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Airway Management in Bariatric Surgery Patients at Hospital Universitario de San Ignacio, Bogotá, Colombia

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ABSTRACT

Introduction: Obesity has increased in the past few years, more so for the morbidly obese; in whom comorbilities that complicate the perioperative anaesthetic and airway management have been identified. The pre-anaesthetic assessment of the patient includes parameters of physical examination and medical history that predict difficulties when intubating or failure to do so. In such cases, the Bonfils retromolar fibroscope has proven to be a useful tool.

Goal: To observe and identify predicting evidence of a difficult airway through physical examination; to revise the incidence of difficult intubation and the use of tools for airway management of obese patients.

Methods: This is a descriptive observational study carried out on 352 obese patients who underwent bariatric surgery at Hospital Universitario San Ignacio, Bogotá. On these patients we assessed the following parameters: body mass index (BMI), oral opening, mallampati score, distance between thyroid and chin, neck circumference, use of laryngoscope or Bonfils retromolar fibroscope and the difficulties encountered for both.

Conclusions: Intubation with the Bonfils retromolar fibroscope proves successfull in 100% of observed cases of obese patients, and intubation difficulty does not correlate with the parameters considered in our assessment.

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Manejo de la vía aérea en pacientes llevados a cirugía bariátrica en el Hospital Universitario de San Ignacio, Bogotá, Colombia

Palabras clave:
Obesidad
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RESUMEN

Introducción: La obesidad ha aumentado en los últimos años y aún más los obesos mórbidos, en quienes se han reconocido comorbilidades que dificultan el manejo perioperatorio anestésico, incluido el manejo de la vía aérea. En la valoración preanestésica existen parámetros del examen físico y de la historia clínica que son predictores de intubaciones difíciles o fallidas, y es en estos casos cuando el fibroscopio retromolar de Bonfils ha sido una herramienta útil.

Objetivo: Observar los predictores de vía aérea difícil a partir del examen físico, la incidencia de intubación difícil y las herramientas utilizadas para el manejo de la vía aérea en pacientes obesos.

Material y métodos: Estudio observacional descriptivo de 352 pacientes obesos llevados a cirugía bariátrica en el Hospital Universitario de San Ignacio, Bogotá, en quienes se evaluó índice de masa corporal, apertura oral, Mallampati, distancia tiromentoniana, circunferencia del cuello y uso de laringoscopio o fibroscopio retromolar de Bonfils y su dificultad en la utilización.

Conclusiones: La intubación con fibroscopio retromolar de Bonfils es exitosa en el 100% de los casos observados en pacientes obesos y la dificultad de la intubación con dicho dispositivo no se correlaciona con los parámetros evaluados.

Introduction

Obesity is defined as body mass index (BMI) score greater than 30. Patients are classified in three groups: obesity grade I: BMI between 30 and 34.9; obesity grade II: BMI between 35 and 39.9, and obesity grade III: BMI > 40. Morbid obesity is considered to be either obesity grade III or obesity grade II or higher in patients with one or more significant associated pathologies that may improve with weight loss. Examples: diabetes mellitus, arterial hypertension and osteoarthritis.[1]

Obesity is a worldwide epidemic. In 2008, the WHO reported that more than 1500 million adults (20 years of age or above) were overweight. Within this group, over 200 million males and nearly 300 million females were obese. The prevalence of obesity has grown in all age groups and all countries. In Argentina, Colombia, México, Paraguay, Peru and Uruguay, over half the population is overweight and over 15% are obese.[2] These population shifts have generated different approaches from an anesthesiological and perioperative standpoint due to anatomical and physiological alterations implied in the obese.

