



ANAESTHETIC MANAGEMENT OF PAPILLARY THYROID CARCINOMA WITH UPPER TRACHEAL INVASION UNDERGOING TRACHEAL RESECTION AND RECONSTRUCTION: A CASE REPORT

Anaesthesiology

Dr. Praneshwori Sinam*

Assistant Professor, Department of Anaesthesiology & Critical care, NEIGRIHMS, Shillong.*Corresponding Author

Dr. Laltanpuii Sailo

Assistant Professor, Department of Anaesthesiology & Critical care, NEIGRIHMS, Shillong.

ABSTRACT

Tracheal invasion by thyroid carcinoma is uncommon but presents significant challenges in airway management during surgical resection. Securing and maintaining the airway during tracheal resection and reconstruction requires meticulous preoperative assessment and coordinated multidisciplinary planning. We report the anaesthetic consideration of a 71 years old patient with papillary thyroid carcinoma involving the upper tracheal segment. Airway evaluation demonstrated tumour infiltration of the second and third tracheal rings with intraluminal extension. Awake-assisted nasal intubation under video laryngoscopic guidance was performed, followed by distal tracheal intubation to facilitate surgical resection and reconstruction. Intermittent apnoeic ventilation was used during tracheal anastomosis. The patient remained haemodynamically stable intraoperatively and was electively ventilated postoperatively before successful extubation after a leak test. This case highlights the necessity of a comprehensive airway assessment, proper planning of airway strategies, and close collaboration between anaesthesiologists and surgeons in the management of thyroid carcinoma with tracheal invasion.

KEYWORDS

Thyroid Carcinoma, Tracheal Involvement, Airway Management, Tracheal Resection.

Introduction

Primary tracheal tumours are rare, accounting for approximately 0.2% of all respiratory tract tumours[1,7]. Secondary involvement of the trachea most frequently occurs due to locally advanced thyroid malignancies. Resection of the involved trachea with reconstruction remains the preferred surgical treatment for thyroid carcinoma with tracheal involvement.

Anaesthetic management in such patient is particularly challenging because the airway may be distorted or partially obstructed by tumour infiltration. Furthermore, airway instrumentation may provoke bleeding or tumour disruption. Therefore, successful management requires detailed preoperative airway evaluation, appropriate imaging, and multidisciplinary coordination between anaesthesiologists, surgeons, and intensivists. This is a case of papillary thyroid carcinoma involving the upper tracheal segment and the perioperative anaesthetic strategy used to safely manage the airway during tracheal resection and reconstruction.

Case Presentation

A 71-year-old male weighing 64 kg presented with a gradually increasing midline neck swelling of 20 years' duration. During the preceding five months, he developed progressive dysphagia, hoarseness of voice, and dyspnoea. The patient had a history of type 2 diabetes mellitus, controlled and no other significant comorbidities. Routine laboratory investigations and thyroid profiles were within normal limits. On physical examination, a firm nodular swelling measuring approximately 4 × 3 cm was noted over the anterior neck. The swelling moved with deglutition, and its inferior margin could not be palpated. Airway assessment revealed: Mallampati grade III and Limited neck flexion with normal extension. Videolaryngoscopy demonstrated a fixed left vocal cord with a mobile right vocal cord. Fiberoptic bronchoscopy revealed tumour infiltration involving the anterior and left lateral walls of the trachea at the level of the second and third tracheal rings, located below the vocal cords. CT Scan of the neck and chest demonstrated a heterogeneously enhancing lesion involving the left thyroid lobe and extension into the left lateral tracheal wall with intraluminal protrusion (Figure:1). Considering the anticipated difficult airway, a detailed airway management strategy was formulated in consultation with the surgical team. A difficult airway cart, rigid bronchoscope, and emergency tracheostomy equipment were kept readily available.

The patient was kept nil per oral and high-risk informed consent was obtained. 2 drops of 0.2% oxy-xylometazoline were put into each nostril to facilitate nasal intubation. Nebulization was done with 2 mL of 4% lignocaine, and glycopyrrolate 0.2 mg intravenously was administered to reduce airway secretions. Once the patient wheeled inside the operation theatre, standard ASA monitoring was instituted,

including: electrocardiography(ECG), non-invasive blood pressure monitoring(NIBP) and pulse oximetry(SPO2). Mild sedation achieved using midazolam 2 mg and fentanyl 80 µg intravenously. The oropharynx was anesthetized with 10% lignocaine spray.

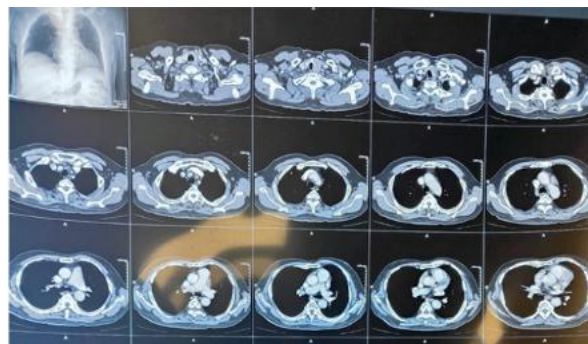


Figure 1: CT neck axial view showing infiltration of the tracheal wall.

