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Clinical Letter

Is Cricothyroid Membrane Puncture for Topical Anesthetic Administration in Flexible Bronchoscopy and EBUS/TBNA Safe for the Patient?

To the Director,

Flexible bronchoscopy and EBUS are very common techniques in pulmonology for the diagnosis and management of patients with lung disease and the study of the mediastinum. The scope can be introduced nasally or orally in case of EBUS.^{3,4} However, they are poorly tolerated by patients, so sedation and local anesthesia become very important,¹ being lidocaine the most used.² Inadequate anesthesia can cause excessive coughing and exposes the patient to complications such as pneumothorax. The most common method is to use a local lidocaine spray, introducing it into the oropharynx to numb both the oropharynx and the larynx itself. An alternative is the puncture of the cricothyroid membrane to administer the anesthetic directly into the airway.⁵ In this way the cough stimulus is triggered and the anesthetic is distributed throughout the larynx thanks to the mechanical stimulus and the airflow generated by the cough. The aim of the study is to evaluate whether cricothyroid puncture is safe, effective, and well tolerated by patients.

This is a prospective observational study performed in a Respiratory Endoscopy and Interventional Pulmonology Unit of a tertiary hospital. One hundred forty-five patients were included in the study who underwent flexible bronchoscopy or EBUS between July 2023 and January 2024. Patients were excluded from the study if they had a platelet count below 44,000, hemoptysis or if the pulmonologist performing the test considered cricothyroid puncture unnecessary.

All patients gave informed consent prior to the procedure and confirmed that they were not allergic to lidocaine or other anesthetics. This study evaluates the complications, symptoms, and internal and external signs that may appear in patients after puncture of the cricothyroid membrane. In all procedures, the cricothyroid membrane was punctured after an initial bolus of the sedative propofol. Patients were continuously monitored throughout the procedure and supplemental oxygen was administered. The puncture was performed by the responsible endoscopist, while additional sedation and local anesthesia were administered by an experienced nurse from the respiratory endoscopy unit. The cricothyroid membrane puncture procedure consisted of locating the membrane and disinfecting the area with 70% alcohol. A 23 G gauge needle connected to a 5 ml syringe was used to inject 2 ml of 2% lidocaine. In addition, 2% lidocaine gel was applied to the nostrils to anesthetize and lubricate the area in case of nasal bronchoscopy. During the

procedure, the doses of propofol and lidocaine, whether the patient coughed before crossing the vocal cords, and signs of bleeding at the puncture site were recorded. After the procedure, the puncture site was examined for external signs such as hematoma, erythema, or swelling/infection. They were asked for pain at the puncture site, as measured by the Visible Analog Pain Scale (VAS). In addition, 51 patients agreed to participate in a follow-up telephone interview conducted between the 7th and 10th day after the procedure, in which they were asked about persistent pain, skin signs or whether they would be willing to undergo cricothyroid puncture again if necessary.

The results of the study demonstrated that cricothyroid membrane puncture was safe and effective as a method of local anesthesia for bronchoscopy and EBUS. Of 145 patients, 63.4% were male, with a mean age of 62 years (range: 29–87 years). One hundred eleven bronchoscopies and 34 EBUS were performed. The bolus of propofol administered was 58.7 ± 15.04 mg and the total dose of propofol was 283.55 ± 158.19 mg. The amount of 2% lidocaine used in the upper airway was 3.31 ± 12.6 mg, in the lower airway 168.13 ± 73.81 mg and in total 211.65 ± 78.11 mg. Only eight patients had cough before vocal cord access. These patients received an additional bolus of anesthetic in the larynx. The remaining patients did not require additional local anesthetic, which facilitated the operator's access to the vocal cords. One hundred twenty-three patients (84%) presented with a bloody spot at the puncture site, 21 (14.5%) presented with slight bleeding and only 1 presented with moderate bleeding (Fig. 1). At the end of the examination and after the patient had recovered from sedation, 127 (87.5%) had no external local signs, 8 (5.5%) had a small hematoma, 10 (6.8%) had erythema and none had signs of swelling and/or infection (Fig. 2). Only 11 (7.5%) patients reported local pain, with the highest score being 2 on the VAS pain scale. Of the 51 patients interviewed by telephone, 11.7% reported small hematoma. Those who presented erythema on the day of the examination disappeared a few hours after the examination. Only 4 reported little or mild pain, and only 1 reported moderate pain. Fifty of them would undergo the procedure again if necessary. The study highlights that the use of cricothyroid membrane puncture for local anesthesia significantly facilitates the passage of the bronchoscope through the larynx during bronchoscopy, reducing patient discomfort and the need for additional doses of lidocaine.