Intubation difficulties are determined by several variables, such as the differences in physical characteristics among patients (oral opening, thyroid to chin length, mobility of the neck and Mallampati score), as well as the operating physician's experience and the instrument used for the procedure.[2,3] However, parameters described independently do not show proper operational sensibility or specificity for intubation difficulties in obese patients. This is why Gaszynski was unable to validate these standards in a group of 87 morbidly obese patients with a BMI of over 50.[3] Regardless, reduced neck mobility and oral opening are often the cause of most difficulties when intubating the obese.[4] Other factors identified by other authors are: neck circumference greater than 40 cm,[5] short neck,[6] and alterations or pathologies such as sleep apnea, hypercapnia, alveolar hypoventilation syndrome, snoring and diabetes mellitus. All of these suggest a higher risk of a difficult airway in the pre-anesthetic assessment.[3]

In many cases, predicting difficulties in intubation is not easy. It is common to suspect a difficult airway and not actually having any problems when carrying out the procedure, although this is hardly of any concern. The greater issue is the actual failure to identify it and coming upon a very difficult airway management. This particular situation results in a crisis that may be due to fat infiltration of the different airway tissues. This fat excess forms anatomic alterations that are not detected by either physical or functional assessment and are relevant during general anesthesia due to relaxation of the tissues.

Generally speaking, worldwide reports consider obese patients to be difficult to ventilate and intubate,[7,8] which increases with greater BMI scores. The prevalence of difficulties is currently 13% to 24%,[9,10] requiring intubation in a conscious state in 8% of patients. According to Voyagis, obesity shows a predictive value of 20.2% when compared to patients with a normal BMI score.[11]

Most reports on difficult intubation describe the use of a traditional laryngoscope despite the fact that laryngoscopic procedures present difficulties from 3 to 10 times more often if the patient is obese, sometimes resulting in iatrogenic lesions in the airway. Incidence depends on the physicians

expertise and the tool in use. There are more adequate and less traumatizing instruments that must be used if available instead of the laryngoscope when faced with a difficult airway, in order to minimize possible lesions in teeth, lacerations of the mucosa, edema, airway bleeding, among others.[12,13]

Based on these premises, and the considerable experience with the use of the Bonfils retromolar fibroscope of the bariatric surgery program at Hospital Universitario San Ignacio in Bogotá, the use of this device was implemented in most of the obese patients, especially in those with suspicion of a difficult airway. Up until now, more than 360 bariatric surgeries with different procedures have been carried out.

This case series was carried out with the aim of assessing the pre-anesthetic parameters of the airway, predictability and incidence of difficulties as well as intruments used by anesthesiologists for endotracheal intubation in bariatric surgery patients at Hospital Universitario San Ignacio in Bogotá, Colombia.

Methods

Data from 352 patients over the age of 18 who underwent bariatric surgery at Hospital Universitario San Ignacio in Bogotá, between February 2, 2008 and August 3, 2011 was analyzed. All of them underwent pre-anaesthetic and pre-surgical assessments. Demographic data was extracted from the bariatric surgery record, which includes age, gender, weight, height, BMI, neck circumference, history of diabetes mellitus. Data regarding anesthetic management, airway conditions, orotracheal intubation, devices used for airway management and names of the anesthesiologists who performed the intubation was taken from anesthesia and medical records, thus creating the database for this study.

Results

In the described time period, a total 352 bariatric surgeries were carried out on an equal number of patients. The average age was 47,5 years (table 1).

Of these, 80.6% (284) were females and 19.3% (68) were males, whose average BMI was >44 (table 1 and figure 1).

The average neck circumference was 40.9±4,14 (33.5-53.5) cm. Out of the total 352 patients, 116 were diagnosed with diabetes mellitus and had perioperative endocrinologic follow up and were admitted into surgery with controlled glucose levels and pre-surgical glycosylated hemoglobin within acceptable limits.

Table 1 – Demographic data

Age (years)	47.5±11.94 (18-72)
Height (cm)	158±9.6 (135-205)
Weight (kg)	110.3±19,92 (73.3-177.0)
BMI	44.2±5.97 (31.6-71.4)

BMI: body mass index.
Data as mean±standard deviation (range).

