

## Use of A Laryngeal Mask in Patients with Severe Bradycardia During Operation of The Laryngoscope for General Anesthesia: A Case Report

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**Citation:** Kang D, Rye S, Kim J (2021) Use of A Laryngeal Mask in Patients with Severe Bradycardia During Operation of The Laryngoscope for General Anesthesia: A Case Report. Annal Cas Rep Rev: ACRR-247.

**Received Date:** 25 May, 2021; **Accepted Date:** 30 May, 2021; **Published Date:** 07 June, 2021

### Abstract

During endotracheal intubation, arrhythmia with bradycardia and atrophy may be caused very rarely. A 49-year-old male, scheduled for transurethral resection of the prostate, received intravenous injection of glycopyrrolate 0.2 mg, propofol 100 mg, remifentanyl 80 µg and rocuronium 50 µg were administered intravenously. After 2 minutes of manual mask ventilation, endotracheal intubation was attempted, and the patient developed severe bradycardia about 30 beats/minute during laryngoscope operation. The laryngoscope was removed immediately and the patient returned to normal heart rate of 80 beats/min. The laryngoscope was attempted once more for endotracheal intubation, but severe bradycardia occurred again. Afterwards, the airway was successfully secured with a laryngeal mask airway, and the heart rate was stable during the procedure.

**Keywords:** Laryngeal mask airway; Vagal reflex; Laryngoscopy.

### Introduction

Laryngoscopy is performed in most cases under general anesthesia. Tachycardia and increased blood pressure commonly occur during laryngoscopy due to sympathetic reflex and release of catecholamine. In rare cases, however, bradycardia or asystole may occur due to parasympathetic stimulation [1]. The authors report a case of severe bradycardia during laryngoscopy in a patient undergoing transurethral resection of the prostate.

### Case

A 49-year-old male Melanesian patient was admitted due to high prostate-specific antigen levels detected during a health examination one month ago. Upon performing a biopsy after admission, the patient was diagnosed with prostate cancer, and multiple osseous metastases were observed on additional tests. To treat the severe ischuria observed in the patient, a surgery was scheduled for transurethral resection of the prostate as palliative care. The past medical records showed no abnormal findings, except diabetes and Type B hepatitis detected during the health examination one month ago. The patient had no prior history of surgery. The preoperative

electrocardiogram showed NSR81, and chest radiography and lung function test results were normal. The heart rate and blood pressure were 82 bpm and 130/85 mmHg, respectively, before anesthesia. The height and weight of the patient were 167 cm and 89 kg, respectively, with a body mass index of 32. Due to multiple osseous metastases in the thoracic and lumbar vertebrae, general anesthesia was planned. For anesthesia induction, an intravenous injection of 0.2 mg glycopyrrolate, 100 mg propofol, and 80 µg remifentanyl was followed with an injection of 50 µg rocuronium. The heart rate and blood pressure were 75 bpm and 110/76 mmHg, respectively, before intubation. For intubation, the laryngoscope was used to position the blade at the vallecula to lift the epiglottis, and severe bradycardia occurred immediately as the heart rate dropped to 30 bpm. The intubation was terminated, the laryngoscope was removed, and the heart rate was restored to 80 bpm after several seconds. At that time blood pressure was 134/90 mmHg and oxygen saturation were 100 percent. Intubation was re-attempted after the vital signs stabilized by expert anesthesiologist. However, as before, the pressure of the blade positioned at the vallecula caused the heart rate to drop to 30 times/min; thus, the laryngoscope was instantly removed, and similar to the first attempt, the vital signs, including the heart rate, were

restored after several seconds. Then, the i-gel (Intersurgical Ltd., Wokingham, UK) was inserted, and the anesthetic induction was completed without causing any abnormalities in the heart rate or vital signs. Subsequently, the operation proceeded as planned and was completed, and the patient did not show any unusual symptoms and was discharged after four days. The patient refused to undergo additional recommended cardiovascular tests.

## Discussion

Insertion of the laryngoscope upon intubation for general anesthesia may cause cardiovascular disturbances, such as hypertension, tachycardia, arrhythmia, bradycardia, and asystole, due to a high level of stimulation. Of note, is the rare case of bradycardia or asystole, with hypoxia, drug use, cervical hyperextension and vagal reflex identified as risk factors. Asystole, in particular, has been reported to be caused by the intense stimulation of sensory nerves distributed on the surface of epiglottis, based on the innervation of upper laryngeal nerves derived mainly from the vagus nerve [1-6].

