

## Airway in Thyroid Surgery: To Foresee than to be Ignored

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### Introduction

The slow growing nature of thyroid enlargement has made the airway symptoms rarely become the presenting complaints. On the other perspective, acute stridor following extubation after a thyroidectomy is not an uncommon phenomenon. It can ignite an emergency situation which necessitate urgent airway secure failing to do so may lead to fatal outcome. The sufficient re-establishment of the airway may be achieved either by a re-intubation or an emergency tracheostomy. However this condition may be avoided if the possible compromised airway post extubation is foreseen. This is particularly important because emergency procedures will increase morbidity and mortality.

### Tumour Factors

The thyroid tumor volume itself is known to affect the diameter of the airway. This is particularly true when the mass slowly grows in all directions making the trachea as well as the esophagus are encased within the mass<sup>1</sup>. The information however can be readily gathered from the preoperative imaging. In such scenario a suitable surgical approach can be predetermined before taking the patient under anesthesia. Modifications to the conventional techniques may be applied as to attain a complete removal of the lesion [1,2]. Fortunately mega goiters rarely present with airway symptoms.

On the contrary, a small or clinically invisible neck mass malignant thyroid lesions are reported to present with airway symptom [3,4]. Though not presenting as an acute episode of stridor following surgery, tumour factors especially in cases of intraluminal involvement of a malignant lesion of thyroid tend to compromise the airway. From the pre-operative imaging, tumor extension into the airway can be visualized and managed accordingly.

Recurrence of the lesion years after the initial thyroidectomy is more difficult to be tackled. This is attributed to the scarred surgical field, difficulty to identify laryngeal nerves if a revision surgery is planned, or complications to the skin and soft tissues following radio-iodine ablation or external beam radiotherapy [4]. Altered anatomy may make the airway intervention namely reintubation or tracheostomy more challenging.

### Tracheomalacia

Tracheomalacia is defined as diffuse or segmental flaccidity of the tracheal cartilage causing tracheal collapse during expiration. In thyroid setting it is owing to the chronic compression. Gradual compression by an increasing size goiter to the airway particularly at the thoracic inlet is a common indication for surgery. However the possible of potential tracheomalacic airway is commonly forgotten.

Tracheomalacia in adult is extremely rare. That is being the reason of the condition not recognized or documented [5]. In general, this condition can occur following infection, trauma including surgery to the upper aero-digestive tract or chronic airway disease. In a long standing mega goiter, compression to the trachea may induce the condition. However, tracheomalacia following thyroidectomy though is known but rare to occur [6].

### Iatrogenic Recurrent Laryngeal Nerve Injury

Direct injury during operation may occur. One percent of the operated cases had a lesion recognized during surgery [7]. The different outcome of nerve injury was not statistically significant between subtotal and total thyroidectomy [8]. However it is highly associated with surgery for cancerous lesion and in the secondary or completion thyroidectomy [7]. The non-recurrent laryngeal nerve and other variants of course may increase the likelihood of injury. Unilateral vocal cord injury may affect mainly the voice whereas bilateral damage may lead to compromised airway presenting as stridor.

Not uncommonly, the nerve also sometimes must be severed due to encroachment by the tumour or it was made unidentifiable by the encasing mass from the thyroid lesion. On the contrary, the involved nerve in differentiated thyroid cancer can be preserved without affecting local recurrence and prognosis [9]. The residual minimal volume is to be taken care by the post operative radio-iodine ablation. It was reported that the invasion of the tumour to the nerve can occur in as high as 19 percent of the total thyroid cancer cases operated [10].

These situations bring to the importance of the preoperative laryngoscopy prior to thyroid surgery, as undiagnosed unilateral vocal cord palsy case may convert into a bilateral vocal cord palsy post thyroidectomy. Bilateral permanent vocal cord palsy will create a greater problem as it will bring clinicians and patients to an unwanted and uncomfortable decision between airway and voice. So preoperative diagnosis will provide the important information of airway status and the surgeon can be more caution to identify and decide to spare the only functioning recurrent laryngeal nerve.

### Bilateral Abductor Palsy

Whilst iatrogenic unilateral recurrent laryngeal nerve injury is often reported, bilateral lesion is relatively very uncommon. Similarly, bilateral injury usually results from reoperation or operation on malignant tumours [11]. The commonest clinical manifestation is stridor, particularly during inspiratory phase. The inspiratory stridor is a result of the adducted position of both paralyzed cords, which fails to abduct during quiet and forced inspiration. The degree of the stridor depends on the position of the paralyzed cords and the patient's cardiopulmonary reserve [12]. In cases when suffocation presents

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only on exertion, the 'watch and wait' policy is often preferable to tracheostomy [12].

## Options of Treatment

In general, majority of patients will improve with conservative management. It includes humidified air, chest physiotherapy, cautious feeding to prevent aspiration, control of secretions and infection with antibiotics [5]. Re-intubation is needed for patient who is unable to maintain good oxygen saturation and tracheostomy is reserved for a prolonged case of intubation or failed intubation cases.

Some authors do advocate a planned tracheostomy especially in the presence of identified risk factors of respiratory complications. They include goiter for more than five years, preoperative recurrent laryngeal nerve palsy, significant tracheal narrowing and/or deviation, retrosternal extension, difficult tracheal intubation and thyroid cancer. In the presence of four out of six risk factors 80% of patients underwent tracheostomy [13].

In bilateral vocal cords abductor palsy, tracheostomy is reserved for condition with severe airway compromise. About 50% of the paralysis is transient [11]. The vocal cords function is expected to recover within 6 to 12 months [12]. During this period the patient needs a tracheostomy for breathing as well as protection from aspiration in some cases. This is because that the intraoperative damage commonly results in reversible neuropraxic injury rather than complete transection of the recurrent nerve [12]. However one has to be cautious with tracheostomy procedure if it is done during or immediately after thyroidectomy. The most significant side effects are intraoperative and postoperative hemorrhage, risk of wound infection and the complication of tracheomalacia and tracheal stenosis due to scarring [12].

The role of speech therapy is commonly described in unilateral vocal cord palsy for the improvement of the voice quality, whereas in bilateral vocal cord palsy the patient's voice is good but unfortunately with a compromised airway. Speech therapy may provide some help in these patients with bilateral abductor palsy but it is rarely definitive [14].

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