

Serial transcutaneous laryngeal ultrasonography in intensive care unit for assessment of vocal cord palsy : a case report

N. KUMAR (*), A. KUMAR (**), A. KUMAR (*), A. KUMAR (**)

Abstract : A direct laryngoscopy is currently the standard method for diagnosing RLN (Recurrent Laryngeal Nerve) paralysis after thyroid or parathyroid surgery but this procedure can be uncomfortable for patients and may cause undesirable changes in vital signs. A 40 years old female after a total thyroidectomy was assumed to have a bilateral vocal cord palsy on direct laryngoscopy after surgery. Patient was shifted to intensive care unit (ICU) on ventilatory support. We used serial transcutaneous laryngeal ultrasonography in the ICU for assessing the vocal cord functions along with conservative management. After 3 days, we were able to safely extubate the trachea and tracheostomy was avoided.

Key words : Serial ; ultrasound ; thyroidectomy ; ICU ; vocal cord palsy.

INTRODUCTION

Thyroid and parathyroid surgical procedures are common operations and due to a close anatomic relationship between the thyroid, parathyroid glands and the laryngeal nerves iatrogenic injury to the recurrent laryngeal nerve (RLN) with subsequent vocal fold paralysis/palsy (VFP) is one of the most commonly encountered complications. As bilateral RLN paralysis can cause upper airway obstruction, early recognition of this complication before tracheal extubation is important. A direct or indirect laryngoscopy is currently the standard method for diagnosing RLN paralysis, but this procedure can be uncomfortable for patients and may cause undesirable changes in vital signs. The ultrasonography (US) of the vocal cords is a non-invasive technique that is well tolerated. We report the successful use of laryngeal US to evaluate vocal cord function in an endotracheally intubated patient which helped us in avoiding tracheostomy. The patient provided written permission for publication of this report.

CASE DESCRIPTION

A 40-year-old female, weighing 60 kg of ASA Physical Status II was planned for total thyroidectomy and central lymph node dissection for papillary carcinoma of thyroid under general anesthesia. ASA standard monitoring was applied along with neuromuscular monitoring. Patient was induced with intravenous injection of fentanyl, propofol and atracurium followed by tracheal intubation with 7.5 mm (ID) endotracheal tube. Anesthesia was maintained with oxygen, air and sevoflurane. After the completion of surgery and reversal of neuromuscular blockage with a TOF (Train of four) ratios of 0.9, deep extubation was done at a MAC (Minimum alveolar concentration) of 0.4. Deep extubation was followed by direct laryngoscopy which showed edematous vocal cords in paramedian position with weak movement even on deep inspiration. A bilateral RLN palsy was assumed and patient was reintubated and transferred to intensive care unit (ICU) for further management.

In the ICU, patient was put on pressure support ventilation and inj. dexamethasone 8mg was given 8 hourly. Serial transcutaneous ultrasonography of the neck region was done daily in awake state to assess vocal cord function and vocal cord velocity. The linear transducer (6-13 MHz, Edge II Ultrasound, FujiFilm SonoSiteTM, Bedford, United Kingdom) was placed transversely on the thyroid cartilage with the neck slightly extended to visualize vocal cord mobility using 2D mode (Fig. 1). Although patient was generating adequate tidal volume on

Neeraj KUMAR, MD ; Abhyuday KUMAR, MD ; Amarjeet KUMAR, MD ; Ajeet KUMAR, MD.

(*) Department of Trauma & Emergency, AIIMS Patna, Bihar, India.

(**) Department of Anesthesiology, AIIMS Patna, Bihar, India.

Corresponding author : Abhyuday Kumar MD, Department of Anesthesiology, AIIMS Patna, India Pin: 801507. Tel : +91 9013512403.

E-mail : drabhyu@gmail.com

Paper submitted on Jan 08, 2020 and accepted on Apr 28, 2020

Conflict of interest : None

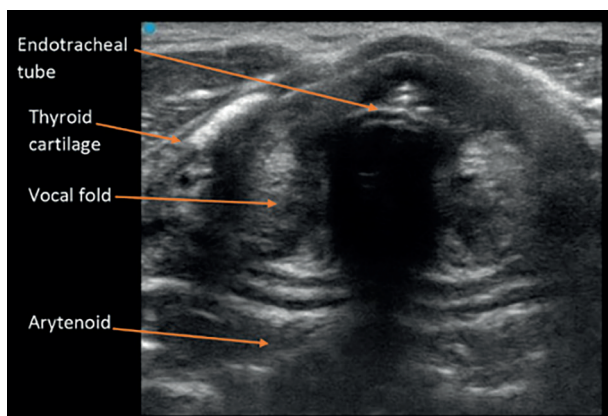


Fig. 1. — Ultrasound image showing vocal folds with endotracheal tube in situ.

