

Airway invasion in papillary carcinoma of thyroid: A case report

Ramanathan Ravi, Animesh Ghosh, Namrata Chakraborty, Faisal Ahmed

From MCH Resident, Department of Head and Neck Surgery, Institute of Post Graduate Medical Education and Research, Kolkata, West Bengal, India

ABSTRACT

Papillary thyroid carcinoma (PTC) usually follows an indolent course with an excellent prognosis; however, gross extrathyroidal extension into the airway is rare and represents locally advanced disease. Laryngotracheal invasion poses significant diagnostic and therapeutic challenges and is associated with increased morbidity and disease upstaging. We report the case of a 69-year-old male who presented with progressive dyspnea requiring an emergency tracheostomy. Endoscopic evaluation and biopsy from the subglottic region revealed PTC. Contrast-enhanced computed tomography demonstrated a thyroid mass with direct invasion into the subglottic airway. Owing to extensive laryngotracheal involvement, the patient underwent total thyroidectomy with total laryngectomy and primary tracheoesophageal puncture. Histopathology confirmed PTC with airway invasion. The patient had an uneventful post-operative course and remains disease-free on follow-up.

Key words: Airway invasion, Extrathyroidal extension, Laryngotracheal invasion, Papillary thyroid carcinoma, Total laryngectomy

Papillary thyroid carcinoma (PTC) is the most common differentiated thyroid malignancy, accounting for approximately 80–85% of all thyroid cancers, and is generally associated with excellent long-term survival [1]. Most patients present with an asymptomatic thyroid nodule or cervical lymphadenopathy, and disease confined to the thyroid gland is typically managed with favorable outcomes. However, a small subset of patients develop locally advanced disease with gross extrathyroidal extension into adjacent aerodigestive structures, including the recurrent laryngeal nerve, esophagus, trachea, and larynx. Such invasion signifies aggressive tumor behavior and is associated with increased morbidity, higher recurrence rates, and reduced disease-specific survival [2].

Laryngotracheal invasion by PTC is rare, reported in < 1% of cases, but represents one of the most challenging scenarios in thyroid oncology [3,4]. Airway involvement may range from extrinsic compression to transmural invasion with intraluminal extension, leading to symptoms such as dyspnea, stridor, hemoptysis, or acute airway compromise. Accurate pre-operative assessment and appropriate surgical planning are critical to achieve optimal oncologic and functional outcomes.

CASE REPORT

A 69-year-old male presented with progressive dyspnea that had worsened over several weeks.

On examination, the patient exhibited signs of significant airway obstruction, prompting an emergency tracheostomy for airway stabilization. Local neck examination revealed a firm, ill-defined thyroid swelling predominantly involving the left lobe, measuring approximately 4 × 3 cm, with reduced mobility. No clinically palpable cervical lymphadenopathy was noted.

Following stabilization, flexible endoscopic evaluation revealed an irregular subglottic mass causing significant luminal narrowing (Fig. 1). A biopsy obtained from the subglottic region demonstrated histopathological features consistent with PTC.

Contrast-enhanced computed tomography (CECT) of the neck showed a heterogeneously enhancing thyroid mass with direct invasion into the subglottic airway and partial luminal compromise, suggestive of true laryngotracheal invasion rather than extrinsic compression (Fig. 2). There was no radiological evidence of distant metastasis.

The patient underwent total thyroidectomy with total laryngectomy following multidisciplinary tumor board discussion. A primary tracheoesophageal puncture with

Access this article online

Received - 05 February 2026
Initial Review - 18 February 2026
Accepted - 25 February 2026

Quick Response code



DOI: 10.32677/ijcr.v12i3.8089

Correspondence to: Dr. Ramanathan Ravi, Department of Head and Neck Surgery, Institute of Post Graduate Medical Education and Research, Kolkata, West Bengal, India. E-mail: ramanathanr66162@gmail.com

© 2026 Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC-ND 4.0).

