

Emergency Needle Tracheostomy in Unanticipated Difficult Intubation Case with Undetected History of Tracheobronchial Injury Patient – A Case Report

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ABSTRACT:

Background: An emergency situation where intubation and/or ventilation are unable to perform is rare but life-threatening. Within Can't Intubate, Can't Oxygenate algorithm, the emergency cricothyrotomy is the final step. Yet, it can be difficult in some cases and require alternative invasive airway strategies.

Case: We present an unusual case of a 22-year-old male, who were taken to the emergency with severe hypoxemia and respiratory distress. Despite optimal vocal cord visualization, the attempts to intubate endotracheal, supraglottic airway placement, and face-mask ventilation were failed, resulting in a CICO situation. Needle cricothyrotomy was unsuccessful. Emergency needle tracheostomy with a 16G enabled the return of spontaneous circulation. The patient's definitive airway control was achieved with rapid percutaneous dilatational tracheostomy. Later, subsequent imaging revealed undetected tracheobronchial injury and experienced 60% trachea narrowing.

Conclusion: This case demonstrates that the needle tracheostomy is a viable and effective technique in emergencies to establish definitive airway access.

Keywords: Airway obstruction; Cricothyrotomy; Undetected history; Tracheobronchial injury; CICO; needle tracheostomy

Inability to intubate and/or ventilate in the emergency ward is an uncommon clinical scenario but potentially life-threatening. In such circumstances, emergency cricothyrotomy represents the final step in the Can't Intubate, Can't Oxygenate (CICO) algorithm and is performed to prevent the patient's death [1]. However, the application of needle cricothyrotomy may be technically challenging due to the area of injury. Specifically for this case, we did not perform cricothyrotomy because we assumed obstruction at the cricoid level. Conventionally, tracheostomy is considered a more complex and time-consuming procedure, and therefore not advised in emergency situations [2]. Needle tracheostomy can be a choice because a quick, safe, and reliable alternative to percutaneous or open tracheostomy. Here, we report a case of an emergency needle tracheostomy performed in a patient with an unanticipated difficult intubation and undetected history of tracheobronchial injury. The writing of this case report has received approval from the patient and family.

Case report

A 22-year-old male was taken to the emergency unit unconscious after choking. According to the patient's father, the patient had previously choked while taking the medication. The patient appeared to have difficulty breathing and then lost consciousness. The patient appeared to have severe respiratory distress. On evaluation, a paradoxical respiratory pattern, cyanosis and hypoxemia on room air (oxygen saturation (SpO₂) 77%) with stable haemodynamic at the beginning. The patient's external airway appeared normal, and there was no history of previous illnesses.

Intubation was performed for expansion. Orotracheal intubation was tried by an intensivist; however, it was unsuccessful. During laryngoscopy with a video laryngoscope, the vocal folds were perfectly visualized, but the Endotracheal tube could not be pushed in.

According to the Difficult Airway Society (DAS) guidelines on the management of unanticipated difficult intubation, Plan B, namely Supraglottic Airway (SAD) insertion for ventilation, was implemented, but the patient continued to desaturate. Plan C, face mask ventilation, was then attempted, but this was also unsuccessful. The patient was declared Can't Intubate, Can't Oxygenate (CICO).

We tried needle cricothyroidotomy and failed. However, in the next few minutes, the patient's condition worsened. He went into cardiac arrest, and resuscitation was started as per Advanced Cardiac Life Support (ACLS) protocol along with needle tracheostomy. We inserted a needle 16G in trachea and ventilated patient (Fig 1). He was successfully resuscitated with the return of spontaneous circulation (ROSC) in approximately 14 – 15 minutes, after ventilation from needle tracheostomy. There was improvement in ventilation and SpO₂, saturation increased to 100%, non-invasive blood pressure (NIBP) 81/34 (49), heart rate 159 beats per minute. We provided adrenaline support of 100 Nanogram/kgBW/minute. A rapid decision for percutaneous dilation tracheostomy was made as an emergency life-saving procedure, with a size 7.0 tracheostomy tube. The time taken to secure an airway was less than 3 minutes, and the tube position was confirmed with clinical signs.