Under videolaryngoscopic guidance, nasotracheal intubation was successfully performed through the right nostril using a 6.5-mm flexometallic tube. Tube position was confirmed by capnography and bilateral chest auscultation. Following airway stabilization, rocuronium 50 mg was administered for neuromuscular blockade. Maintenance of anaesthesia was done with oxygen:nitrous oxide (50%:50%) and sevoflurane (1–3%), with intermittent rocuronium supplementation as required. Invasive arterial blood pressure monitoring was established, and two 16-G intravenous cannula were inserted. A fiberoptic bronchoscope was then advanced beyond the tumour-involved segment into the normal distal part of trachea, and the reinforced tube was passed into the distal trachea under bronchoscopic guidance.

During tracheal resection, the surgeon inserted a sterile 6.5-mm flexometallic tube through the tracheostomy site into the distal trachea, and ventilation was confirmed by capnography(Figure 2). Distal tracheal ventilation with intermittent positive pressure ventilation with tidal volume = 400 ml, FiO₂ = 50, PEEP = 5 cm of H₂O and respiratory rate = 12/min was initiated. ABG findings after distal tracheal ventilation were pH- 7.335, pO₂- 109, pCO₂-32.2, HCO₃-18.1. To facilitate tracheal anastomosis, an intermittent apnoeic technique was employed. The surgical procedure involved removal of the left thyroid lobe along with the left lateral and posterior walls of the second and third tracheal rings. The left recurrent laryngeal nerve was also removed because of tumour encasement, while the right recurrent laryngeal nerve was preserved. The patient was haemodynamically

stable throughout the intraoperative period. Following tracheal reconstruction, the proximal nasotracheal tube was advanced beyond the anastomotic site and ventilation was resumed.



Figure 2: Sterile Flexometallic tube inserted into the Tracheostomy site.

The neck was maintained in flexion using a chin-to-chest stitch to reduce tension on the anastomosis. Neuromuscular blockade was fully reversed, but the patient remained intubated for 24 hours as a precaution against airway oedema and tracheomalacia. Dexamethasone 8 mg intravenously was administered to reduce airway oedema. The patient was mechanically ventilated with sedation for 24 hours and subsequently extubated after a cuff leak test under videolaryngoscopic guidance.

DISCUSSION

Tracheal invasion is a recognized but relatively uncommon complication of advanced thyroid malignancy. Among thyroid cancers, anaplastic carcinoma most frequently invades the trachea, whereas differentiated papillary carcinoma typically demonstrates a less aggressive pattern of local invasion. Surgical resection with tracheal reconstruction remains the preferred treatment in patients with localized tracheal involvement, as it reduces tumour burden and improves long-term disease control [1]. However, such procedures pose substantial anaesthetic challenges because the airway may be partially obstructed, anatomically distorted, or prone to bleeding during instrumentation.

Careful preoperative airway assessment is therefore essential. Imaging modalities such as computed tomography provide valuable information regarding tracheal narrowing, the extent of tumour infiltration, and involvement of adjacent structures. Fiberoptic bronchoscopy further allows direct visualization of the airway lumen and helps determine the degree of obstruction and the feasibility of distal intubation [2,5]. The anaesthetic management of tracheal resection typically involves several critical stages:

1. Induction and airway control
2. Tumour dissection
3. Open airway phase during tracheal resection
4. Airway reconstruction
5. Emergence and extubation

Among these stages, induction and the open airway phase are particularly high-risk periods, as ventilation may be compromised while the airway is shared with the surgical team [5]. Awake or minimally sedated intubation techniques are frequently preferred in patients with compromised airways because they preserve spontaneous ventilation and reduce the risk of airway collapse [1]. However, excessive airway manipulation during awake procedures may lead to coughing, bleeding, or haemodynamic instability. In the present case, a combined topical airway anaesthesia and mild sedation approach was adopted to facilitate smooth nasotracheal intubation while maintaining airway reflexes [13]. Nebulized lignocaine, topical lignocaine spray, and nasal vasoconstriction with xylometazoline were used to improve patient comfort and intubation conditions. Transtracheal block was avoided because of the risk of bleeding from the tumour. During resection of trachea, distal tracheal intubation was done and intermittent positive pressure ventilation allowed adequate oxygenation while providing the surgeon with optimal exposure for tumour resection. The intermittent apnoeic technique during tracheal anastomosis minimized interference with the surgical field and facilitated precise reconstruction [2,3,5].

