

Intubation-Related Vocal Cord Palsy - Case Series and Literature Review

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ABSTRACT

- **Objective**

 1. To review the incidence of intubation-related vocal cord palsy.
 2. To analyze the risk factors of intubation-related vocal cord palsy and review literature.

- **Methods**

This is a prospective study of patients who received general anesthesia by intubation from Jan, 2010 to Dec, 2011 in Otolaryngology department. Patients who complained hoarseness after operation will undergo flexible laryngoscopy to look for vocal palsy and will be included in this study.

- **Results**

During Jan, 2010 and Dec, 2011, 2511 patients received general anesthesia by intubation in Otolaryngology department. 6 patients developed post-operative vocal palsy, including 5 male and 1 female, aging from 47 to 67 year-old. Time of endotracheal cuff inflation varies from 45 minutes to 144 hours. These 6 patients had neck hyperextension during operation. Recovery time of vocal palsy in 4 cases is less than 10 weeks except one case is loss follow up and one case had persistent vocal palsy. The incidence of intubation-related vocal palsy is around 0.2% in Otolaryngology department, considering higher than literature reported. Prolonged endotracheal cuff inflation time and neck hyperextension could be the reasons for higher incidence.

- **Conclusion**

The incidence of intubation-related vocal palsy in Otolaryngology department is 0.2%. Risk factors are same as literature, including prolonged endotracheal cuff inflation time, and neck hyperextension position.

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INTRODUCTION

Vocal cord palsy after general anesthesia is considered to be a rare complication. Incidence of intubation-related vocal cord palsy is less than 0.1% in routine intubation¹. The etiology for vocal cord palsy after intubation is mainly due to recurrent laryngeal nerve paralysis. Furthermore, recurrent laryngeal nerve paralysis is further subdivided into two patterns of direct injury and indirect injury. Direct injury is associated with trauma or stretch injury during surgery. Indirect injury is usually associated with neurapraxia without nerve degeneration due to compression from cuff pressure.

The aim of this study was to clarify the incidence of vocal cord palsy after general anesthesia in our department and to discuss the associated risk factor and literature review.

METHODS AND MATERIALS

This is a prospective study of 2511 cases that all underwent general anesthesia by intubation in our department between January, 2010 and December, 2011. Gender, Age, Diagnosis, duration of induration, size of endotracheal tube, fix position and routes of intubation (oral or nasal) were all recorded. The endotracheal tube used in all patients was with high-volume and low-pressure cuff, made from Pharmplast Ltd, Redditch, UK (Fig 1). We survey patient presenting with post-operative hoarseness with laryngoscopy. The patients complicated with vocal palsy was included in this study. We follow up these cases till vocal cord palsy got recovery. Recovery time is also recorded.

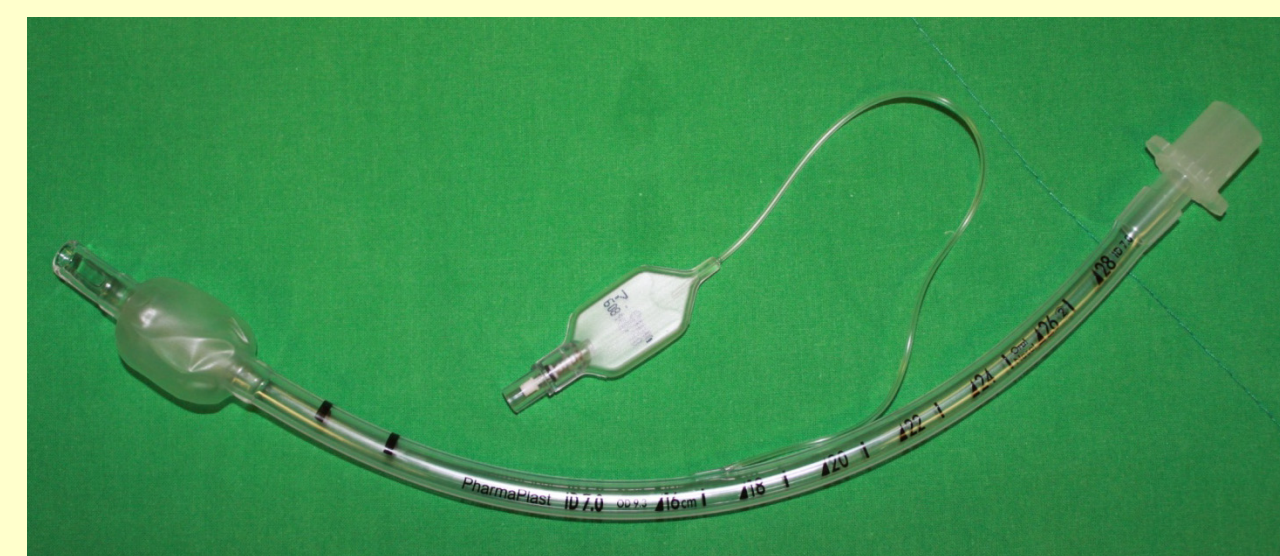


Figure 1. high-volume and low-pressure cuff, Pharmplast Ltd, Redditch, UK

RESULTS

During the period between January, 2010 and December, 2011, 2511 patient received general anesthesia by intubation in ENT department of Shin-Kong Wu-Ho-Su Memorial Hospital. 6 cases were noted to have post-operative vocal palsy. Incidence of post-operative vocal palsy in our department is around 0.2% (6/2511). The characteristics of the 6 studied patients (5 males and 1 female) are summarized in Table 1. Mean age of these cases is 56.0 year-old (47~67 year-old). Duration of intubation time is varied from 45 minutes to 144 hours minutes. Intubation time of 3cases is longer than 20 hours; intubation time of the other 3 cases is shorter than 3 hours. 5 cases had unilateral vocal cord palsy and one case had bilateral vocal cord palsy. All 6 patients had neck hyperextension position during whole operation period. Recovery time from vocal cord palsy is all less than 10 weeks in 4 cases except one case was loss follow up and another case had persistent bilateral vocal cord paralysis.

