

## Difficult airway after late postoperative bleeding in a case of total thyroidectomy, tracheal resection and reconstruction

Sir,

Difficulty in managing the airway is the most important cause of major anesthesia-related morbidity and mortality.<sup>[1]</sup> Surgery of the upper airway requires diagnostic or therapeutic manipulation of the respiratory tree despite ongoing ventilation.<sup>[2]</sup> Airway lesions offer the greatest challenge to anesthesiologist and surgeon, as maintaining the airway while surgery is performed on it needs special techniques. About 6% of patients with thyroid cancer present with life-threatening tumor invasion of the trachea.<sup>[3]</sup> Intratracheal tumors are challenging to manage because it may be difficult to establish a patent airway. We present the management of one such case needing re-exploration due to massive extra-tracheal bleeding resulting from a rent in the carotid artery, which added to the woes. An informed written consent of the patient was taken to publish this case report.

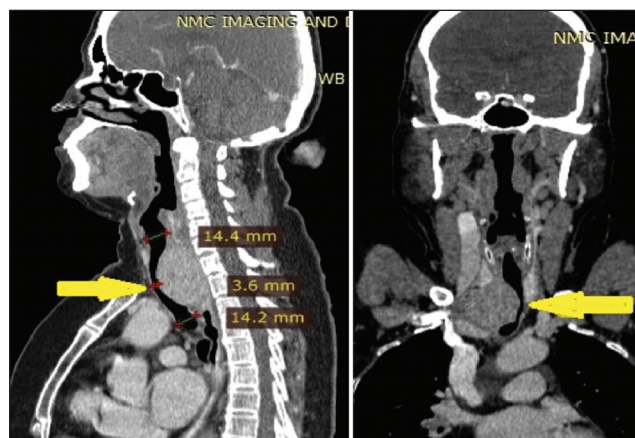
An 80 kg 55-year-old lady presented with cough of a years' duration and swelling in the neck of 2 months duration. She elicited a history of 5-6 episodes of hemoptysis in the last 3 months. The patient developed difficulty in breathing and dysphagia to solids and liquids about 1.5 months back. There was no history of audible stridor, change in speech, hematemesis or loss of weight. The difficulty in breathing was not related to the position, and she was comfortable supine and while sleeping. She was a regular Hookah smoker (tobacco smoke passed through a water basin before inhalation). The patient was a known case of hypertension and chronic obstructive lung disease.

Examination of the neck revealed a firm-to-hard swelling over the right side of the neck, which moved with deglutition. On palpation, swelling was restricted to the neck and had no thoracic extension. There were no signs of retrosternal extension, tracheal compression, thyroid dysfunction or respiratory distress. The basic clinical parameters were within normal limits. Clinical examination was unremarkable except for crackles heard bilaterally over chest on auscultation. Routine investigations were within normal limits. X-ray chest revealed an ill-defined consolidation lung patch in right lower zone, suggestive of a tubercular origin. Pulmonary function test showed a fixed truncated flow-volume loop indicative of extrathoracic obstruction.

Contrast-enhanced computed tomography (CT) scan neck revealed a right-sided thyroid mass compressing and infiltrating trachea posteriorly. The lesion extended from C4 to D2 level with the maximum compression and infiltration at the C7 level, with tracheal diameter was reduced to 3.6 mm at C7 level (14.4 mm of normal trachea above) [Figure 1]. Fine needle aspiration cytology sampling revealed a papillary carcinoma of the thyroid. A total thyroidectomy with tumor resection, tracheal resection and reconstruction was planned.