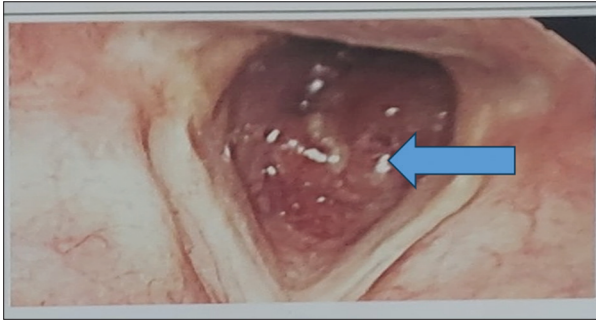


Figure 1: Flexible endoscopic image demonstrating an irregular intraluminal tumor in the subglottic region (arrow), resulting in significant airway compromise

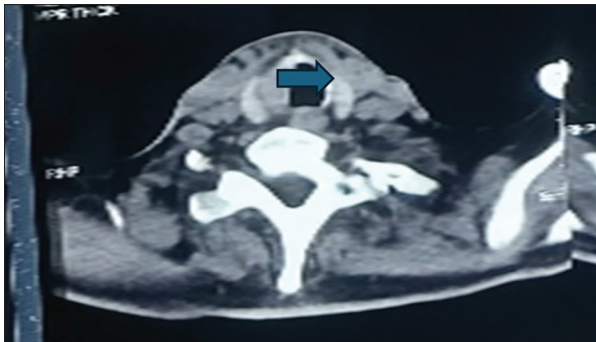


Figure 2: Contrast-enhanced computed tomography of the neck showing a heterogeneously enhancing thyroid mass with direct invasion into the subglottic airway (arrow), causing luminal narrowing

voice prosthesis insertion was performed during the same surgical sitting.

Resected specimen showing thyroid tumor extending into subglottis. (Fig. 3). Histopathology confirmed PTC with transmural airway invasion, with tumor-free margins.

The post-operative course was uneventful. The patient has been followed up for 6 months, during which he has remained disease-free with satisfactory functional outcomes. Adjuvant radioiodine therapy was planned based on final histopathology and risk stratification.

DISCUSSION

Although PTC is generally indolent, gross extrathyroidal extension into the airway represents a distinct clinical entity associated with aggressive behavior and poorer prognosis [2]. Several retrospective series and case reports have described airway invasion, most commonly involving the trachea, followed by the larynx [3-5]. Similar to previously reported cases, our patient presented with progressive dyspnea and acute airway compromise, emphasizing the importance of early recognition of airway involvement in advanced thyroid malignancy [6].

CECT plays a crucial role in differentiating true airway invasion from extrinsic compression and in assessing cartilage destruction and intraluminal extension [5,7]. Endoscopic evaluation complements imaging by allowing direct visualization and biopsy confirmation. In our case, both modalities demonstrated transmural subglottic invasion, indicating advanced disease.

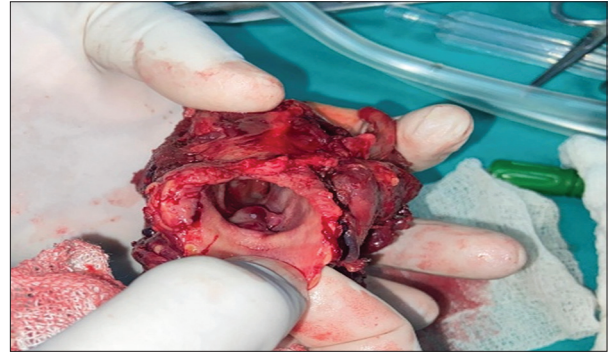


Figure 3: Resected specimen showing total thyroidectomy with laryngectomy, confirming extensive laryngotracheal involvement

According to the American Joint Committee on Cancer 8th edition staging system, gross invasion of the larynx or trachea is classified as T4a disease [7]. Depth-based classifications, such as the Shin staging system, identify full-thickness or intraluminal airway invasion as advanced disease associated with poorer outcomes if treated conservatively [8]. Similarly, McCaffrey staging categorizes extensive intralaryngeal invasion with airway compromise as Stage IV disease, often requiring radical surgical resection [9].

