

# Bilateral Vocal Cord Palsy after Thyroidectomy Detected by McGrath Videolaryngoscope

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Bilateral vocal cord palsy (BVCP) is a rare complication of thyroid surgery, and it is confusing and frustrating for both patients and medical staff. We found postoperative vocal cord dysfunction using a McGrath videolaryngoscope from a patient with stridor and dyspnea after thyroidectomy performed with intraoperative recurrent laryngeal nerve monitoring. Soon after, the patient was diagnosed with BVCP by an ENT otolaryngologist using a laryngeal fiberscope. The patient underwent exploration and received a permanent tracheostoma. The possibility of false negative findings from intraoperative nerve monitoring should be considered if there is suspicion of BVCP in a high risk patient after thyroidectomy. The McGrath video-laryngoscope can be useful for early discovery of postoperative vocal cord dysfunction.

**Key Words:** Bilateral vocal cord palsy, Intraoperative nerve monitoring, Thyroidectomy, Videolaryngoscope

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## INTRODUCTION

Bilateral vocal cord palsy after thyroid surgery is a rare complication. Recurrent laryngeal nerve injury during thyroid surgery can result from nerve compression, accidental dissection, retraction stretching or electrocautery while unrecognized by the surgical team. Direct visual identification and intraoperative nerve monitoring (IONM) of the recurrent laryngeal nerve reduces the risk of postoperative vocal cord dysfunction.<sup>(1)</sup> However, unexpected postoperative vocal cord dysfunctions can occur.<sup>(2,3)</sup> Postoperative laryngoscopy is recommended when vocal cord dysfunction is suspected.<sup>(4)</sup> The videolaryngoscope provides a better view of the glottis than conventional laryngoscope, with more comfort.<sup>(5)</sup> We report a case of bilateral vocal cord palsy despite normal intraoperative neuromonitoring detected by McGrath videolaryngoscope.

Written consent was obtained from the patient for case report.

## CASE REPORT

A 52-year-old female patient, 64 kg, 158 cm was diagnosed with thyroid malignancy, and she had total thyroidectomy and modified radical neck dissection scheduled. Her medical history included an abdominal hysterectomy three years prior. Based on thyroid ultrasound, neck CT, and lymph node biopsy prior to the surgery, a metastatic lymph node was located in left side of the neck. Prior to the surgery, the patient had a normal voice, and tracheal compression or deviation was not found in the chest X-ray. Electrocardiogram (ECG) showed normal sinus rhythm and the laboratory results, including thyroid hormone, were also normal.

On arrival in the operating room, non-invasive blood

pressure, ECG, pulse oximetry (SpO<sub>2</sub>), and end-tidal carbon dioxide monitor were installed. Pulse oximetry was 98% with blood pressure of 146/85 mmHg and heart rate of 64 beats/min. The patient was anesthetized with intravenous administration of propofol 130 mg, midazolam 3 mg, and fentanyl 100 ug. After the loss of consciousness, rocuronium 40 mg was administered for intubation. Laryngeal view was confirmed to be grade I of Cormack and Lehane score through McGrath<sup>®</sup> videolaryngoscope (Aircraft Medical, Edinburgh, UK), and an EMG endotracheal tube was used for intubation. A wire electrode from NIM<sup>®</sup> Standard Reinforced EMG endotracheal tube (Medtronic, Minneapolis, MN) was fixed after confirming its contact with the vocal cords. Anesthesia was maintained with N<sub>2</sub>O-O<sub>2</sub>-sevoflurane (end-tidal sevoflurane concentration 2~2.5%), and no additional muscle relaxant was administered for 210 minutes. During the surgery, BP and HR were maintained within 20% range of pre-anesthetic values. The recurrent laryngeal nerve was checked intermittently with NIM-Response<sup>®</sup> 3.0 neuromuscular monitoring. At the threshold of 100 uV, the stimulus was checked 1 mA or more during the procedure.

At the end of surgery, muscle relaxant was reversed with glycopyrrolate 0.4 mg and pyridostigmine 10 mg, and the endotracheal tube was removed after confirming recovery of the airway reflex, motor function and consciousness. After smooth extubation, the patient had difficulty in respiration with stridor but SpO<sub>2</sub> maintained at 100%. Wheezing was not heard through stethoscope, and hematoma was not found in the operative field. In spite of sustained head lift, additional sugammadex (2 mg/kg) was administered because of concern about residual neuromuscular blockade. However, as the symptoms did not improve, we decided to evaluate vocal cord dysfunction under spontaneous respiration. The surgeon did not agree that the problems resulted from surgery because the intraoperative recurrent laryngeal nerve monitoring showed normal response. The procedure was explained to the patient, and 60 mg of propofol was administered intravenously. Decline of vocal cord mobility was found by McGrath videolaryngoscopy under spontaneous respiration. Immediate laryngeal fiberoptic by the ENT oto-

laryngologist confirmed bilateral vocal cords palsy with median fixation and compromise of the glottis opening. The patient was decided to evaluate dissection of the recurrent laryngeal nerve because adhesive capsulitis was noticed during the surgery. The patient was reintubated 45 minutes after completion of the surgery, and 5 mg of dexamethasone was administered intravenously. From the operative field, we could not identify specific risk factors for false negative IONM. At right side of paratracheal area, a dissected recurrent laryngeal nerve was identified. An aggressively exfoliated left recurrent laryngeal nerve was identified. There was no additional damage to the recurrent laryngeal nerve during the re-exploration. A frozen biopsy from the right side of paratracheal area consisted of nerve tissue and vessel tissue. The patient was transferred to the general ward after permanent tracheostomy. The tracheostomy was removed after two weeks, and the patient was discharged after three weeks.

