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RESEARCH ARTICLE

SUBMENTAL ULTRASOUND TO PREDICT DIFFICULT AIRWAY IN PATIENTS UNDERGOING GENERAL ANESTHESIA AT THE NAVAL MEDICAL CENTER

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ABSTRACT

Introduction: Difficult intubation is defined as the need for three or more attempts for intubation of the trachea or more than 10 minutes to complete, situation occurs in 1.5% to 8% of the general anesthesia procedures. **Objective:** In this study a comparison of the assessment of airway ultrasound specifically insonando hyoid bone for display or not, compared to the degree of Cormack-Lehane in adult patients undergoing general anesthesia was performed. **Material and methods:** This study is a prospective, observational cross where 69 patients scheduled for elective surgery under general anesthesia were evaluated. They were subjected to a detailed evaluation of the airway prior to your surgery. Mallampati Classification, Distance and Distance Esternomentoniana thyromental documented, was also evaluated with submental ultrasound visualization or not of the hyoid bone. At the time of surgery, after general anesthesia monitoring and direct laryngoscopy was performed and the degree of Cormack-Lehane was observed. **Results:** The incidence of difficult intubation was 2.9%. Finally, the ultrasound to visualize the hyoid bone had a sensitivity of 96.4% on; specificity 75.0%, positive predictive value of 81.8%; negative predictive value of 92.7% which supports us to suggest as a predictor of the difficult airway. **Conclusions**: Display hyoid bone via the submental ultrasound demonstrated higher sensitivity than the combination of standard clinical scales. The highest sensitivity and negative predictive value were shown to display or not the hyoid bone and correlated with a difficult laryngoscopy.

INTRODUCTION

Management of the airway, the diagnosis of pathological conditions and complications are essential skills that every anesthetist should know. Improper handling of the airway remains a factor of morbidity and mortality in our patients (Justin, 2016) 30% of deaths attributed to anesthesia are due to the inability to maintain the airway. In a patient anesthetized or unconscious, we can keep the airway through mask ventilation, laryngeal mask or tracheal intubation oro-naso (Ezri, 2003) The American Society of Anesthesiologists (ASA) in 1993 published a clinical guideline for management of the difficult airway in order to reduce the frequency of these complications. At the time of publication 28% of deaths related to anesthesia they were caused by the inability to ventilate or intubate mask. In this guide, the ASA defined as the Air Hard Way (VAD) existence of clinical factors that complicate both the ventilation delivered by a face mask or intubation performed by an experienced person in these clinical conditions (Michael, 2014). VAD represents a complex interaction between patient factors, the clinical setting, skills and preferences of the director.

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Analysis of the interaction of these factors still requires accurate data collection, however, you can appreciate the difficulties in following approach:

A difficulty mask ventilation, 2. - difficulty in performing conventional laryngoscopy after multiple attempts, 3. difficulty during intubation after multiple attempts in presence or absence of tracheal pathology and 4. failed intubation (Reddy, 2016). For the year 1969 is no record of the first article in which use of ultrasound in anesthesiology is done. By Dr Kirby et al. Dr. Buckland, in 1976, showed that the Doppler monitoring improved detection capability of air embolisms up to 58% compared to the esophageal stethoscope in patients at high risk of air embolism (in posterior fossa surgery seated position) (Wąsowicz, 2015). In 1990, a study evaluating the position of the tongue during induction of anesthesia by ultrasound described. This is the first record display of one of the components of the airway by ultrasonographic means (Hofauer et al., 2017). In previous studies, ultrasound has proven to be a cost-effective and non-invasive method for assessing airway. A study of Korea South uses ultrasound to examine the epiglottis in normal patients and those diagnosed with acute epiglottitis and found a significant difference in the anteroposterior diameter, and proposes ultrasound as a possible tool for the diagnosis of acute epiglottitis (Hall et al., 2018)

Marciniak et to the., Described the use of ultrasound airway during intubation with direct laryngoscopy. criteria described ultrasound to confirm tracheal intubation and unlike using ultrasound to simply confirm proper placement of the endotracheal tube is used in this study to guide intubation (Fiadjoe et al., 2012). Kundra et to the., Held ultrasound airway for imaging through the sublingual approach described previously by Tsui et to the., Where observed a hyperechoic structure and originally thought it might be the epiglottis and was actually the hyoid bone (Kundra et al., 2011)

