بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

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Preoperative Ultrasound Assessment of Residual Gastric Volume in Patients with Delayed Gastric Emptying Undergoing Elective Surgeries

Thesis

Submitted for Partial Fulfillment of Master Degree in

Anesthesia, Intensive Care and Pain Management

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2021

Acknowledgment

First and foremost, I feel always indebted to Allah , the Most Kind and Most Merciful.

I'd like to express my respectful thanks and profound gratitude to Prof. Dr. Gamal Eldin Mohammad Ahmad Elewa, Professor of Anesthesia, Intensive care medicine and Pain Management - Faculty of Medicine- Ain Shams University for his keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.

I am also delighted to express my deepest gratitude and thanks to Assist. Prof. Dr. Wail Ahmed Mohamed Abdelaal, Assist Professor of Anesthesia, Intensive care medicine and Pain Management, Faculty of Medicine, Ain Shams University, for his kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.

I am deeply thankful to Dr. Faisal Said AbdelHamid, Lecturer of Anesthesia, Intensive care medicine and Pain Management, Faculty of Medicine, Ain Shams University, for his great help, active participation and guidance.

I would like to express my hearty thanks to all my family for their support till this work was completed.

Last but not least my sincere thanks and appreciation to all patients participated in this study.

Verina Fares Zaref Bekheet

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List of Abbreviations

Abb.	Full term

ASA ..... *American society of anesthesiology*

D cells ..... *Delta cells or δ-cells*

ECL cells ..... *Enterochromaffin-like cells*

ENS ..... *Enteric nervous system*

G-cells ..... *Gastrin cells*

GI tract ..... *Gastrointestinal tract*

HCL ..... *Hydrochloric acid*

ICC ..... *Interstitial cells of cajal*

IQR ..... *Inter Quartile range*

LES ..... *Lower esophageal sphincter*

PSNS ..... *Parasympathetic nervous system*

RGV ..... *Residual gastric volume*

SNS ..... *Sympathetic nervous system*

INTRODUCTION

Perioperative aspiration of gastric contents is a serious complication of anesthesia ***(Warner et al., 1993).*** Its incidence ranges from < 0.1% to 19%, depending on patient and surgical factors. Aspiration pneumonia leads to prolonged mechanical ventilation, with significant morbidity ***(Neelakanta and Chikyarappa, 2006)***. Pulmonary aspiration is responsible for 9% of all anesthesia-related deaths. Of the main risk factors for aspiration is presence of *risk stomach. Risk stomach* is defined as the presence of solid particles and/or gastric volume of 0.4-0.8 ml/kg at time of induction of anesthesia ***(Lienhart et al., 2006)***.

Bedside utrasonography can provide reliable information about nature (fluid or solid) and volume of gastric content**.** Antral sonography can differentiate empty stomach from one with fluid or solid content based on qualitative assessment alone. Moreover, when the stomach contains fluid, a cross-sectional area (CSA) of the antrum measured in the right lateral decubitus (RLD) can predict total gastric fluid volume. Sedation and general anesthesia depress or impede the physiological mechanisms (upper airway reflexes and tone of lower esophageal sphincter) that protect against aspiration ***(Warner et al., 1993)***.

Since restriction of fluid and food intake before general anesthesia is vital for patient safety, anesthesiology societies have developed guidelines for preoperative fasting. For example, ASA

has recommend a minimum of 2 h of fasting for clear fluids, 6 h after a light meal (toast and clear fluids), and 8 h after a full meal with high calorie or fat content. However, these guidelines may not be applicable to patients with coexisting diseases with delayed gastric emptying, or in emergency situations ***(American Society of Anesthesiologists, 2011).***

Bedside ultrasonography may provide reliable information about the nature and volume of gastric content, and provide a qualitative and quantitative description of the gastric antrum in patients undergoing surgery.

