

## Case Report

# Ball valving laryngeal masses: a difficult “ball” in the anaesthetists’ court

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### ABSTRACT

Dynamic airway obstruction (also called ball-valve effect) is a serious condition often seen in glottic lesions. This is an anesthetic challenge as total airway obstruction can occur after the induction of general anesthesia. We present a case of a middle aged female who had a large laryngeal mass which was showing ball-valve effect. The patient had refused for tracheostomy despite it being the safest procedure in the circumstances. We then performed videolaryngoscopy and managed to intubate the patient with the help of some improvisation. The patient underwent a successful and uneventful surgery.

**Keywords:** Dynamic airway obstruction, Ball-valve, Tracheostomy

### INTRODUCTION

Dynamic total airway occlusion (ball-valve effect) is often seen in patients with a glottic lesion. The airway management of these cases requires a specialized and individualized approach. After induction of general anesthesia, the loss of hypopharyngeal tone along with abolition of spontaneous ventilation and initiation of positive pressure ventilation can lead to complete airway obstruction. This can result in the inability to ventilate and/or intubate.<sup>1</sup> In patients with large or periglottic airway masses, awake or minimally sedated videolaryngoscopy or fiberoptic bronchoscopy is used for placing endotracheal tube.<sup>3</sup> However, the size and position of the glottic mass often renders such approaches unfeasible and elective tracheostomy remains the only viable option.<sup>4</sup> We describe a case of a large ball valving laryngeal mass in which elective tracheostomy was advised but we managed to intubate the patient by individualizing the management plan.

### CASE REPORT

A 39-year-old female presented with hoarseness of voice and intermittent bouts of severe cough. Her evaluation by direct laryngoscopy in the ENT department revealed a large laryngeal mass arising from the right vocal cord which appeared to obstruct the airway (Figure 1). A laser excision of the laryngeal mass was planned. Since the airway was not visible beyond the mass, tracheostomy was suggested to the patient as the only safe approach to anesthesia. The patient, however, perceived the tracheostomy as invasive and cosmetically unacceptable and did not give consent for tracheostomy.

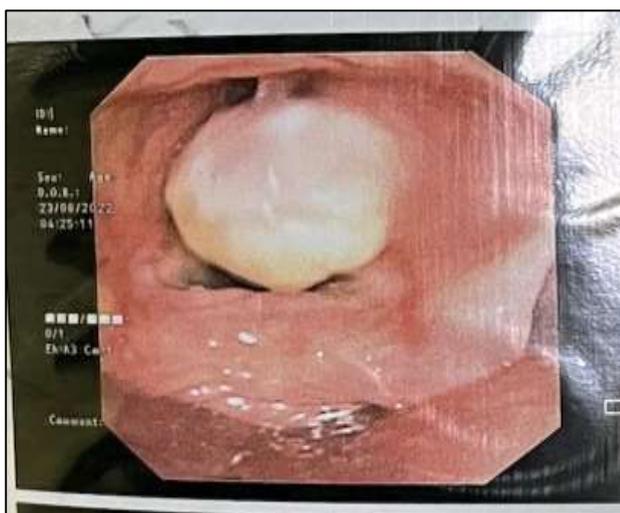
Her past history was unremarkable and she had no comorbidities. Her general physical and systemic examination was normal. Her physical examination revealed that the neck was fully mobile and dentition was intact. Her Mallampati grade was 1. All her blood investigations including hemogram and liver and kidney

function tests were normal. We planned to perform videolaryngoscopy to assess the mass and to attempt endotracheal intubation with a smaller sized endotracheal tube by negotiating it beyond the mass when it moved during respiration.

