

The Airways and Gastric Contents in Obese Patients

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INTRODUCTION

Classically, obese patients have been considered as having a potential full stomach, and it has been believed that abdominal pressure and gastric volume have a similar behavior to that of pregnant patients. However, in parturients, gastric emptying is slowed, not only as a consequence of the anatomical changes secondary to the cephalad displacement of the stomach by the uterus, but also due to the actions of progesterone. In 1983, Wright¹ demonstrated that gastric emptying in obese patients is faster than in non-obese patients, especially in males. However, the anesthetic literature still considers obese patients as having a potential full stomach. Those statements are based, mainly, on a study by Vauhan's² who, in 1975, observed greater gastric contents and lower pH in obese patients. Based on the study of Roberts and Shirley³, published in 1974, who reported gastric contents greater than 25 mL and pH lower than 2.5 as risk factors for aspiration of gastric contents, Vaughan reported that 75% of obese patients (compared to none of non-obese patients) presented this relationship. Methodologically, the study of Vaughan failed, as pointed by Schreiner⁴, by the blind aspiration of the stomach to determine the volume of the gastric contents.

Very few studies correlating the body mass index and gastric contents can be found in the literature. Several studies published after 1975 reinforced the concept that obese patients should be considered as having a potential full stomach, but those statements are based on the study by Vaughan⁵⁻⁹. In the present review, we tried to analyze the literature looking for more studies on the subject and its repercussions on the anesthetic technique, especially on techniques to access the airways.

OBEASITY, GASTRIC CONTENTS, AND THE AIRWAYS

The concept of a full stomach related with obesity was initially reported by Vaughan in 1975. However, this affirmation was not confirmed in the literature. Even the relationship between critical pH and volumes as risk factors for aspiration of gastric contents, described by Roberts and Shirley³, seems to be less important than initially though.

Unlike the study of Vaughan, Harter¹⁰, in a study with 256 patients undergoing elective surgical interventions, did not observe statistically significant differences in gastric volume and pH between obese and non-obese patients. Indeed, when gastric volume and pH were combined, the author ob-

served a lower risk of aspiration in obese patients than in normal individuals. The same study also demonstrated that, despite larger gastric volumes in obese patients treated with citrate, citrate and metochlopramide, citrate and ranitidine, or citrate and ondansetron, the incidence of high-risk patients was significantly lower. This evidence suggests that all obese patients should receive those drugs before surgery. Juvin¹¹, after endoscopy-guided aspiration of gastric contents, did not observe significant differences in gastric volume, despite discretely lower pH levels in obese patients.

Maltby¹² compared fasting obese patients with those who ingested 300 mL of fluids two hours before surgery by aspirating the stomach after anesthetic induction with a gastric tube. The author did not observe significant differences in gastric volume and pH between both groups. Although the gastric volume in both groups was approximately 25 to 30 mL, both in fasting obese patients and in those who ingested fluids, gastric pH was low (approximately 1.7) and within risk levels. This seems to be the only study in the literature that confirms the results of Vaughan². Illing¹³ investigated 44 patients, seven obese and 37 non-obese, undergoing general anesthesia for elective surgeries. The author reported an incidence of 15.9% of gastroesophageal reflux, relating cases of reflux with bucking or coughing during intubation and extubation. Obesity and the increase in intra-abdominal pressure were not related with them.

Huxley¹⁴ observed episodes of aspiration of gastric contents in 45% of normal individuals during sleep, which increased to 70% when they were medicated with CNS depressors. However, according to a review by Engelhardt¹⁵ published in 1999, several factors are related with those events, but obesity was not one of those factors.