MATERIAL AND METHODS

The design of this study was cross-sectional descriptive was conducted in the period from January to July 2019 in the Naval Medical Center. Earlier this protocol was read and approved by the ethics committee Research Clinic Naval Medical Center, 69 patients were included, the inclusion criteria were; patients scheduled for elective surgery, requiring general anesthesia and direct laryngoscopy and endotracheal intubation, over 18 years, ASA 1,2 and 3; Exclusion criteria were to be under 18, ASA 4 or more, patients scheduled for surgeries that warranted regional anesthesia, patients who refused to participate in the study, craniofacial malformations; elimination criteria were lesions in cervical spine, patients were intubated with video laryngoscope and broncosfibroscopio. All patients were assessed in consultation pre-anesthetic assessment to evaluate the clinical scales, and performing a submental ultrasound prior reading and signing the informed consent. They were subjected to a thorough and detailed assessment of the airway prior to your surgery. age were recorded, gender, step height, body mass index, the Mallampati, Distance Distance Esternomentoniana thyromental and, also evaluated submental ultrasound visualization of the hyoid bone by the same investigator. And at the time of surgery Classification Cormack-Lehane was collected.

For the ultrasonographic evaluation, the patient was to be supine with the head in sniffing position without a pillow, with closed mouth and tongue on the floor of the mouth without any movement. A linear probe 5-10 MHz frequency ultrasound Sonosite. the transducer is placed under the chin of the patient and transversely between submental midline and top of the neck. submental sectional view used to display the hyoid bone. After the pre-anesthetic evaluation, patients were classified as easy or difficult laryngoscopy, based on the results of clinical scales applied. At the time of elective surgery patients in her ward operating room, he placed monitoring electrocardiogram, pulse oximetry, noninvasive blood pressure. Previa preoxygenation FiO2 to 100% for three minutes, intravenous induction of Midazolam 1 mg IV was performed, Fentanyl 3 mcg / kg, Propofol 1.5-2 mg / kg, muscle relaxation with rocuronium to 0.6-1 mg / kg. Ventilation with oxygen and sevoflurane to 2 volumes percent for 3 minutes, direct laryngoscopy made was performed by an anesthesiologist using a Macintosh sheet size suitable for pada patient, the degree of Cormack-Lehane was observed there. The anesthesiologist who performed the intubation was not involved in clinical and ultrasonographic evaluation previously performed by the researcher. They were rated as easy laryngoscopy grades Cormack-Lehane I and II, and as difficult laryngoscopy CL grades III and IV. The patients were intubated with an endotracheal tube appropriate size and allowed to proceed surgery. At the end of surgery, patients emerged and successfully extubated.

RESULTS

In our study total were revised to 69 patients with the characteristics mentioned above, 27 patients of the male (39.1%) and 42 females (60.9%) within the range of 19-83 years old with a mean of 55.1 + / - 16.8 years. According to the gold standard, 65.2% of patients is corresponded to a Cormack-Lehane I and 17.4% one Cormack-Lehane II was observed; in 10 cases (14.5%) A Cormack-Lehane III was observed and only two patients (2.9%) A Cormack-Lehane IV was observed; ie 82.6% were cases of airway conventional and 17.4% cases of airway difficult. The results obtained with the standard test were influenced significantly by no gender ($p = 0.92$), age ($p = 0.83$) and anthropometric measurements cases; however, results of grade I CL scale associated with a BMI of less than 26.7 on average ($p = 0.19$). Hyoid bone visualized in 84.1% of cases and the comparison with the gold standard (CL) the result: of the 45 cases in which Cormack-Lehane I was observed in ultrasound hyoid bone positively identified 97.8%; of the 12 who had Cormack-Lehane II, ultrasound hyoid bone also identified 91.7%; however, the 10 cases Cormack-Lehane III, the hyoid bone ultrasound was positive only in 30% and only two cases of Cormack-Lehane not were observed by ultrasound. CL scale collapsed to a dichotomous outcome as Intubation Conventional (CL III) and difficult intubation (CL III-IV) of the sensitivity display hyoid bone equivalent to 96.4% (55/57) and specificity to 75.0% (9/12) with a positive predictive value of 94.8% (55/58) and negative 81.8% (9/11) to an accuracy of 92.7% that is 55 + 9/69.

