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CASE REPORT

The use of airway ultrasound for managing airways in patients with eagle syndrome undergoing cardiac surgery: a case report

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ABSTRACT

Ultrasound can provide a clear visual representation of the anatomical structures of the airway. However, imaging of the suspended epiglottis can be challenging. A difficult airway is associated with high complication and mortality rates, underscoring the imperative to explore the use of ultrasound in airway assessment. Ultrasound is crucial in airway management and is gaining popularity in anesthesiology. Point-of-care ultrasound (POCUS) is portable, fast, and noninvasive, replacing traditional imaging techniques. Ultrasound imaging of the upper airway has various clinical applications. Ultrasound should be promptly and effectively used with specific goals to achieve better patient outcomes. Cardiac surgery represents a scenario in which critical oxygen levels can exacerbate ischemia or cardiac disease in patients. Intubation strategies for these patients can be quite challenging. Occasionally, conditions such as Eagle syndrome may pose a risk to intubation, which is one of the reasons why improvements of the intubation process are necessary. This is particularly true when considering the hemodynamic situation, as intubation represents a critical step. The focus of our case was to demonstrate the necessity for continuous training of the anesthesia team and the need for use of airway ultrasound in difficult airway situations. The informed consent statement was signed, and the patient accepted be part of the study.

KEYWORDS

Eagle syndrome; airway ultrasound; cardiac surgery; difficult airway

INTRODUCTION

Ultrasound can provide a clear visual representation of the anatomical structures of the airway. However, imaging of the suspended epiglottis can be challenging[1]. A difficult airway is associated with high complication and mortality rates, making it imperative to explore the use of ultrasound in airway assessment[2]. Ultrasound is crucial in airway management and is gaining popularity in anesthesiology. Point-of-care ultrasound (POCUS) is portable, fast, and noninvasive, replacing traditional imaging techniques. Ultrasound imaging of the upper airway has various clinical applications. Ultrasound should be promptly and effectively used with specific goals to achieve better patient outcomes[3]. Cardiac surgery represents a scenario in which critical oxygen levels can worsen ischemia or cardiac disease in patients. Intubation strategies for these patients can be quite challenging. Occasionally, conditions such as Eagle syndrome may pose a risk to intubation, which is one of the reasons why improvements in intubation

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are necessary. This is particularly true when considering the hemodynamic situation, as intubation represents a critical step[4]. The focus of this case report was to demonstrate the necessity for continuous training of the anesthesia team and the need for using airway ultrasound in difficult airway situations. The informed consent statement was signed, and the patient accepted to be part of the study.

CASE REPORT

A 65-year-old man with a medical history of Eagle syndrome, coronary artery disease, gastroesophageal reflux disease, hypertension, dyslipidemia, and diabetes was admitted to our hospital for coronary artery bypass graft (CABG). Physical examination revealed limited mouth opening, right deviation, Mallampati III, standard lip bite test, and restricted neck extension (Figure 1). Angiography revealed 70% stenosis of the left main artery and 75% stenosis of the proximal portion of the posterior descending branch. The left ventricle showed mild anterior wall hypokinesis.

An airway ultrasound pre-evaluation was conducted because the patient had upper airway pathologies and anatomical anomalies. The ultrasound examination employed a high-frequency probe (5–10 MHz) and transversal imaging with a complicated airway algorithm. The results showed that the patient had less than 3 mm of anterior cricoid cartilage near the skin, indicating a short distance (Figure 2). The posterior shadow did not show a bullet-shaped appearance, which is indicative of the angle to the cricoid cartilage of the neck. This cannot be detected during an airway examination; rather, it can only be identified using ultrasound. The medical team received the necessary information to prepare for a video laryngoscopy procedure using a glidescope blade 4, orotracheal intubation (OETT) 8.5 with a stylet, and modified for anterior airway presumption. Following the difficult airway algorithm, the airway equipment was kept in the room when a rescue airway was required.