American data indicate that more than 70 thousand surgeries are performed in obese patients every year. A large number of obese patients is operated every year, for bariatric surgeries and others, worldwide and, despite those numbers, reports of bronchoaspiration in obese patients are rare, indicating that probably the data of Vaughn² are not correct. But what is the implication of considering obese patients at a high risk for aspiration of gastric contents? This concept leads many anesthesiologists to use rapid sequence intubation (RSI) or awake intubation (AI) instead of intubating the patient after anesthetic induction. Awake intubation causes great discomfort to the patient, which is partially relieved by low doses of sedatives or opioids due to the risk of respiratory depression. Tracheal instillation of a topical local anesthetic has limited benefits, since it does not abolish completely the laryngoscopy-associated discomfort and release of catecholamines. Regional blocks can be useful, but very few anesthesiologists are used to performing it. Awake intubation is a painful and aggressive procedure, and should be reserved for cases of imminent risk of aspiration of gastric contents or intubation failure. Tachycardia and hypertension are common complications and the lack of patient cooperation can hinder laryngoscopy. Due to the greater predisposition of obese patients for arrhythmias, the release of catecholamines can be potentially deleterious. Rapid sequence intubation allows little latency time for the opioids, since the patient will not be ventilated from the mo-

ment of loss of consciousness until tracheal intubation. Sellick maneuver offers partial protection against aspiration of gastric contents due to the lateral displacement of the esophagus in relation to the trachea¹⁶. Obese individuals have an important reduction in functional residual capacity and increase in airways occlusion¹⁷, as well as elevated oxygen consumption⁷, leading to rapid desaturation, up to 90% faster than in non-obese individuals¹⁸, giving very little time for the anesthesiologist to intubate the patient. Prior ventilation with 100% oxygen besides being potentially capable of causing or worsening atelectasis¹⁹, allows limited time before desaturation. This gives intubation a character of urgency, which can lead to technical difficulties and odontological or cavitory damage.

Whenever possible, intubating an anesthetized patient is the best conduct. Under those conditions, the patient presents better degree of muscular relaxation and better protection to the release of catecholamines, which favor more effective laryngoscopy. In cases of doubts on the difficulty of intubation, fiberoptic-guided intubation is an interesting alternative, since it allows awake intubation and causes less discomfort. If a fiberoptic bronchoscope is not available, the look awake technique, which consists of progressive laryngoscopies, under topical anesthesia with lidocaine spray, gently advancing the laryngoscope. The spray of local anesthetic is applied on every attempt and, after three or four maneuvers, it is possible to safely assess the real difficulty to intubate. One should not forget that those maneuvers should be gently performed to avoid traumatizing mucous membranes, causing significant discomfort to the patient, and promoting significant release of catecholamines. If the anesthesiologist detects good conditions for laryngoscopy, anesthetic induction can be carried on, followed by intubation. If conditions are not favorable, other intubation techniques can be used.

However, another pertinent question should be made: does obesity hinder intubation? A large proportion of anesthesiologists consider obesity an indication of difficult intubation; however, the literature on this subject is controversial. It is important that, despite the large number of anesthesia in obese patients for so many years, reports on intubation failures in this population are rare.

During pre-anesthetic evaluation, the presence of nocturnal snoring or sleep apnea, potential indicators of mechanical obstruction of the airways, especially in patients treated with depressors of the CNS, should be investigated⁸. Obese individuals with sleep apnea seem to be more difficult to intubate²⁰. Wilson²¹ listed snoring, changes in spinal column mobility, odontological failures, and mouth opening of less than 35 mm as predictive factors for difficult intubation. Obesity was associated with difficult laryngoscopy.

In 1996, a review of the literature by Oberg⁷ reported difficult intubation in approximately 13% of obese patients, similar to that reported by Addams²² in 2000. Both authors based their reports on the 1983 study by Buckley²³. Juvin²⁴ also reported greater intubation difficulty in obese individuals, but, in the same study, he reports that unsuccessful intubation was not observed in any of the patients. He also reported that Mallampati index of III and IV was the only isolated factor related

with difficult intubation. In 2005, Shiga²⁵ reported a 15.8% incidence of difficult intubation in obese individuals, which was corrected to 12.7% in a letter published in 2006²⁶.