A general anesthesia technique with airway management by awake fiber-optic bronchoscope (FOB) assisted tracheal intubation was planned. A written informed consent was taken. Glycopyrrolate 0.2 mg was administered intramuscular 30 min before the procedure. The airway was anesthetized by nebulization of 4% lignocaine (4 ml). 10% lignocaine was sprayed over posterior pharyngeal wall. Dexmedetomidine 0.2-0.3 mcg/kg/h intravenous (IV) infusion was administered, without a loading dose for procedural sedation. FOB was passed nasally. The tumor infiltration was visible through the FOB over posterior wall of the trachea. The FOB was gently guided beyond the infiltration and thereafter a 6.5 mm ID reinforced endotracheal tube (ETT) successfully rail-roaded into trachea over the FOB ensuring no damage to tissue infiltration, and its cuff was inflated beyond the site of infiltration. Air entry was bilaterally equal. The ETT insertion depth was 28 cm at the level of the nares. General anesthesia was induced by administration of 150 mcg fentanyl and 200 mg propofol IV. Anesthesia was maintained with fentanyl, desflurane in a mixture of air/oxygen and vecuronium. Standard monitoring was supplemented with arterial blood pressure (BP) monitoring and left subclavian venous cannulation.

A standard transverse cervical incision about 2 cm above the suprasternal notch was used to approach the tumor. The



**Figure 1:** Contrast enhanced computerized tomography scan, sagittal and coronal views showing tracheal narrowing at C4-D2 levels, with maximum narrowing at the level of C7

tumor was resected along with the postero-lateral tracheal wall. At the time of tracheal resection, the ETT cuff was deflated and withdrawn about 5-6 cm under surgical vision. Posterior tracheal wall was repaired without pull down. Fresh gas flow was increased to cater for leak and deliver 100% oxygen by apnea technique during the repair. After the tracheal repair, ETT suction done and ETT was repositioned back to its original depth, its cuff re-inflated and re-fixed at 28 cm. There was no seepage of blood or tumor tissue distally into the tracheobronchial tree while resecting the tumor.

Intraoperative vitals were stable. A suction drain placed at the operative site. Laryngeal drop (mobilization of trachea to permit a tension free anastomosis of the superior and inferior cut margins) coupled with suture fixation of larynx to sterno-clavicular ligament was carried out to relieve the tension on the tracheal suture-line. In addition, two sutures were applied from the chin to the skin over the manubrium sterni to fix the neck in a flexed position. Neuromuscular (NM) blockade was reversed, but the ETT left *in situ*. Morphine 6 mg IV was administered on completion of surgery for pain relief and sedation to tolerate ETT. Oxygen supplementation was done using a T-piece attachment, and the patient was shifted to Intensive Care Unit (ICU) with instructions not to extend the neck and maintain ETT *in situ* for 48 h.

Tracheal extubation was done over tube exchanger on the 2<sup>nd</sup> postoperative day with all measures for emergency re-intubation ready. It was uneventful with no airway obstruction, surgical emphysema or desaturation. The surgical site drain was removed on the 3<sup>rd</sup> postoperative day. Postoperative check CT scan neck displayed no remaining tumor tissue or collection. The patient developed carpo-pedal spasm on 4<sup>th</sup> postoperative day, which was relieved by administration of calcium gluconate IV.

On 7<sup>th</sup> postoperative day, patient had a bout of hemoptysis and coughed out 1-1.2 L of blood and clots. Emergent FOB revealed a raised mucosal flap with mild active bleeding. Adrenaline was injected locally which stopped the bleeding. The wound was healthy, with no evidence of local infection or swelling in the cervical region. It was decided to wait and watch as the patient was hemodynamically stable, and etiology of the bleed was not established. About 4 h later, patient had another bout of hemoptysis (500-600 ml of fresh blood) and vitals indicated hypovolemia (heart rate [HR] 120 bpm, BP 90/60 mmHg, oxygen saturation [SpO<sub>2</sub>] 92%). The patient was shifted for an emergent neck re-exploration.