AIM OF THE WORK

The primary aim of this study is to provide a qualitative description of the sonographic appearance of the gastric antrum in fasted patients with delayed gastric emptying undergoing elective surgery by proposing a grading system of the gastric antrum based exclusively on qualitative findings and correlation with the quantitative predicted gastric volume by the known formula prescribed for persons without delayed gastric emptying.

The secondary aim is to correlate the qualitative and quantitative description of the higher risk group in this grading system with the aspirated residual gastric volume by a nasogastric tube.

REVIEW OF LITERATURE

Anatomical background:

The stomach is the widest part of the alimentary canal. It is a sac-like structure that is continuous proximally with the abdominal esophagus and distally with the duodenum. The stomach is en-sleeved in peritoneum. The proximal and distal ends of the stomach are relatively immobile due to their fixity to nearby structures. Elsewhere the stomach shows appreciable mobility. The principal functions of the stomach are (i) to act as a receptacle and reservoir for ingested food and to release the food into the duodenum in small and physiologically appropriate amounts. (ii) to secrete hydrochloric acid and proteolytic enzymes that initiate protein digestion and neutralize many harmful bacteria in the ingested food; and (iii) to churn the ingested food and soften it by means of gastric juice to produce a liquefied mixture termed chyme.

The stomach lies largely in the left hypochondrial region under cover of the lower part of the rib cage. The lower and distal part of the stomach, however, lies in the epigastric and upper umbilical regions of the abdomen. The stomach is a distensible organ. In the adult, it has an average capacity of 1.5 litres. The stomach is approximately J-shaped, although in certain individuals it may lie transversely when it is known as a steer-horn stomach. The size, shape and position of the stomach can vary considerably, depending on the posture of the individual and on the state of fullness of the stomach.

The empty stomach appears flattened. It presents anterior and posterior surfaces, which are separated from each other by the greater and lesser curvatures **(Figure 1)**. The lesser curvature forms the upper right border of the stomach while the greater curvature forms the lower left border. The stomach has two openings or orifices. The proximal one is termed the cardiac orifice through which the stomach communicates with the esophagus. The distal orifice is termed the pyloric orifice and this lies at the gastroduodenal junction. The regions of the stomach adjacent to the cardiac and pyloric openings are known as the cardia and pylorus respectively. The main parts of the stomach are the fundus, body and pyloric part.

The various parts of the stomach **(Figure 1)** have physiological differences and are taken into account by the endoscopist, radiologist and surgeon in localization of gastric pathologies.

The fundus of the stomach is the part which projects upwards above the level of the cardiac orifice. Lying to the left of the abdominal esophagus, it makes contact with the left dome of the diaphragm. Two-thirds of the way from the cardiac orifice along the lesser curvature of the stomach is a distinct notch, the angular notch (incisura angularis). The body of the stomach extends from the cardiac orifice to the level of the angular notch. It is the largest part of the stomach and is the part that contains in its inner lining, the parietal cells which secrete HCl. The pyloric part of the stomach extends from the

angular notch to the gastro- duodenal junction. It comprises the pyloric antrum proximally and the pyloric canal distally. The distal end of the pyloric canal features a very distinct ring of sphincter muscle. It is immediately proximal to the pyloric orifice and can be easily felt. It is greatly thickened in the condition of infantile hypertrophic pyloric stenosis. The position of the pyloric sphincter is indicated by the presence of a fairly constant vein, the prepyloric vein (of Mayo) that runs vertically on the anterior surface of the pylorus.

The pyloric antrum produces the hormone gastrin, which is responsible for the hormonal phase of gastric acid secretion.

Attached along the lesser curve is the lesser omentum, a double-layered peritoneal sheet that extends from the lesser curvature of the stomach to the visceral surface of the liver. At the lesser curvature the two leaves of the lesser omentum diverge; the anterior leaf covering the anterior wall of the stomach and the posterior leaf adhering to the posterior wall. At the greater curvature the two leaves meet to form the greater omentum. The greater omentum hangs down like an apron from the greater curvature. The lesser and greater omenta contain the blood vessels, lymphatics and nerve supply of the stomach ***(Mercer et al., 2002)***.