The postoperative period represents another critical stage, as airway oedema, recurrent laryngeal nerve injury, haemorrhage, and tracheomalacia may result in respiratory compromise [17]. Risk factors for postoperative tracheomalacia include: [18]

- long-standing goitre with retrosternal extension
- tracheal deviation or narrowing
- preoperative recurrent laryngeal nerve involvement
- difficult intubation, malignancy of thyroid gland

Reported incidence of tracheomalacia following thyroidectomy varies from 0% to 5.3%, with some studies reporting rates up to 10% in patients with large goitres [11,19,20]. For this reason, several authors recommend delayed extubation for up to 24–36 hours in high-risk patients [8]. In our patient, elective postoperative ventilation allowed time for airway oedema to resolve and enabled safe extubation after confirmation of adequate airway patency using a leak test [10,16]. This case highlights the importance of individualized airway strategies and close intraoperative coordination between anaesthesia and surgical teams when managing tracheal invasion by thyroid carcinoma.

CONCLUSIONS

Tracheal resection and reconstruction for thyroid carcinoma with tracheal invasion present significant anaesthetic challenges. The airway remains vulnerable during induction, surgical resection, reconstruction, and emergence from anaesthesia. Thorough preoperative evaluation, careful airway planning, and multidisciplinary collaboration are essential to ensure safe perioperative management. Distal tracheal intubation combined with intermittent positive pressure ventilation provides effective airway control while allowing optimal surgical access with minimal complications.

REFERENCES

1. Ding Y, Gu L, Wang L, Xing L, Zhou Y, Jiang Y. Anaesthetic management of thyroid carcinoma invading the upper tracheal segment: a case report. *Int J Surg Case Rep*. 2024;117:1–8.
2. Ranganath N, Arathi BHR, Ramamani PV, Gourda VB. Anaesthetic considerations for tracheal resection in oncological thyroid surgeries. *Indian J Anaesth*. 2015;59(3):188–190.
3. Pinsonneault C, Fortier J, Donati F. Tracheal resection and reconstruction. *Can J Anaesth*. 1999;46:439–455.
4. Hobai IA, Chhangani SV, Alfille PH. Anaesthesia for tracheal resection and reconstruction. *Anesthesiol Clin*. 2012;30:709–730.
5. Sandberg W. Anaesthesia and airway management for tracheal resection and reconstruction. *Thorac Anesth*. 2000;38:55–75.
6. Morgan GE, Mikhail MS, Murray MJ. Anaesthesia for thoracic surgery. In: Morgan GE, Mikhail MS, Murray MJ, editors. *Clinical Anesthesiology*. 4th ed. New York: McGraw Hill; 2008.
7. Catherine L. Benign central airway obstruction. *Semin Respir Crit Care Med*. 2018;39(6):731–746.
8. Shaikh SI, Atlapure BB. Airway challenges in thyroid surgery. *Karnataka Anaesth J*. 2015;28–30.
9. Rajan H, Jacob A. Anaesthetic management of retrosternal thyroid: a case report. *Kerala Med J*. 2024;17(1):49–51. doi:10.52314/kmj.2024.v17i1.633
10. Paulo L, Silva EM, Rego S, Lima MH, Carreria C, Costa G. Positive cuff leak test in a patient with post-extubation stridor after total thyroidectomy: how to deal with it? *Rev Soc Port Anesthesiol*. 2018;27(4):108–111.
11. Kaur H, Kataria AP, Muthuramalingapandian M, Kaur H. Airway considerations in a case of large multinodular goiter. *Anaesth Essays Res*. 2017;11(4):1097–1100.
12. Bhiwal AK, Patidar NC, Desai SH, Mandot P. Anaesthetic challenges for total thyroidectomy in a patient with a large thyroid mass with retrosternal extension: a case report. *Dev Anaesth Pain Manag*. 2023;2(4):DAPM.000542. doi:10.31031/DAPM.2023.02.000542
13. Patil VH, Huddar KS, Barsagade WS, Rao AU. Airway management of huge thyroid swelling with tracheal deviation: challenges faced. *Indian J Clin Anaesth*. 2022;9(4):514–517.
14. Shamim F, Yahya M, Ikram M. Awake fiberoptic intubation in a patient with known difficult airway due to huge thyroid goiter. *Anaesth Pain Intensive Care*. 2017;21(1):94–97.
15. Pani N, Rath SK. Regional and topical anaesthesia of the upper airways. *Indian J Anaesth*. 2009;53(6):641–648.
16. Srivastava D, Dhiraaj S. Airway management of a difficult airway due to prolonged enlarged goitre using loco-sedative technique. *Saudi J Anaesth*. 2013;7(1):86–89. doi:10.4103/1658-354X.109829
17. Valizadeh N, Mohammadi P, Mahmodlou R, Seyed Mokhtari SA, Ramezani G. Tracheomalacia after thyroidectomy: does it truly exist? *Niger J Surg*. 2020;26(1):59–62. doi:10.4103/njs.NJS_31_19
18. Wong P, Liew GH, Kothandan H. Anaesthesia for goitre surgery: a review. *Proc Singapore Healthc*. 2015;24:165–170.
19. Findlay JM, Sadler GP, Bridge H, Mihai R. Post-thyroidectomy tracheomalacia: minimal risk despite significant tracheal compression. *Br J Anaesth*. 2011;106:903–906.
20. Ayandipo O, Adigun T, Afuwape O. Airway complications and outcome after thyroidectomy in Ibadan: a 15-year review. *Arch Med*. 2016;8:4.