Awake FOB assisted tracheal intubation was planned. The chin stitch removed and the patient kept in sitting a position with the table tilted Trendelenburg to avoid traction on the suture line and possible loss of airway. FOB revealed gross airway

edema and massive airway bleed was encountered on entering the trachea. The airway was secured with a 7.5 mm ID plain ETT and its cuff inflated. Thorough FOB assisted tracheo-bronchial suction and clot evacuation done, which lasted for almost 1 h. During this period, intermittent ventilation with 100% oxygen was done. Vitals recorded during this period were HR 100-130 bpm, BP 90-100/50-70 mmHg and SpO<sub>2</sub> 60-92%. General anesthesia was maintained with isoflurane in air/oxygen, fentanyl, and atracurium. Fluid resuscitation with warm crystalloids and two units of packed red blood concentrate was done. Additional access in the form of a femoral arterial line and a femoral venous line were taken for monitoring and rapid infusion if required. Neck re-exploration revealed a rent on postero-medial aspect of the right common carotid artery near its origin. There was a small gap in the tracheal suture line. The bleeding from the common carotid artery was controlled by digital pressure. As the access to the vessel was poor by cervical approach, a midline sternotomy, with the help of the cardiac surgery team, was done, and the vessel successfully repaired. The patient remained hemodynamically stable during the surgery and SpO<sub>2</sub> was maintained 92-100% on a FiO<sub>2</sub> of 0.5. Trachea was not extubated postoperatively, although the patient was breathing spontaneously on reversal of NM blockade. Oxygen supplementation was done using a T-piece attachment. The trachea was extubated on 2<sup>nd</sup> postoperative day with no airway difficulty or compromise in the ICU. She was transferred to ward on 5<sup>th</sup> postoperative day and discharged to home on 7<sup>th</sup> postoperative day.

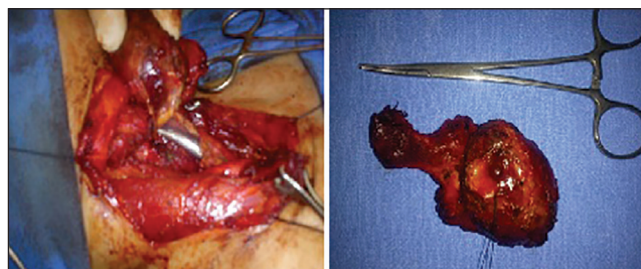
Primary and secondary tumors of the trachea are relatively uncommon and present a therapeutic challenge. Secondary neoplasms result from local tracheal invasion by thyroid, laryngeal, esophageal, or bronchogenic carcinomas. Complete resection with primary tracheal re-anastomosis is a therapeutic modality of choice.<sup>[4]</sup> There are limited reports of surgical treatment of tracheal infiltration by thyroid carcinoma.<sup>[5]</sup> Meticulous planning and communication between the anesthesia and surgical teams are mandatory for safe and successful outcome of surgery for patients undergoing this procedure.<sup>[6]</sup>

In the case reported, the tumor was insinuating between trachea and esophagus and compressing and infiltrating the posterior part of the trachea. Preoperative CT scan of the neck showed near-complete occlusion of the trachea by tumor at C7 level. Tracheal intubation could have been performed after standard induction of anesthesia and NM blockade as the patient had no history of respiratory distress on lying supine, and the tumor was not compressing the trachea anteriorly. FOB assisted nasal intubation, with a smaller sized reinforced ETT, was however planned to avoid injury to infiltrated tumor tissue, which could result in hemorrhage in the airway. We successfully intubated the trachea and guided the ETT beyond the infiltration site without injury. A reinforced ETT was also passed to prevent ETT collapse due to pressure of the tumor tissue. The ETT was intubated deep to

ensure that the cuff was beyond the infiltration site. During tracheal resection and repair, ETT was withdrawn above the tracheotomy level. The thyroid tumor and posterior tracheal wall were resected [Figure 2] and primary closure of the tracheal wall done. ETT was left *in situ* and neck kept flexed to act as a stent across the suture line and to prevent tension on the tracheal anastomosis. Tracheal extubation was done over a tube exchanger to facilitate re-intubation in case of inability to maintain airway.