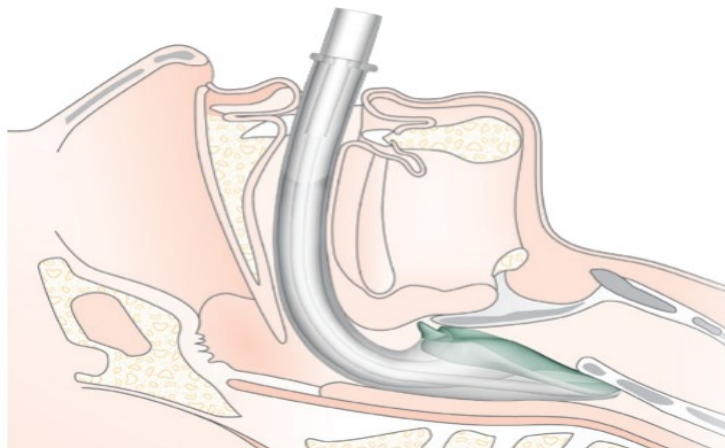
The laryngeal mask is well known for low stimulation during intubation, but it has been studied for the benefit of less increase in blood pressure or heart rate. This case is the first case report of replacement with a laryngeal mask in a patient with severe bradycardia during endotracheal intubation.

The patient in this case showed oxygen saturation of up to 100%, which was maintained until the insertion of the laryngoscope during ventilation. No decrease in oxygen

saturation was observed during intubation. Only a low dose of propofol (1.2 mg/kg) or remifentanyl (1 µg/kg) was administered; if bradycardia was caused by the use of these drugs, the heart rate would not be rapidly restored after terminating the intubation. Thus, hypoxia or drug use were eliminated as the causes of bradycardia, and the cause was presumed to be vagal reflex due to intense stimulation during the insertion of the laryngoscope.

While no study has yet investigated the level of stimulation required to cause bradycardia, Kim et al. reported a case of asystole upon the suspension laryngoscope during laryngeal microscopic surgery as well as a case of a lower level of bradycardia upon the use of a video laryngoscope [7,8]. Based on this, an association between bradycardia or asystole and the intensity of the stimulation to the epiglottis can be inferred. In the present case, the use of the laryngoscope led to severe bradycardia, even during general anesthesia induction; however, when a laryngeal mask was used for airway management, anesthesia could be induced and maintained without causing severe bradycardia.

According to Russell et al. [9] the average pressure applied to the vallecula during endotracheal intubation using a Macintosh blade reaches 20 N/mm<sup>2</sup>. Endotracheal intubation should lift epiglottis by placing the tip of the laryngoscope in the vallecula, but the laryngeal mask is inserted along the soft palate and oropharynx, and the irritation is insignificant compared to the vallecular and tongue base, which are associated with severe bradycardia (Figure 1).



**Figure 1:** Ideal position of laryngeal mask airway.

The tip of the airway should be located into the upper esophageal opening and the cuff should be located against the laryngeal framework.

We think that this mechanism allows the laryngeal mask to be safely used in patients with severe bradycardia or contraction during laryngoscope use. The use of a laryngeal mask is thus expected to be an effective alternative in patients with severe bradycardia or asystole despite the use of the laryngoscope, as the mask aids in protecting the free airway.

Unfortunately, a laryngeal mask does not guarantee low stimulation in all cases. According to Zhou et al., a surgery in an inclined position caused the laryngeal mask to shift its position, and the resulting cervical hyperextension and hyperinflation of the paranasal cavity in the carotid artery led to severe bradycardia [10]. Although a laryngeal mask is advantageous since it causes less throat pain and stimulation upon insertion, its large size and hardness could cause dislocation more commonly than endotracheal tubes [11]; therefore, utmost care should be taken during anesthesia induction.

Patients with cardiovascular autonomic neuropathy caused by long-term diabetes have been reported to show a high incidence of bradycardia related to anesthesia or unpredicted cardiovascular complications [12-14]. The patient in this case report had diabetes for an unknown period. It is thus suggested that during the intubation of diabetic patients, potential adverse reactions should be carefully monitored.

In summary, a clinician may consider the use of a laryngeal mask if severe bradycardia occurs during direct intubation using the laryngoscope. Care should be taken during anesthesia induction in patients with a history of uncontrolled diabetes. Furthermore, during the operation, the position of the laryngeal mask and head should be carefully monitored.

### Conflicts of interest

No potential conflict of interest relevant to this article was reported.

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