The patient was preoxygenated with a facial mask, and midazolam, sufentanil, lidocaine, propofol, and rocuronium were administered to ensure a smooth induction process. Mean arterial pressure (MAP) was monitored within the range of 65–80 using a cardioscope with five leads. Additionally, we monitored tachycardia and evaluated alterations in the waves. Direct ultrasound (US) accompaniment was provided throughout intubation to ensure constant vigilance and a clear view of the glidescope screen. Evidence from Cormack-Lehane 3a was used. Backward, Upward, and Rightward Pressure (BURP) maneuvers were used to insert the cannula to complete the process. The ultrasound was positioned

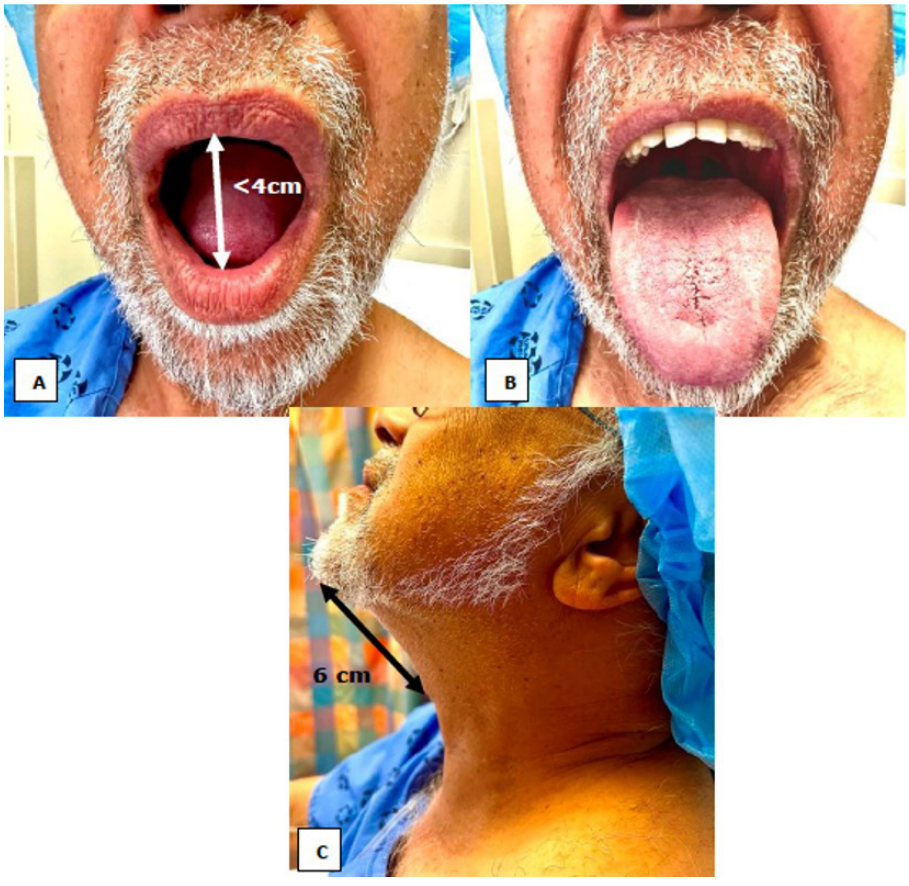

Figure 1. Airway examination. A. Limited open mouth <4 cm, B. Mallampati III, C. Thyromental distance 6 cm.