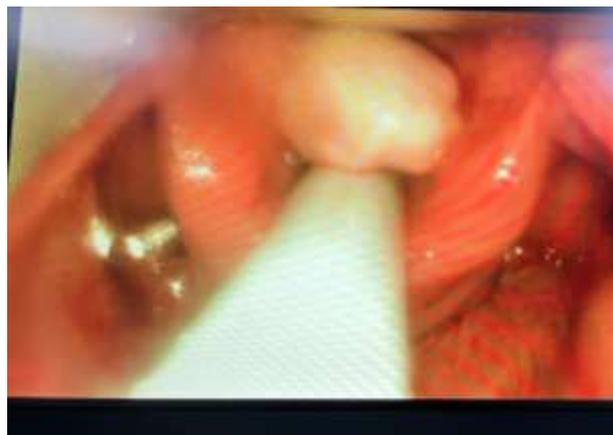
Nebulized lidocaine (2%, 8 ml) was given in the preoperative area. 10% lignocaine spray was applied over the oral cavity and oropharynx. Transtracheal block was given using 4 ml of 4% lignocaine. Intravenous dexmedetomidine (1 mcg/kg) was administered over 15 minutes followed by an infusion of fentanyl. Then laryngoscopy was done with a C-MAC D Blade. We found a pedunculated growth over the right vocal cord. As the growth was large, it was obstructing most of the area between the vocal cords causing a “ball valve” effect (Figure 2).

The growth tended to move laterally during expiration allowing a slightly better visualization of the cords. We attempted intubation with a size 5 laser ET tube but even that could not be negotiated beyond the growth. We then chose Ivory PVC soft seal cuffed tracheal tube of size 5.0. During expiration, this tube was quickly negotiated between the vocal cords under indirect visualization. The cuff was inflated with methylene blue tinted normal saline and ET CO<sub>2</sub> was checked to confirm successful intubation. For safe conduct of the surgery, the patient was shifted to total intravenous anesthesia (TIVA) using propofol and fentanyl infusion which was titrated to maintain a BIS of 40. Additionally, to reduce airway fire, we reduced the FiO<sub>2</sub> to 30% and placed moist gauze in and around the airway. Dexamethasone 8 mg iv was given to limit airway edema.

Laser excision of the laryngeal mass was then performed by the surgical team. The emergence from the anesthesia was smooth and no postoperative respiratory distress occurred.



**Figure 1: Direct laryngoscopy image of laryngeal mass.**



**Figure 2: C-MAC visualization of the laryngeal mass.**

## DISCUSSION

The anaesthetic management of glottic lesion causing dynamic airway obstruction is a challenge.<sup>1</sup> Total airway obstruction can occur when induction of general anaesthesia is attempted due to various factors such as loss of hypopharyngeal tone, cessation of spontaneous breathing and starting of positive pressure ventilation. This can result in inability to intubate or ventilate the patient. The safest approach in this setting is an elective tracheostomy which essentially eliminates most if not all of the aforementioned risks. However, the morbidity associated with tracheostomy is also considerable and both the patient and the surgeon wanted to avoid the same. Awake video laryngoscopy followed by endotracheal intubation is perhaps the only remaining viable option in such circumstances.<sup>2,5-8</sup>

The risk of airway fire merits consideration in all laser surgeries. The triad of airway fire: an oxidising agent (oxygen), a combustible material (endotracheal tube) and a source of ignition (laser) is present in such situations. Laser-resistant endotracheal tubes are therefore considered indispensable for such surgeries. However, in our case, even the smallest available laser tube could not be negotiated beyond the mass. Hence, we had to opt for Ivory PVC tube. Reducing the availability of oxygen by lowering the FiO<sub>2</sub> and use of moist gauze to reduce risk of fire are other steps which can reduce the risk of fire.<sup>9</sup>

Patient sedation for awake laryngoscopy can be accomplished by various approaches such as using dexmedetomidine, midazolam or fentanyl. Dexmedetomidine has an advantage that respiratory depression is minimal and patient has the ability to follow commands, including deep inspiration and expiration. This is useful in opening the airway. Due to these factors, we preferred dexmedetomidine in our patient.<sup>10</sup>

## CONCLUSION

Although ball valving laryngeal masses are uncommon, awareness about their attendant risks and available

strategies is useful for the practicing anaesthetist. While the safest procedure in a large ball valving lesion is a tracheostomy, awake videolaryngoscopy and endotracheal intubation can be performed if the patient is willing to consider the associated risk. However, expertise in the use of videolaryngoscopy and facilities for management of difficult airway is essential before such procedures are undertaken. In selected cases, this approach can avoid the morbidity associated with tracheostomy. A careful approach to ball-valving laryngeal masses is essential.

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