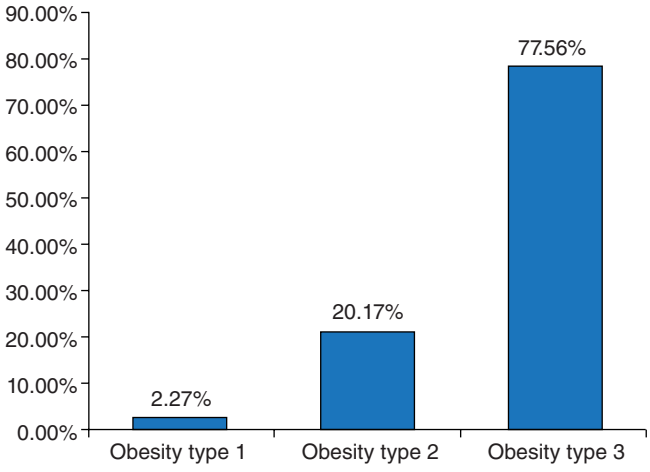

Fig. 1 – BMI distribution in study subjects.

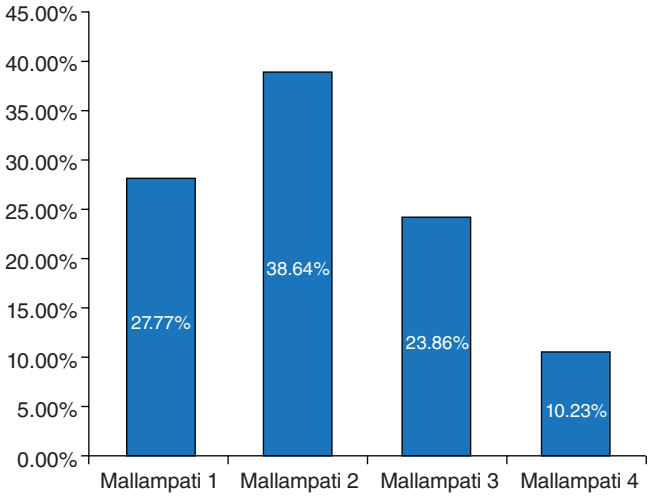

Fig. 2 – Distribution of the Mallampati scores.

In the pre-anesthetic assessment, conventional parameters for prediction of a difficult airway were evaluated. Findings showed a normal distribution curve for Mallampati scores and events of difficult airway. The most frequent score was 2, a total of 136 patients (38,64%) (figure 2).

The oral opening findings were classified in two groups: limited or under 4 cm, found in 17 patients; and appropriate or more than 4 cm, which included the remaining 335 patients. Thyroid to chin length <5 cm was found in 19 patients (5.39%) and ≥5 cm in the other 332 patients (94.3%).

Out of the 352 cases, 81.5% of intubations were performed with the Bonfils retromolar fibroscope (287 patients) and 18,5% (65 patients) were carried out with a regular laryngoscope. In

98,3% of cases, intubations were reported as easy procedures. No difficult intubations were reported with the use of the conventional laryngoscope, whereas the Bonfils retromolar fibroscope group reported 6 (2,1%). However, all of them were successful, with no iatrogenic damage inflicted on teeth, lips or oropharyngeal mucosa and none required more than two attempts of orotracheal intubation.

In the 6 events reported as difficult intubations, no relation was found among the analyzed variables such as BMI, Mallampati scores, oral opening, neck circumference, history of Diabetes and prediction of difficult airway.

The 7.5 orotracheal tube was the most used (69%), followed by the 8.0 tube in 20,0% and 7.0 in 9% of all cases.

Discussion

We are witnesses of the rising prevalence of obesity as a pathology of our daily surgical practice and its consequences, namely in airway management. Many studies have suggested that obesity in fact increases the risk of complications in airway management.[14] A BMI >30 increases the risk of mask ventilation difficulty in as much as three times and intubation difficulties tenfold when using a regular laryngoscope.[15]

In this study, the parameters found in the pre-anaesthetic assessment and intra-operative management of the airway in 352 bariatric surgery patients are described. The possibility of a correlation between difficult intubation and an assessed variable in obese patient is explored, especially those intubated with the Bonfils retromolar fibroscope.

As described in medical literature, a BMI score >30 is an independent factor for difficult intubation given the use of a conventional laryngoscope. In this case series, 81% of patients were intubated with the Bonfils retromolar fibroscope and there were no procedure failures or more than two intubation attempts. No iatrogenic lesions were observed in the patients' airway. If we take all 6 cases reported as difficult intubations, incidence would be under 1.7% of patients, which is lower than the findings reported in other studies on obese population.