The incidence of intubation-related vocal palsy is around 0.2% in Otolaryngology department, considering higher than literature reported. Prolonged endotracheal cuff inflation time and neck hyperextension could be the reasons for higher incidence.

	Gender Age	Diagnosis	Intubation time	Vocal palsy	Tube size, position	Recovery time
1	54, M	1. Left Tongue CA, T1N0M0 s/p wide excision + SOHND, left; 2. DM	02:20	Left	7.5# nasal endo, 28cm	? (loss follow up)
2	47, M	Left Buccal CA, T4aN1M0 s/p Wide excision + segmental mandibulectomy + MRND, left + free flap reconstruction	27:55	Left	7.0# nasal endo, 28cm	< 7 weeks
3	63, F	1. Left parapharyngeal space tumor s/p excision; 2. DM	01:10	Left	7.0# oral endo, 21 cm	< 1 week
4	50, M	1. Left Buccal CA, T2N0M0 s/p Wide excision + SOHND, left + free flap reconstruction; 2. HTN	22:55	Left	7.0# nasal endo, 28cm	< 10 weeks
5	67, M	Left post-cricoid verrucous hyperplasia s/p laryngomicrosurgery	00:45	Left	6.0# oral endo, 23cm	< 6 weeks
6	55, M	1. Soft palate cancer, left, pT3N0M0 s/p total palatotomy + bilateral tonsillectomy + bilateral nasopharyngectomy + left MRND + right SOHND + flap reconstruction 2. Hypopharyngeal cancer s/p CCRT	144:00	Bilateral	7.0# oral endo, 21 cm	not recovery till now

Table 1. Characteristics in Patients With Vocal Cord Paralysisa

DISCUSSION

The present study demonstrated that intubation-related vocal cord palsy in our Otolaryngology department occurred with a higher incidence (0.2%) than literature reported (0.1%). Furthermore, we demonstrated that prolonged endotracheal cuff inflation time and neck hyperextension could be the reasons for higher incidence.

The etiologic mechanisms of postoperative VCP is generally related to recurrent laryngeal nerve paralysis. Furthermore, recurrent laryngeal nerve paralysis is further subdivided into two patterns of direct injury and indirect injury. The mechanism of recurrent laryngeal nerve paralysis due to tracheal intubation is usually indirect injury. The factors of indirect injury are said to include tracheal tube size, location of the cuff, fixing side of the tube, cuff pressure, curvature of tracheal tube, intubation time².

Anatomic analysis of recurrent laryngeal nerve palsy was performed by Ellis and Pallister³. They highlighted the fact that the posterior branch of the recurrent laryngeal nerve innervates the posterior cricoarytenoid and the interarytenoid muscles, whilst the anterior branch supplied most of the adductors. Cavo performed a series of laryngeal dissections which showed that the probable site of injury to the recurrent laryngeal nerve is the subglottic region. In this area, the anterior branch of this nerve is vulnerable to compression between the expanded cuff and the overlying thyroid cartilage on the superoanterior border of the posterior cricoarytenoid muscle, which is about 6 to 10 mm below the posterior third of true vocal cord⁴.

DISCUSSION

As the anterior branch of the recurrent laryngeal nerve exclusively innervates the adductors, bilateral paralysis of this branch results in cords being in the intermediate or more abducted position. The usual symptoms are hoarseness and aspiration (as exhibited by our patient) rather than airway obstruction which occurs with bilateral recurrent laryngeal nerve palsy⁸.

Several risk factors of intubation-related vocal cord palsy have been studied previously. Increased cuff pressure, neck hyperextension which will result in migration of cuff proximally to just below vocal cords, older patients (>60 y/o), patients with hypertension or diabetes mellitus which will contribute to impaired microcirculation, increased intubation time and inadequate size of tube (>#8 in men, >#7 in women) were all reported before.

In this study, the risk factors of postoperative are same with literature, including prolonged endotracheal cuff inflation time, and neck hyperextension position. However, in our study, 1 patient did not recover from bilateral vocal cord palsy. This patient is a case of hypopharyngeal cancer received concurrent chemoradiation therapy. Previous radiation exposure may cause hypovascularity around laryngeal area. Prolong intubation in this case (144 hours) may exacerbated neurapraxia situation. Thus persistent vocal cord palsy developed.

CONCLUSIONS

The incidence of intubation-related vocal palsy in Otolaryngology department is 0.2% considering higher than literature reported. Risk factors are same as literature, including prolonged endotracheal cuff inflation time, and neck hyperextension position.

We need to ensure cuff is below cricoid cartilage, check intra-cuff pressure is minimum required to prevent a gas leak and avoiding excessive ETT movement to prevent the complication occurred.

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