - 64 \cite{4}. Obesity is one of the largest and most important epidemics facing Canadians today.

Bariatric Surgery

Bariatric surgery is currently the most effective evidence-based method to obtain long-term weight loss in severely obese patients \cite{5}. Laparoscopic sleeve gastrectomy (LSG) is a new bariatric procedure introduced in the 1990’s for the management of severely obese patients. It was initially used as the first step to a two-stage approach to biliopancreatic diversion with duodenal switch (BPD-DS) \cite{6}, but has been recently shown to be an effective single procedure \cite{7}. LSG is characterized as a restrictive procedure and functions to mechanically limit food intake. Furthermore, it is thought that LSG may decrease appetite stimulation by resecting the portion of gastric fundus responsible for producing ghrelin \cite{8}.

Obesity and Hypertension

Obesity and the presence of adipose tissue have been associated with increased blood pressure. The precise pathophysiology to the development of hypertension in obese patients is currently unknown. However, there are several factors involved in obesity-related hypertension including physiologic, genetic and environmental factors. Hypertension is also a known component of the metabolic syndrome, which consists of centripetal obesity, dyslipidemia, impaired glucose

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tolerance and insulin resistance [9]. It has been postulated that in the obese, activation of the renin-angiotensin-aldosterone system (RAAS) and sympathetic nervous system may contribute to high blood pressure [10]. Estimates of up to 70% of hypertension in adults may be directly caused by adiposity [11]. It has also been postulated that obesity-related hypertension may be in part due to increased renal sodium retention and impaired pressure naturesis [12]. Recent evidence has suggested that adipocytes releasing neuroendocrine hormones may impact arterial pressure [9]. Adipose-related causes of hypertension may thus be reduced with weight loss.

There have been many recent studies that have shown improvement or resolution of hypertension following LSG. A multi-center study by Sanchez et al [13] found that hypertension was improved in 63% of LSG patients. Hutter et al [14] conducted a prospective study on 944 patients and reported that 68% had improvement or resolution of hypertension at one year follow up. In another cohort study, Basso et al [15] found that out of 100 high-risk super obese patients with a mean BMI of 54.4 kg/m² had complete resolution of their hypertension in 62% of cases. A long-term study done by D’Hondt et al reported that 90.9% of LSG patients had improvement or resolution of hypertension 5 years post-operatively [16]. A systematic review by Sarkhosh et al [17] found that out of 3997 patients, 75% had improvement or resolution of their hypertension and 58% had complete resolution of hypertension following sleeve gastrectomy. In a meta-analysis done by Buchwald et al [18], improvement or complete resolution of hypertension was seen 70.8%, 87.2%, 85.4% and 75.1% of patients undergoing gastric banding, gastric bypass, gastroplasty and biliopancreatic diversion/duodenal switch respectively.

**Conclusion**

In conclusion, there has been promising evidence of the beneficial effects of laparoscopic sleeve gastrectomy (LSG) on hypertension in obese patients. It has been found in many studies that sleeve gastrectomy results in resolution or improvement in hypertension in the majority of patients. LSG is therefore an effective surgical option for weight loss as well and improvement of associated comorbidities of obesity. Further studies are needed to evaluate the effect of bariatric surgery and sleeve gastrectomy on comorbidities on a long-term basis.

**References**

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