One hour after percutaneous dilation tracheostomy, the patient showed speed recovery, he was awake, neurologically alert and oriented. We support ventilation with Continuous Positive Airway Pressure (CPAP) mode. Patients were switched to a T-Piece and then to a mask tracheostomy on the next day, and were moved to low care.

Discussion

Airway management of an unanticipated or emergency difficult airway consists of interventions addressing (1) calling for help, (2) optimisation of oxygenation, (3) use of a

cognitive aid, (4) noninvasive airway management devices, (5) combination techniques, (6) invasive airway management interventions, and (7) ECMO [3, 4]. In a difficult airway situation, emergency cricothyroidotomy is recommended in most guidelines, and a definitive airway still has to be established after emergency cricothyroidotomy [2]. Needle cricothyrotomy followed by transtracheal jet ventilation or surgical cricothyrotomy are the recommended final life-saving treatments in the Cannot ventilate, cannot intubate (CVCI) emergency by both the American Society of Anesthesiologists (ASA) and the Difficult Airway Society [5]. The conventional breathing systems deliver low flows with a small internal diameter of the cannula and jet ventilation. With proper ventilation technique, we can optimise oxygenation [1]. Somehow, the application of needle cricothyrotomy is difficult due to the area of injury, needle cricothyroidotomy attempts result in failure [9]. Several pathological conditions and traumatic injuries may substantially increase the technical difficulty of the procedure. Tracheal transection represents a major challenge, as retraction of the distal tracheal segment into the mediastinum can occur, rendering cannulation extremely difficult or impossible. Severe injury or fracture of the laryngeal or cricoid cartilages may result in distortion of normal airway anatomy, thereby preventing reliable identification of essential landmarks such as the thyroid cartilage, cricoid cartilage, and cricothyroid membrane required for accurate needle placement. In addition, extensive cervical edema or hematoma can obscure normal anatomical contours, limiting effective palpation and localization of the cricothyroid membrane. Difficulty in landmark identification may also arise from patient-related factors, including morbid obesity or a history of prior neck surgery or radiation therapy, which significantly alter local anatomy. Furthermore, complete upper airway obstruction located distal to the intended cricothyrotomy site cannot be bypassed by the procedure and may predispose

patients to complications such as barotrauma or subcutaneous emphysema. Needle tracheostomy can be a choice because it is a quick, safe, and reliable alternative to percutaneous or open tracheostomy. Theoretically, temporary needle tracheostomy could fulfil these criteria until endotracheal intubation or tracheostomy was expertly performed [3, 6, 7]. Needle tracheostomy, that is, the percutaneous insertion of a hollow needle into the trachea, was described some years ago for the emergency management of acute upper airway obstruction. The introduction of high-pressure jet ventilation into the lower airway has made it apparent that this technique can be used to advantage where needle tracheostomy is indicated [4]. But it may be potentially hazardous, especially with an obstructed or misplaced cannula. Conventionally, tracheostomy is considered a more complex and time-consuming procedure, and therefore not advised in emergency situations. Percutaneous tracheostomy can be a choice because it is a quick, safe, and reliable alternative to open tracheostomy [2].

We found out later on medical imaging (Fig 2) that the patient had a history of tracheobronchial injury and experienced 60% narrowing of the trachea at the level of VC 5-7, a distance of ± 7.7 cm from the carina. Choking caused edema in the trachea, and the airway narrowed down. The patient experienced cardiac arrest after 15 minutes and ROSC after ventilation from needle tracheostomy and sequence ACLS. The patient's ROSC can be achieved due to prompt treatment and oxygenation.

Our cases demonstrated that needle tracheostomy can be a valuable and viable option in emergency situations, especially in cases of an unanticipated difficult airway. Proper ventilation techniques, such as needle tracheostomy, can save a patient's life. Emergency percutaneous dilation tracheostomy is an option to establish definitive airway access.

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Fig. 1. Post-needle cricothyroidotomy procedure. Needle cricothyroidotomy using a 16G sureflow needle.