The primary surgical dilemma in airway-invasive PTC is between conservative airway resection and radical surgery. In the present case, extensive subglottic involvement, compromised laryngeal function, and the high risk of positive margins with limited resection favored total laryngectomy. Previous studies have demonstrated improved local control with *en bloc* resection in advanced airway invasion compared with conservative procedures [3,4]. Primary tracheoesophageal puncture allowed early voice rehabilitation with acceptable functional outcomes.

Adjuvant radioiodine therapy is recommended for high-risk PTC with gross extrathyroidal extension, while external beam radiotherapy may be considered in selected cases with unresectable disease or close margins [2,5].

CONCLUSION

PTC with airway invasion is a rare but serious manifestation of locally advanced disease. Progressive dyspnea may be the presenting symptom and warrants urgent airway management and comprehensive evaluation. Accurate radiological and endoscopic assessment is essential for surgical planning. In cases of extensive laryngotracheal invasion, aggressive surgical management can achieve effective oncologic control with acceptable functional outcomes.

REFERENCES

1. Mohtasib ME, Sharabate KM, Dweik RF, Shawar FI, Shehadeh DA. Papillary thyroid carcinoma with invasion of the trachea. *Ann Med Surg (Lond)* 2024;86:4820-4.
2. Toraih EA, Jishu JA, Hussein MH, Shaalan AA, Fawzy MS, Kandil E. Prognostic indicators and comparative treatment outcomes in high-risk thyroid cancer with laryngotracheal

- invasion. *Endocrinol Metab (Seoul)* 2025;40:201-15.
3. Inoue Y, Ebina A, Toda K, Shimbashi W, Yamada K, Mitani H, *et al.* Surgical strategy for patients with papillary thyroid carcinoma invading the trachea: A comparison of tracheal sleeve resection with end-to-end anastomosis and window resection with tracheocutaneous fistula. *Gland Surg* 2023;12:1167-78.
 4. Parida PK, Herkal K, Preetam C, Pradhan P, Samal DK, Sarkar S. Analysis of pattern of laryngotracheal invasion by papillary thyroid carcinoma and their management: Our experience. *Indian J Otolaryngol Head Neck Surg* 2022;74:1920-8.
 5. Chen J, Zhong Q, Hou L, Ma H, Shi Q, Feng L, *et al.* Preoperative voice analysis and survival outcomes in papillary thyroid cancer with recurrent laryngeal nerve invasion. *Front Endocrinol (Lausanne)* 2022;13:1041538.
 6. Zhang J, Fu C, Cui K, Ma X. Papillary thyroid carcinoma with tracheal invasion: A case report. *Medicine (Baltimore)* 2019;98:e17033.
 7. Amin MB, Edge SB, Greene FL, Gershenwald JE, Brookland RK, Meyer L, *et al.* *AJCC Cancer Staging Manual*. 8th ed. New York: Springer; 2017. p. 873-90.
 8. Shin DH, Mark EJ, Suen HC, Grillo HC. Pathologic staging of papillary carcinoma of the thyroid with airway invasion based on the anatomic manner of extension to the trachea: A clinicopathologic study based on 22 patients who underwent thyroidectomy and airway resection. *Hum Pathol* 1993;24:866-70.
 9. McCaffrey JC. Aerodigestive tract invasion by well-differentiated thyroid carcinoma: Diagnosis, management, prognosis, and biology. *Laryngoscope* 2006;116:1-11.

Funding: Nil; Conflicts of interest: Nil.

How to cite this article: Ravi R, Ghosh A, Chakraborty N, Ahmed F. Airway invasion in papillary carcinoma of thyroid: A case report. *Indian J Case Reports*. 2026; 12(3):194-196.