

## Cricoarytenoid subluxation presenting as vocal cord palsy following endotracheal intubation - A case report

### ABSTRACT

Airway interventions commonly present with self-limiting throat pain and hoarseness of voice. Persistent hoarseness is rare and should be evaluated for serious complications. Cricoarytenoid injuries may present as vocal cord palsies which need careful evaluation. We encountered a case of intubation-related cricoarytenoid subluxation in a 49-year-old diabetic female with a past history of pulmonary tuberculosis was planned for a modified radical mastectomy after a course of neoadjuvant chemotherapy. During intubation by a third-year resident, Cormack Lehane's grade was 3, and bougie-guided railroading of 7 mm endotracheal tube was done blindly. The patient developed haemoptysis and desaturation following intubation and was on ventilator support for 24 hours. Following extubation, the patient had throat pain and hoarseness in voice for more than 2 days. Fiberoptic laryngoscopy revealed right vocal cord palsy. A detailed evaluation revealed right cricoarytenoid subluxation which was treated successfully by closed reduction after 1 week. Cricoarytenoid subluxation, though rare is a serious complication after interventional airway procedures. According to the literature, unfavourable intubating conditions, predisposing patient factors and inadequate experience of the anaesthesiologist are the major contributors to this complication. Injury may produce submucosal haemorrhage and haemarthrosis, which cause adhesions and scarring leading to fixing of vocal cord in abnormal position and permanent disability. Early diagnosis by fiberoptic laryngoscopy and CT imaging and prompt interventions like closed reduction or laryngoplasty should be done to restore vocal cord function.

**Key words:** Cricoarytenoid subluxation, intubation, vocal cord palsy

### Introduction

Airway-related injuries present as temporary hoarseness of voice and throat pain with a reported incidence of 14.4–50% and persistent hoarseness in 1% of cases, which needs evaluation.<sup>[1]</sup> Cricoarytenoid dislocation is often under diagnosed and if not treated early may lead to permanent damage.<sup>[2]</sup>

We encountered a case of right vocal cord palsy following intubation in a mastectomy case which presented as hoarseness

of voice and throat pain, later diagnosed to be cricoarytenoid subluxation and successfully treated with closed reduction.


### Case Report

A 49-year-old female with carcinoma left breast having a history of diabetes mellitus and pulmonary tuberculosis treated 20 years back was planned for modified radical mastectomy (MRM). She was having haemoptysis occasionally,

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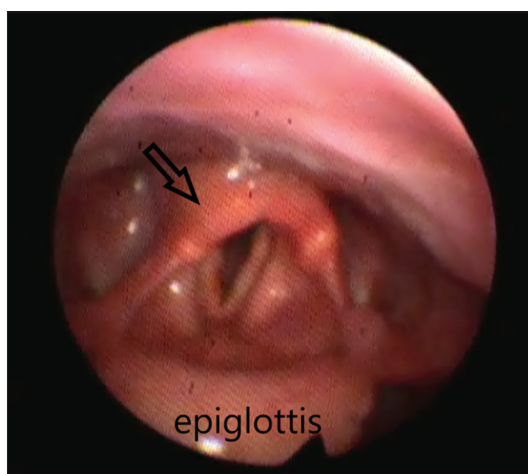
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which she denied at the time of pre-anaesthetic assessment. Her airway examination was normal and chest X-ray did not reveal any abnormalities. The procedure was planned under general anaesthesia—fentanyl 2 µg/kg, propofol 2 mg/kg and succinylcholine 1.5 mg/kg were used for induction. On direct laryngoscopy by third-year resident, Cormack–Lehane grade was 3 which did not improve even after optimal external laryngeal manoeuvre. Gum elastic bougie was introduced into the glottis and a 7 mm portex endotracheal tube railroaded blindly.

After positive pressure ventilation, a sudden bout of haemoptysis occurred. The oral cavity was clear and direct laryngoscopy revealed no upper airway injuries. On tracheal suctioning, 50 mL of blood was collected in the drain and desaturated to 89%. Ventilation with 100% oxygen continued and tranexamic acid 500 mg bolus dose was given intravenously. After 10 minutes, saturation improved to 94% but with FiO<sub>2</sub> of 1.0, and the procedure was deferred.

The patient was shifted to Post Anaesthesia Care Unit (PACU) for mechanical ventilation and monitoring. Tranexamic acid was given at 1 mg/kg/h for 24 h. Bleeding from the endotracheal tube stopped after 6 h. CT chest revealed fibrotic and bronchiectatic changes suggestive of TB sequelae and CTPA was normal. The coagulation profile was normal. She was extubated after 24 hours. After extubation, the patient complained of odynophagia and hoarseness of voice.