Unfortunately, our patient bled from a carotid artery injury after 7 days. The rent in the common carotid probably resulted from weakening of the vessel wall by the sharp edge of the suction drain, the surgeon had fashioned. Severe neck flexion maintained postoperatively possibly pushed the drain tip into the superior mediastinum and against the origin of the common carotid, weakening its postero-medial wall. The clinical presentation of hemoptysis was unusual. The hemorrhage vented out through the tracheal suture line and thus there was no local collection in the neck. As there was no local evidence of a bleed and because the patient had a history of episodes of hemoptysis, the hemoptysis was initially thought to result from the tracheal mucosal flap or the lung parenchymal lesion present. Hemoptysis reported preoperatively too was possibly from the tracheal infiltration, as such infiltrations are known to present as hemoptysis by ulceration of the tumor either by cough or the vascularity of a tumor itself.<sup>[5,7]</sup>

There is no report, in contemporary literature, of a postoperative bleed from the common carotid artery after thyroid resection and tracheal reconstruction, when no surgical dissection around the carotid trunk was done. Postoperative innominate artery hemorrhage after tracheal surgery has been reported, but the reports involved an extensive neck dissection, including around the arterial brachiocephalic trunk and in these the tracheal anastomoses were not protected by covering tissue.<sup>[8,9]</sup> The patient was taken up for the re-exploration as an emergency with FOB guided tracheal intubation. Patient had gross airway edema and needed urgent FOB assisted tracheal intubation, for which expert help of a pulmonary physician was also called for. Torrential bleed immediately on passing the ETT soiled the lungs. Repeated suctioning of the bronchial tree was needed, and a major desaturation encountered.



**Figure 2:** The 10 cm × 4 cm × 3 cm size tumor and the tracheal wall being resected en-bloc. The endotracheal tube is seen in the tracheal lumen

Postoperative airway compromise, resulting from paratracheal hematoma, poses a challenge for the Anesthesiologist. A rapidly expanding hematoma in close proximity to the airway needs to be diagnosed early and treated before airway obstruction occurs due to compression or by the onset of occlusive laryngo-pharyngeal edema. Immediate surgical re-exploration is indicated, and airway management should be addressed with caution.<sup>[1]</sup> Preparation to secure the airway is a priority, and multispecialty assistance should be mobilized.<sup>[10]</sup> The surgical team should be ready with a tracheostomy tray. The clinical presentation is challenging given the rapid onset of airway compromise, limited time to act and distortion of upper respiratory tract and ventral neck anatomy, especially if associated with a hematoma. We were better off in this case as there was no hematoma, although airway edema was present.

The aim of the presentation is to inform about a new and unusual complication in a surgery involving the airway region and how it was managed. We had a successful outcome of a well-planned surgery though we unfortunately encountered a major complication with a compromise of the airway. The success can also be attributed to the planning, cooperation and support of other teams.

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## References

- Hagberg C, Georgi R, Krier C. Complications of managing the airway. *Best Pract Res Clin Anaesthesiol* 2005;19:641-59.
- McRae K. Anesthesia for airway surgery. *Anesthesiol Clin North Am* 2001;19:497-541, vi.
- Filipovic A, Vuckovic L, Mijovic M. Invasive follicular thyroid carcinoma infiltrating trachea. *Vojnosanit Pregl* 2011;68:891-4.
- Compeau CG, Keshavjee S. Management of tracheal neoplasms. *Oncologist* 1996;1:347-53.
- Ishihara T, Kikuchi K, Ikeda T, Inoue H, Fukai S, Ito K, *et al*. Resection of thyroid carcinoma infiltrating the trachea. *Thorax* 1978;33:378-86.
- Pinsonneault C, Fortier J, Donati F. Tracheal resection and reconstruction. *Can J Anaesth* 1999;46:439-55.
- Mohamad I, Haron A. Papillary thyroid carcinoma presenting with intraluminal tracheal mass symptoms. *Med J Malaysia* 2013;68:164-5.
- Cordos I, Bolca C, Paleru C, Posea R, Stoica R. Sixty tracheal resections — single center experience. *Interact Cardiovasc Thorac Surg* 2009;8:62-5.
- Grillo HC. Reconstruction of the trachea. Experience in 100 consecutive cases. *Thorax* 1973;28:667-79.

10. Palumbo MA, Aidlen JP, Daniels AH, Thakur NA, Caiati J. Airway compromise due to wound hematoma following anterior cervical spine surgery. *Open Orthop J* 2012;6:108-13.

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