Mallampati scale with 68.1% was Grade I, Grade II 15.9%, 14.5% in grade III and in one case (1.4%) grade IV. Compared with Cormack-Lehane scale 45 identified as CL I, the scale Mallampati grade I in 88.9% of cases; CL II in 12 patients, in which I Mallampati 50%, 33.3% reported in 16.7% Mallampati II; 10 cases in which the scale of CL III, a case was reported as Mallampati I (10%), two cases Mallampati II 20% and Mallampati III the remaining 70%; Finally, the two cases reported as Cormack-Lehane IV, were classified as Mallampati III and IV respectively Mallampati 50% (Table 6). DTM had a sensitivity of 82.4%, specificity 100%, 100% positive prognostic value, negative prognostic value 54.5% and an accuracy of 85.5%. With the scale of Distance Esternomentoniana, 73.9% were grade I, 24.6% and 1.4% grade II grade III. DEM classified into stages I to 93.3% of 6.7% CL I and the TMD II classified as; Scale of 12 Cormack-Lehane II DEM classified 58.3% grade I 1 and 41.7% grade II; where CL III DEM classified as grade I to 20% and as grade II 80%; two patients as CL IV; one was classified by DEM grade II and one grade III. Collapsed both scales DEM had a sensitivity of 85.9%, specificity 83.3%, positive predictive value 96%, negative prognostic value 55.5% and an accuracy of 85.5%.Measures statistical correlations with Tau-b Kendall gives the following coefficients: CL relative to the standard correlates with USG HH coefficient 0.593 ($p = 0.0001$); Mallampati one of 0.670 ($p = 0.0001$); DTM 0.724 ($p = 0.0001$) and DEM 0.633 ($p = 0.0001$); meanwhile, USG HH Mallampati correlates with a coefficient of 0.600 ($p = 0.0001$), with DTM 0.486 ($p = 0.001$) and DEM 0.383 ($p = 0.01$).

DISCUSSION

In this study, we can conclude that the difficult airway has been documented from different perspectives over time, it is for this reason that the review continues by various

international associations has reached a consensus on the dynamics of managing this entity. As shown in this and other research, in all surgical patients it is necessary to devote the time necessary to conduct a thorough assessment of the airway and thereby contribute to improve, maintain and even increase their security. Analyzing the results and comparing them with the literature, we can conclude that we have a casuistry, even though the sample does not look so great, similar or ranges that reported worldwide. A meta-analysis of 55 studies identified that only 35% of difficult intubations had an Mallampati score III or IV. (10) In our study, these results differ because the Mallampati scale was 68.1% grade I, grade II 15.9%, 14.5% in grade III and in one case (1.4%) Grade IV which differs with bibliography. Recently it described technique for predicting a sublingual difficult airway and identification laryngeal disorders, for confirmation of the placement of the endotracheal tube, to guide percutaneous tracheotomy and to predict stridor after extubation. (fifteen). Obesity alone does not seem to be a good predictor of difficult laryngoscopy, however, Juvin (17) found 15.5% of difficult intubations in obese (BMI greater than 35) versus 2.2% in non-obese. Brodzky (18) found no association between BMI and difficult intubation to the study a group of obese patients, but found no association with neck circumference. In our study the results of the CL Grade I level was associated with a BMI of less than 26.7 on average ($p = 0.19$). In a feasibility study, Hui et to the. suggested an association between an inability to see the hyoid bone in the sublingual ultrasound and difficult laryngoscopy. That study found 11% of patients with difficult intubation presence. (16) Compared with our results we can infound in 10 cases (14.5%) A Cormack-Lehane III was observed and only two patients (2.9%) A Cormack-Lehane IV was observed; ie 82.6% were cases of airway conventional and 17.4% cases of airway difficult.

In the same study the clear images of the hyoid bone could be seen in 96.6% of intubations easy while the hyoid bone could not be seen in 72.7% of difficult intubations, indicating a sensitivity and specificity of 73% and 97%, respectively. (16) In this studyhyoid bone visualized in 84.1% of cases and the comparison with the gold standard (CL) the result: of the 45 cases in which Cormack-Lehane I was observed in ultrasound hyoid bone positively identified 97.8%; of the 12 who had Cormack-Lehane II, ultrasound hyoid bone also identified 91.7%; however the 10 cases Cormack-Lehane III, the hyoid bone ultrasound was positive only in 30% and only two cases of Cormack-Lehane not were observed by ultrasound. Which assimilates the literature found. Finally, the ultrasound to visualize the hyoid bone had a sensitivity of 96.4% on; specificity 75.0%, positive predictive value of 81.8; negative predictive value of 92.7 which supports us to suggest as a predictor of the difficult airway.

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