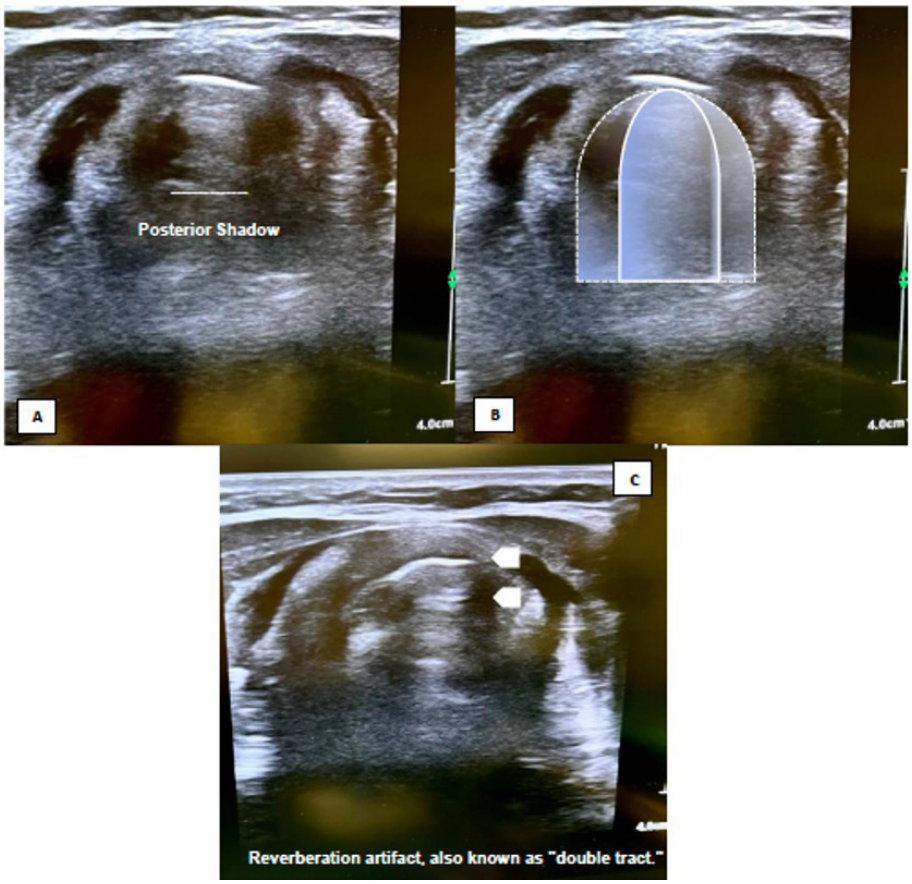

Figure 2. The cricoid cartilage has three distinct scenarios. **A.** Cricoid cartilage without an oral endotracheal tube. **B.** The posterior shadow of the cricoid cartilage without endotracheal tube. Notably, the anterior image indicates a minor "bullet shape" (continous line – pointed line is expected to be normal), resulting in a less prominent posterior shadow. **C.** Demonstrates the cricoid cartilage with an endotracheal tube, a scenario described as a "reverberation artifact or double tract".

in the neck and used to guide the intubation process and verify the position of the endotracheal tube, and the capnography wave was monitored. The patient's neck was kept neutral throughout the procedure, and no extensions or movements were made. We effectively managed the patient's blood pressure and heart rate to prevent hypertension and tachycardia. The vital signs remained stable throughout the procedure. The transesophageal echocardiogram (TEE) probe insertion was successful, the echocardiogram did not show a new image compared with the previous echocardiogram, and the patient was safely removed from the ventilator during cardiac surgery recovery (CSRU) without any orofacial pain post-surgery. Informed consent was obtained from the patient to disseminate the case report as well as the accompanying images, which were available on record.

DISCUSSION

The primary objective of this study was to evaluate the utility of ultrasound in assessing the airways of high-risk cardiovascular patients with Eagle syndrome and to decrease the likelihood and number of attempts required. Previous studies have revealed that 42.6% of patients exhibited cardiovascular instability, 9.3% experienced severe hypoxemia, and 3.1% experienced cardiac arrest[5]. Airway ultrasonography is a useful tool for assessing the airway, predicting difficulty in laryngoscopy, and supplementing clinical judgment. Inadequate airway management can have severe consequences.

The incorporation of ultrasound in evaluating the airway can help prevent awake intubation and decrease the number of attempts in high-risk cardiovascular patients, resulting in improved quality and safety, thus more cardiovascular anesthetists should receive training in this area. Further research is necessary to better understand the impact of difficult airways on patients undergoing cardiac surgery.

REFERENCES

1. Kundra P, Mishra SK, Ramesh A. Ultrasound of the airway. Indian J Anaesth. 2011;55(5):456-62. PMid:22174461. http://doi.org/10.4103/0019-5049.89868.
2. Osman A, Sum KM. Role of upper airway ultrasound in airway management. J Intensive Care. 2016;4(1):52. PMid:27529028. http://doi.org/10.1186/s40560-016-0174-z.

3. You-Ten KE, Siddiqui N, Teoh WH, Kristensen MS. Point-of-care ultrasound (POCUS) of the upper airway. Can J Anaesth. 2018;65(4):473-84. PMid:29349733. http://doi.org/10.1007/s12630-018-1064-8.

4. Kendall JL, Hoffenberg SR, Smith RS. History of emergency and critical care ultrasound: the evolution of a new imaging paradigm. Crit Care Med. 2007;35(5 Suppl):S126-30. PMid:17446770. http://doi.org/10.1097/01.CCM.0000260623.38982.83.

5. Russotto V, Myatra SN, Laffey JG, Tassistro E, Antolini L, Bauer P, et al. Intubation practices and adverse peri-intubation events in critically ill patients from 29 countries. JAMA. 2021;325(12):1164-72. PMid:33755076. http://doi.org/10.1001/jama.2021.1727.

This study was carried out at the University Hospital (UH), London, Ontario, Canada.

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