Volumetric CT in Sleeve Gastrectomy

Thesis

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List of Abbreviations

Abb.	Full term
3D	Three dimensional
BAROS	Bariatric analysis and reporting outcome system
BMI	Body mass index
BPD-DS	Bilio-pancreatic diversion – duodenal switch
DS	Duodenal switch
GDA	Gastro duodenal artery
GRDS	Gastric reduction – duodenal switch
LES	Lower esophageal sphincter
LGA	Left gastric artery
LSG	Laparoscopic sleeve gastrectomy
MSCT	Multi-slice computed tomography
RGA	Right gastric artery
RGV	Residual gastric volume
UGI	Upper gastro-intestinal endoscopy

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Introduction

In most humans, body weight is maintained in a stable condition. Humans can have the same body weight for many years. To have a constant weight, there must be an energy balance; energy intake has to be equal to energy expenditure. However, when the energy balance gets disturbed, this may eventually lead to sustained weight problems ***(Jakobsdottir et al., 2006)***.

Obesity continues to be a major public health problem, as defined by a body mass index (BMI) ≥30 kg/m^2. Obesity has been associated with an increased hazard ratio for all-cause mortality, as well as significant medical co-morbidity ***(Mechanick et al., 2013)***.

Obese individuals are highly stigmatized and face multiple forms of prejudice and discrimination because of their weight. Weight bias translates into inequities in employment settings, health-care facilities, and educational institutions, often due to widespread negative stereotypes that overweight and obese persons are lazy, unmotivated, lacking in self-discipline, less competent, noncompliant, and sloppy. These stereotypes are prevalent and are rarely challenged, leaving overweight and obese persons vulnerable to social injustice, unfair treatment, and

impaired quality of life as a result of substantial disadvantages and stigma ***(Puhl and Heuer, 2009).***

Bariatric surgery procedures are indicated for patients with clinically severe obesity. Currently, these procedures are the most successful and durable treatment for obesity. Furthermore, although overall obesity rates and bariatric surgery procedures have plateaued, rates of severe obesity are still increasing ***(Hurley et al., 2013).***

The role of radiology in gastric bariatric surgery is no longer limited for detection of postoperative complications, but also it extends to evaluate the role of surgical reduction of gastric size in body weight reduction after surgery. MSCT gastric volumetric study is the only method for accurate assessment of volumes of stomach and gastric sleeve before and after surgery. It insures exact data concerning gastric volumes and diameters of anastomoses.

Aim of work

The study aims to evaluate the role of multi slice CT gastric volumetry in assessment of gastric sleeve surgery and to correlation between the operative gastric volume reduction and body weight reduction after surgery.

Anatomy of Stomach

Classic anatomical textbooks describe the stomach as the most dilated part of the digestive tract, located beneath the diaphragm in the left hypochondrial and epi-gastric regions of the abdominal cavity ***(Cottam et al., 2006).***

The stomach is characterized by a cylindrical form with a well-formed anterior and posterior wall, lesser (medial) and greater (lateral) curvatures as well as fundus, cardia, body and pylorus ***(Cottam et al., 2006).***

The shape and position of the stomach are strongly associated with organogenesis. Any developmental abnormality of the organ itself or nearby located viscera and peritoneum, as well as their vessels and nerves may influence stomach morphology ***(Chen et al., 2009).***

The final topography depends also on contents of the stomach and surrounding viscera, respiratory phase, age and body type of the individual. Any abnormal fluid accumulation in the pleural and peritoneal cavity may change the stomach shape as well ***(Chen et al., 2009).***

Heavily build hypersthenic individuals with short thorax and long abdomen are likely to have stomach that is placed in higher position and more transversally. In persons with a slender asthenic physique, the stomach is located lower and more vertical ***(Ferrer-Márquez et al., 2012).***

Gross Anatomy

Parts:

The gastro-esophageal junction: *(illustrated in Fig.1)*

The abdominal esophagus enters the stomach at an acute angle named "The angle of His" or "Cardiac notch" created between it and the cardia. It forms a valve, preventing reflux of duodenal bile and stomach acid from entering the esophagus. The esophageal insertion angle is more acute in expiration than in inspiration, but was not affected by feeding ***(Forsell, 1996).***

At the gastro-esophageal junction, there is the *lower esophageal sphincter (LES)* which function is to prevent the retrograde movement of gastric content into the esophagus. However if the normal function of this sphincter is altered, such as prolonged lower esophageal sphincter relaxation, a hypotensive lower esophageal sphincter or anatomic disruption of the gastro-esophageal junction as a hiatal hernia, gastro-esophageal reflux of different severity can occur ***(Forsell, 1996).***