## DISCUSSION

Bilateral vocal cord palsy (BVCP) after thyroid surgery is a troublesome complication for both patient and medical staff, and its incidence is about 0.5% after a bilateral procedure.<sup>(2)</sup> Recurrent laryngeal nerve injury during thyroid surgery occurs by nerve compression, accidental dissection, retraction stretching or electrocautery while unrecognized by the surgical team. The gold standard for prevention is the visual confirmation, but it is difficult to distinguish when there is anatomical alteration or deformation.<sup>(6)</sup> Risks of recurrent laryngeal nerve palsy during surgery include thyroid malignancy, large goiter, reoperation, total thyroidectomy, and radiation therapy. In this case, metastasis had occurred to the left neck lymph node so total thyroidectomy and modified neck dissection was performed, which makes the patient a high risk case.

Intraoperative nerve monitoring of the recurrent laryngeal nerve is reported to decrease the risk of post-operative vocal cord palsy in high-risk patients.<sup>(7)</sup> Many surgeons request that the anesthesiologist intubate with a NIM<sup>®</sup> neuromonitoring tube that allows checking of the recurrent laryngeal nerve during thyroid surgery. The

specificity of IONM for detecting nerve injuries is 83~99%.<sup>(1,7)</sup> Schneider et al.<sup>(8)</sup> mentioned that continuous monitoring of IONM is safer than intermittent nerve monitoring. It is controversial whether IONM is more beneficial than visual identification for the recurrent laryngeal nerve.

In this case, we suspected other possibilities such as insufficient muscle relaxant reversal, damage due to intubation, or respiratory problems, instead of false negative IONM response as the cause of stridor and dyspnea after extubation. However, hand grip power recovery, tidal volume, and respiratory rate was stable, and additional muscle relaxant antagonist administration did not improve stridor and dyspnea. Therefore, insufficient reversal was excluded from the possibilities. Pulmonary auscultation, SpO<sub>2</sub> and end-tidal capnography were normal, so a respiratory problem was also excluded from the possibilities. Lastly, vocal cord trauma by intubation was excluded as the intubation was successful without any difficulty with videolaryngoscope at the initial attempt. Laryngeal soft tissue damage was not found when the EMG endotracheal tube location was checked. As the patient's symptoms did not improve, we performed McGrath videolaryngoscopy under spontaneous respiration. The glottic view revealed reduced motility of the bilateral vocal cord. Bensghir et al.<sup>(5)</sup> failed to explore the vocal cords by Macintosh laryngoscope in a patient with laryngeal stridor and dyspnea after extubation, but discovered reduced vocal cords mobility using an Airtraq videolaryngoscope. Their patient was diagnosed with BVCP after consulting with an ENT surgeon. As the symptoms did not improve after 48 hours of re-intubation, tracheostomy was performed.

Most vocal cords palsy is transient and recovers within six months. Airway management of the patient with BVCP depends on the degree of glottis opening. Consultation with ENT otolaryngologist may be necessary to determine limitations in glottis patency. In the immediate post-operative period, BVCP with stridor and respiratory distress requires urgent reintubation. If the vocal cord palsy persists by fiberoptic laryngoscopy after a few days, a tracheostomy is performed. In permanent paralysis,

surgical intervention remains the option for treatment.

In the present case, the patient's vocal cord showed median fixation with a compromised glottis opening. The patient was decided to evaluate dissection of the recurrent laryngeal nerve because she was a high-risk patient and adhesive capsulitis was noticed during surgery. A dissected right recurrent laryngeal nerve and already damaged left recurrent laryngeal nerve was identified during re-exploration. We suggest that false negative IONM response was due to any unrecognized nerve injury occurred after last normal IONM response.

Videolaryngoscopy is a newly developed instrument with a better view of the glottis compared to the conventional laryngoscope, confirmed to be more effective in difficult intubation and awake intubation. The anterior camera angle of the videolaryngoscope provides an improved view and direct route for endotracheal tube. It can be intubated without oral-pharyngeal-laryngeal axes alignment and with less force in the mandible; thus, it can reduce trauma rates to the surrounding tissues of the vocal cord caused by intubation.<sup>(9)</sup> The video screen of the McGrath videolaryngoscope used in this case has a good posterior view as well, allowing viewing the movement of endotracheal tube from the beginning of the intubation procedure, reducing the risk of vocal cord damage. It is slimmer than other types of videolaryngoscope, which reduces the discomfort for the patient after extubation.

Although the combined use of sugammadex and neostigmine may be helpful to decrease the recovery time from rocuronium,<sup>(10)</sup> a limitation of this case report is that we did not evaluate the TOF ratio before administering sugammadex. A major weakness of the present case is that the IONM was not checked during the re-exploration. We were unable to compare the IONM signal response pretreatment and post dissection.

In conclusion, the possibility of false negative IONM should be considered if BVCP is suspected in a high-risk patient after the thyroidectomy, and videolaryngoscope can be useful for early discovery of postoperative vocal cord dysfunction.

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