spontaneous ventilation, we found weak vocal cord movement on post operative day (POD)1. With time, we found significant improvement in vocal cord movement on US assessment and on POD 3, we noticed a bilateral mobile vocal cords. On POD 3 trachea was extubated over an airway exchange catheter (AEC) and we again assessed bilateral vocal cord mobility. True vocal cords were moving symmetrically in abduction and adduction during respiration. Clinically patient was having hoarseness of voice without any respiratory distress. By serial monitoring of vocal cord with endotracheal tube in situ by US, we safely extubated the trachea and tracheostomy was avoided.

DISCUSSION

Bilateral vocal cord palsy (BVCP) can be transitory or permanent, may occur in adduction or abduction, may be complete or incomplete and may recover from 1 day to 12 months (1). The incidence of bilateral vocal cord palsy (BVCP) after total thyroidectomy has been reported to be 0.4–14% (2). Various techniques have been described to monitor the recurrent laryngeal nerve and they are following: (i) direct visualization under the fibro bronchoscope; (ii) palpation of the larynx during stimulation of the recurrent laryngeal nerve; (iii) laryngeal muscles electromyography; (iv) electromyography with orotracheal tube inserted electrodes. Ultrasonography was proposed as an alternative to flexible fiberoptic laryngoscopy because it is less expensive and causes less discomfort to the patient. Assessment of upper airway function is always essential for successful tracheal extubation, but can be difficult to evaluate during endotracheal intubation. Flexible laryngoscopy and stroboscopy (with rigid endoscopes) however do suffer some

limitations imposed by a sensitive gag reflex or neck and jaw rigidity. Direct observation of vocal cord movement by laryngoscopy or observation by fiberoptic laryngoscopy is a standard method to diagnose RLN paralysis in those patients with a native airway. However, the utility of these methods in intubated patients is unclear because the endotracheal tube interferes with the evaluation of laryngeal function. Oral and pharyngeal secretions also interfere with direct laryngoscopy. In addition, introduction of the scope can be uncomfortable in awake or only lightly sedated patients.

US is an evolving method for assessing the vocal cords and successful detection of RLN palsy after thyroid surgery has been reported (3). US has also been used perioperatively to assess vocal cord palsy with endotracheal tube in situ (4). On USG examination in transverse view, uncalcified thyroid cartilage is seen as an inverted V shape within which the true and false vocal cords are visible. The false vocal cords appear as hyperechoic structures whereas true cords are hypoechoic. Visibility of cords is found to be easier in females and young males (5). With increase in age, there is calcification of thyroid cartilage, which is seen as a strong echo with posterior acoustic shadowing. However, the anatomical structures can be visualized despite the calcifications by angling the transducer. In a male patient greater than 40 years, it is better to place the probe superior to the thyroid cartilage and scan through the hyoid-thyroid membrane or below the thyroid cartilage and scan cranially through the crico thyroid membrane (5).

In our case, laryngeal US allowed satisfactory serial evaluation of vocal cord function in the tracheally intubated patient in the intensive care unit. The absence of vocal cord abduction during deep breathing strongly suggested bilateral vocal cord paralysis. Laryngeal ultrasonography or “Echolarynography” seems to be a simple, easy, cheap, non-invasive, easily available tool with no radiation exposure concerns.

References

1. Reiter R, Pickhard A, Smith E, Hansch K, Weber T and Hoffmann TK, et al. 2015. Vocal cord paralysis-analysis of a cohort of 400 patients. *Laryngo- Rhino- Otologie*. 94: 91-96.
2. Hazem MZ, Naif AA and Ahmed AS. 2011. Recurrent laryngeal nerve injury in thyroid surgery. *Oman Med. J.* 26: 34-38.
3. Kundra P, Kumar K, Allampalli V, Anathkrishnan R, Gopalakrishnan S and Elangovan S. 2012. Use of ultrasound to assess superior and recurrent laryngeal nerve function immediately after thyroid surgery. *Anaesthesia*. 67: 301-302.

4. Yamamoto N, Yamaguchi Y, Nomura T, Yamamoto, Takeshi and Yamaguchi et al. 2017. Successful assessment of vocal cord palsy before tracheal extubation by laryngeal ultrasonography in a patient after esophageal surgery: a case report. *A&A Case Reports*. 9: 308-310.
5. Kristensen MS. 2011. Ultrasonography in the management of the airway. *Acta Anaesthesiol Scand*. 55 : 1155-1173.