This technique avoids coughing as the bronchoscope passes through the vocal cords, making the procedure gentler and more effective. Bronchoscopy is usually performed under conscious sedation,⁶ but local anesthesia, especially in the larynx is essential.⁷ The larynx naturally resists foreign bodies such as the bronchoscope or anesthetic fluid as it attempts to protect the vocal cords and airway. However, puncture of the cricothyroid membrane

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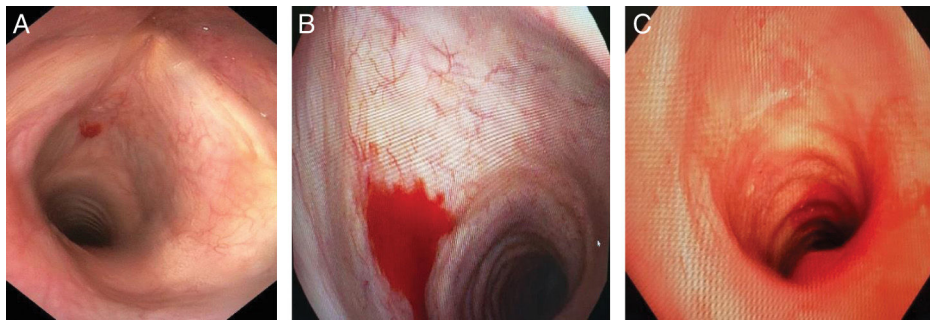


Fig. 1. Internal signs in the larynx produced by puncture of the cricothyroid membrane. (A) Puncture site, (B) slight bleeding, and (C) moderate bleeding.



Fig. 2. External cutaneous signs produced by puncture of the cricothyroid membrane. (A) Puncture site, (B) erythema, and (C) haematoma.

injects the anesthetic directly into the proximal airway, causing a cough that distributes the anesthetic throughout the larynx, effectively desensitizing it and eliminating the need for additional anesthetic. The study agrees with previous research,⁸ which shows that cricothyroid puncture reduces the need for additional doses of local anesthetic, which reduces the risk of side effects related to lidocaine.⁹⁻¹¹ Although this study did not compare anesthetic doses with other techniques, it confirms that most patients did not require additional doses.¹² This method has proved to be safer and more effective, especially for procedures such as endobronchial bronchoscopy ultrasound (EBUS), which involves a larger, stiffer endoscope and requires multiple airway entries.^{13,14} The technique was well tolerated, with minimal local complications. Only one patient experienced moderate bleeding and most had no outward signs from the puncture. Authors acknowledge some limitations, such as not comparing the cricothyroid puncture technique with other methods of local anesthesia. It also did not evaluate the difficulties encountered during procedures requiring repeated airway entries, such as cryoprobe mediastinal biopsy. Despite these limitations, the study concludes that cricothyroid membrane puncture is a safe, effective and well-tolerated technique for the patient, facilitates passage of the bronchoscope through the larynx, reducing cough and minimizing the need for additional anesthesia, and is therefore suitable for repeated bronchoscopies.

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Conflict of Interests

The authors declare not to have any conflicts of interest that may be considered to influence directly or indirectly the content of the manuscript.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

Artificial intelligence has not been used in the development of this manuscript.

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