Since the symptoms did not resolve even after 2 days of conservative management, ENT opinion was sought. Fibre optic laryngoscopy was done and the right vocal cord was found to be immobile [Figure 1]. CT neck revealed medial rotation of right arytenoid over the vocal cord complex causing foreshortening of the right vocal cord,



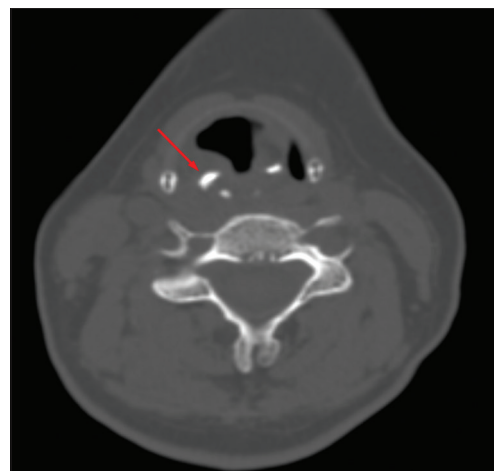
**Figure 1:** Fibreoptic laryngoscope image showing the right cricoarytenoid subluxation

suggestive of cricoarytenoid subluxation [Figure 2]. After 7 days, MRM and reduction of cricoarytenoid subluxation were done in a single sitting. Informed risk consent was obtained from the patient and relatives. The patient was intubated using a C-MAC video laryngoscope with a 5-mm micro laryngeal tube and closed reduction of CA joint was done by ENT surgeon and then the tube was changed with 7-mm normal portex tube to proceed for MRM surgery. The surgery was uneventful and the patient was extubated at the end of surgery and observed in PACU for 24 hours. Even though there was no significant improvement in right vocal cord mobility, the hoarseness of voice was drastically reduced after 2 days. The speech was clear and the patient was satisfied at the time of discharge after 5 days. Prior permission from the patient and the consent for publication has been obtained.

## Discussion

The Cricoarytenoid joint is a synovial joint between the base of the arytenoid process and the posterior cricoid ring having three-dimensional gliding and rocking movements.<sup>[3]</sup> The stabilizing forces like ligamentum vocalis, conus elasticus and anterior capsular ligament prevent the displacement of the larynx posterolaterally while cricoarytenoid ligament and posterior capsular ligament contribute to the anteromedial stability.<sup>[4]</sup> Hence, significant forces are needed to subluxate or dislocate the cricoarytenoid joint.

The common causes of arytenoid dislocation include direct laryngoscopy, intubation, usage of McCoy blade, laryngeal mask airway insertion, use of lighted stylets, double-lumen endotracheal tube, nasogastric tubes and transesophageal echocardiography probe. Excellent intubating conditions reduce the incidence of complications related to vocal cord injury. This was an unanticipated difficult airway where an



**Figure 2:** CT image of right cricoarytenoid subluxation

external laryngeal manoeuvre has been administered and the endotracheal tube is passed over the bougie blindly. A retrospective study on arytenoid dislocation on intubated patients by Jang *et al.*<sup>[5]</sup> showed that neck movements during positioning like flexion, extension and rotation with inflated cuff have significantly contributed to the arytenoid dislocation, the other predisposing factors being less experience of the anaesthesiologist and female gender.

Several pre-existing conditions predispose to arytenoid dislocation like diabetes mellitus, chronic kidney disease, prolonged steroid use, laryngomalacia, rheumatoid arthritis, acromegaly, laryngeal cancer, or postradiation, chondroradionecrosis.<sup>[6]</sup> Our patient was a chronic diabetic and underwent four cycles of chemotherapy which may be a predisposing factor to be considered.

Left-sided dislocations were common accounting for 55% of cases, right-sided dislocations in 39% and bilateral dislocations in 4% of patients.<sup>[7]</sup> Anterior dislocations are more common that occur due to pushing off the arytenoids by the endotracheal tube, whereas posterior dislocations indicate that the arytenoid is pulled towards the oropharynx during removal of incompletely deflated ET tube cuff.<sup>[2,7]</sup> Anterior dislocations commonly present with persistent hoarseness which is better tolerated by patients, whereas posterior dislocations present as severe throat pain and odynophagia along with hoarseness.<sup>[8]</sup> This patient had right-sided anterior type subluxation probably due to injury while introducing ET tube and presented with persistent hoarseness and brief throat pain.

Early diagnosis and intervention are needed to achieve the best outcome, because submucosal haemorrhage causes adhesions and scarring leading to joint stiffening and fixation in abnormal position. CT scan of the neck<sup>[9]</sup> and fiberoptic laryngoscopy are helpful in the early diagnosis. Treatment options include closed reduction, injection laryngoplasty and speech therapy. Closed reduction within 21 days of dislocations was shown to be associated with the successful restoration of joint movements and quality of voice.<sup>[10]</sup> We diagnosed the case on day 3 after injury and performed the closed reduction in 10 days. Hence a better outcome was achieved.

## Conclusion

Cricorytenoid injury is a rare complication following endotracheal intubation requiring high index of suspicion. Patients with predisposing factors and unfavourable intubating conditions need careful evaluation because early intervention results in adequate restoration of glottic functions.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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