Historically speaking and in medical literature, it is considered that for all patients with a suspected difficult airway (such as obese patients) intubation must be carried with a flexible fibroscope and in a state of consciousness. This study shows that the Bonfils retromolar fibroscope is a viable alternative for these patients, with a success rate of 100% causing no iatrogenic lesions in the airway for our studied population.

In this study, the option of intubation with either the regular laryngoscpe or the Bonfils retromolar fibroscope was determined by each anaesthesiologist who individually performed any one intubation. The fact that under suspicion of a difficult intubation in the pre-anaesthetic assessment the retromolar fibroscope was the first option is noteworthy. It is likely that this is the reason for all 6 cases of reported difficult intubations occurred with the use of the Bonfils fibroscope, although all of them were successful.

There is a limitation in this investigation, which is the heterogeneity of pre-operative airway assessments given by the different evaluators. However, airway management during surgery (intubation and ventilation) was carried out by the same anaesthesiologist in 72% of cases, 15% was performed by a second, 10% by a third and the remaining 3% by other anaesthesiologists.

Obesity is a common pathology that complicates management of the airway. This report suggests an alternative method for orotracheal intubation of patients, the Bonfils retromolar fibroscope. Our intubation trained personnel achieved a 100% success rate and no evidence of iatrogenic lesions. We conclude that in spite of obesity as a condition that compromises management of the airway, the use of the Bonfils retromolar fibroscope as first choice for intubation is a safe, effective alternative method, yielding 100% success with no iatrogenic airway lesions.

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Conflict of interests

None declared.

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REFERENCES

1. Ebert TJ, Shankar H, Haake RM. Perioperative considerations for patients with morbid obesity. Anesthesiol Clin. 2001;24:621-36.
2. World Health Organization [Website] [updated March 2011]. Available from: http://www.who.int/mediacentre/factsheets/fs311/es/
3. Gaszynski T. Standard clinical tests for predicting difficult intubation are not useful among morbidly obese patients. Anesth Analg. 2004;99:956.
4. Williamson JA, Webb RK, Szekely S, Gillies ER, Dreosti AV. The Australian Incident Monitoring Study. Difficult intubation: an analysis of 2,000 incident reports. Anaesth Intens Care. 1993;21:602-7.
5. González H, Minville V, Delanoue K, Mazerolles M, Concina D, Fourcade O. The importance of increased neck circumference to intubation difficulties in obese patients. Anesth Analg. 2008;106:1132-6.
6. Brodsky JB, Lemmens HJ, Brock-Utne JG, Vierra M, Saidman LJ. Morbid obesity and tracheal intubation. Anesth Analg. 2002;94:732-6.
7. Kristensen MS. Airway management and morbid obesity. Eur J Anaesthesiol. 2010;27:923-7.
8. Myatt J, Haire K. Airway management in obese patients Focus on: Bariatric. Curr Anaesth Crit Care. 2010;21:9-15.

9. Buckley FP, Robinson NB, Simonowitz DA, Dellinger EP. Anaesthesia in the morbidly obese: a comparison of anaesthetic and analgesic regimens for upper abdominal surgery. Anaesthesia. 1983;38:840-51.
10. Cherit G, Gonzalez R, Borunda D, Pedroza J, Gonzalez J, Herrera MF. Anesthesia for morbidly obese patients. World J Surg. 1998;22:969-73.
11. Voyagis G, Kyriakis K, Dimitriou V, Vrettou I. Value of oropharyngeal Mallampati classification in predicting difficult laryngoscopy among obese patients. Eur J Anaesthesiol. 1998;15:330-4.
12. Ali A, El Solh. Airway management in the obese patient. Clin Chest Med. 2009;30:555-68.
13. Schumann R. Anaesthesia for bariatric surgery. Best Pract Res Clin Anaesthesiol. 2011;25:83-93.
14. Chung F, Mezei G, Tong D. Pre-existing medical conditions as predictors of adverse events in day-case surgery. Br J Anaesth. 1999;83:262-70.
15. El-Ganzouri AR, McCarthy RJ, Tuman KJ, Tanck EN, Ivankovich AD. Preoperative airway assessment: predictive value of a multivariate risk index. Anesth Analg. 1996;82:1197-204.