In a series of 18,500 patients²⁷, obesity was implicated in difficult intubation (relative risk of 10.3), as well as male gender and age between 40 and 59 years. In the same study, factors, such as small mouth opening, reduced thyromental distance, and limited visualization of the hypopharynx were listed as difficulties for laryngoscopy. However, in a later study with 444 patients²⁸, obesity was not implicated in difficult intubation, and only mouth opening, retrognathism, and atlanto-occipital extension were listed as risk factors. Other authors also did not observe a correlation between obesity and difficult intubation²⁹⁻³¹. However, even in those studies the controversy remains. While Brodsky²⁹ correlated neck circumference and Mallampati index with difficult intubation, Ezri³⁰ reported that advanced age, male gender, temporomandibular joint disorders, history of sleep apnea, and changes in the upper teeth were also related with difficult intubation. A study by Cattano³¹ also implicated neck circumference, but the Mallampati index was not considered a predictive factor.

Adding to the discussion, Collins³², in 2004, reported that patients with cervical elevation of 8 to 10 cm presented better conditions for laryngoscopy. The author, in a 2006 letter³³, questioned the results of the study by Shiga²⁵ due to the inadequate positioning (without cervical elevation) used by the author.

Despite controversies in the literature, the anesthesiologist should be careful during intubation of anesthetized obese patients, maintaining readily available all the resources necessary for the management of possible difficulties. Obesity alone does not seem to be predictive of difficult intubation, but other factors are important: neck circumference greater than 55 cm, Mallampati III and IV, buccal opening smaller than 3.5 cm, thyromental distance smaller than 6 cm, retrognathism, and limited cervical movement. Proper patient positioning, with cervical elevation of 8 to 10 cm, is indispensable and helps laryngoscopy. Similarly, neuromuscular blockade facilitates laryngoscopy maneuvers, reducing the difficulty.

CONCLUSION

In the current review of the literature, it was not clearly established the relationship between obesity and gastric contents, despite the small number of studies aimed at investigating this relationship. Analysis of the studies mentioned did not demonstrated clear evidence of increased risk of aspiration of gastric contents in obese individuals, going against current concepts. The lack of case reports and clinical experience, along with scientific studies, allow the conclusion that obesity does not represent an isolated risk factor.

Thus, the authors consider that intubation maneuvers to protect the airways against aspiration of gastric contents are not necessary, especially in view of the potential negative effects for the patient. The use of rapid sequence intubation or awake intubation should be reviewed in cases without other risk factors besides obesity.

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RESUMEN

Reis LA, Reis GFF, Oliveira MRM – Vías Aéreas y Contenido Gástrico en el Paciente Obeso.

JUSTIFICATIVA Y OBJETIVOS: El presente artículo tuvo el objetivo de analizar nuevamente las referencias bibliográficas y de cuestionar el concepto de que el obeso debe ser considerado como de estómago lleno, cuestionando, por tanto, la forma como la vía aérea debe ser abordada en la inducción de la anestesia general considerada de difícil acceso a causa de la obesidad.

CONTENIDO: Clásicamente, al paciente obeso se le considera como de estómago lleno, conllevando a conductas protectoras de las vías aéreas durante la inducción de la anestesia general. A menudo se realizan intubaciones con el paciente despierto o intubación de secuencia rápida. Sin embargo, tal concepto se basa en un solo trabajo de la literatura, citado por diversos autores. El obeso también se considera difícil de intubar, creando un recelo respecto del éxito del abordaje de la vía aérea. Los trabajos de la literatura, sin embargo, refutan tales conceptos, lo que nos lleva a cuestionar sobre las técnicas de acceso a las vías aéreas.

CONCLUSIONES: Los trabajos de la literatura muestran que el vaciamiento gástrico en el obeso no es lentificado como se creía, como también el contenido gástrico no es mayor que en el paciente no obeso, por lo tanto, la intubación en la anestesia puede ser realizada con seguridad. A pesar de que la obesidad aisladamente no cause una falla en la intubación, otras señales pueden ser usadas para prevenir la intubación difícil.