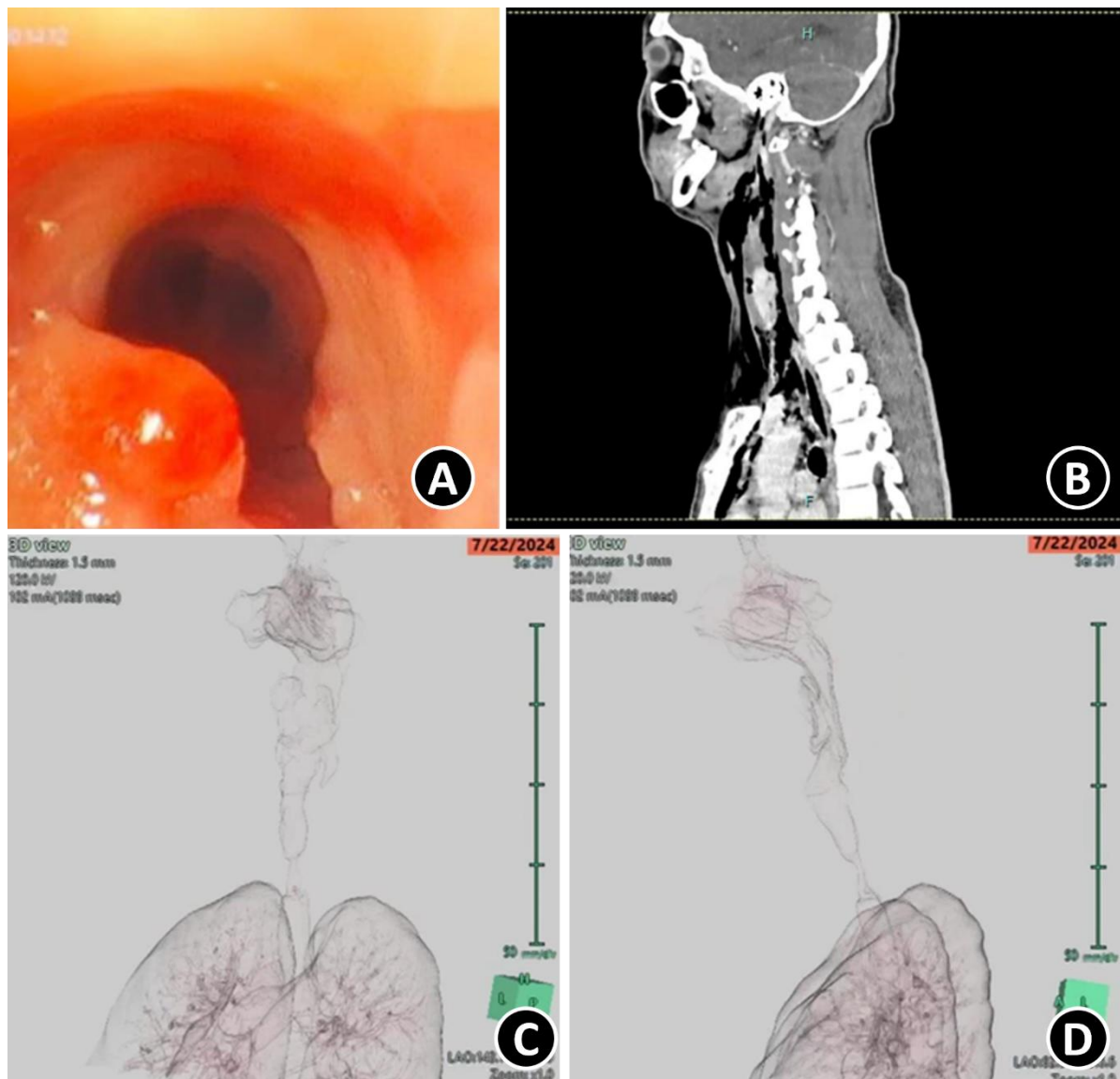


Fig. 2. (A) A bronchoscopy visual and (B) a cervical CT scan of the patient. (A) Visualized tracheal narrowing at the level of VC 5-7, approximately 1.8 cm long, with a narrowest diameter of approximately 0.41 cm projected at the level of VC 7. Distally, the narrowing is approximately 7.7 cm from the carina. The above findings may indicate a tracheobronchial injury, with the following features (C and D): a tracheal defect of approximately 0.16 cm on the right posterolateral side at the level of VT_h 3.