

# A Case of Surgical Treatment for Advanced Papillary Thyroid Cancer with Tracheal Invasion

Hamidreza Khorshidi<sup>1</sup>, Sara Alipour<sup>2</sup>, Ramin Mansouri<sup>2</sup>, Kiana Kimiaei Asadi<sup>2</sup> and Behrooz Goli<sup>3\*</sup>

<sup>1</sup>Associate Professor, Department of Surgery, Faculty of Medicine, Hamedan University of Medical Sciences, Hamedan, Iran

<sup>2</sup>student research committee, Hamedan university of medical sciences, Hamedan, Iran

<sup>3</sup>Department of Surgery, Faculty of Medicine, Hamedan University of Medical Sciences, Hamedan, Iran

## \*Corresponding Author

Behrooz Goli, Department of General Surgery, Faculty of Medicine, Hamedan University of Medical Sciences, Iran.

Submitted: 2024, Jul 05; Accepted: 2024, Aug 09; Published: 2024, Aug 12

**Citation:** Khorshidi, H., Alipour, S., Mansouri, R., Asadi, K. K., Goli, B. (2024). A Case of Surgical Treatment for Advanced Papillary Thyroid Cancer with Tracheal Invasion. *J Nur Healthcare*, 9(3), 01-05.

## Abstract

The trachea is in close to the thyroid gland and can be affected by thyroid cancer spreading beyond the gland. Tracheal invasion by invasive thyroid cancer is rare but life-threatening and important to manage. Hoarseness, hemoptysis, and respiratory distress have been reported in some patients with obvious tracheal invasion. The case we are presenting was a 69-year-old man with a papillary thyroid carcinoma (PTC) history and eight tracheal cartilages were affected by the malignancy. nevertheless, it was remarkable that in this case, seven centimeters of trachea was resected and then anastomosis was performed in intact area of trachea and the patient had no complaint. Then, anastomosis was performed in an intact area of the trachea. Surgery of PTC with tracheal invasion is challenging. Appropriate surgical management of tracheal invasion is important for the operation and prognosis. This demands a high level of proficiency and extreme care to avoid any damage to the trachea's blood vessels.

**Keywords:** Thyroid Carcinoma, Thyroid Neoplasm, Neoplasm Invasion

## 1. Introduction

The incidence of papillary thyroid carcinoma (PTC) has rapidly increased worldwide over the past 15 years. Although most PTCs are non-aggressive, but some patients may have poor outcomes due to extracapsular (EC) extension, lymph node (LN) involvement, and distant metastases [1].

The trachea is in close proximity to the thyroid gland and can be affected by thyroid cancer spreading beyond the gland. Tracheal invasion by invasive thyroid cancer is rare. Symptoms of tracheal invasion range from none to fatal, including airway obstruction and bleeding. Hoarseness, hemoptysis, and respiratory distress have been reported in some patients with obvious tracheal invasion. Surgery remains the best management for most patients with PTC. Most surgeons follow a special approach, depending on preoperative diagnostics and intraoperative assessment, by means of shaving, partial resection or transverse circumferential (sleeve) resection of the trachea [2]. Here, we report a case of PTC with tracheal invasion in a 69-year-old man with successful seven

centimeters of trachea resection followed by anastomosis in intact area of trachea.

## 2. Case Presentation

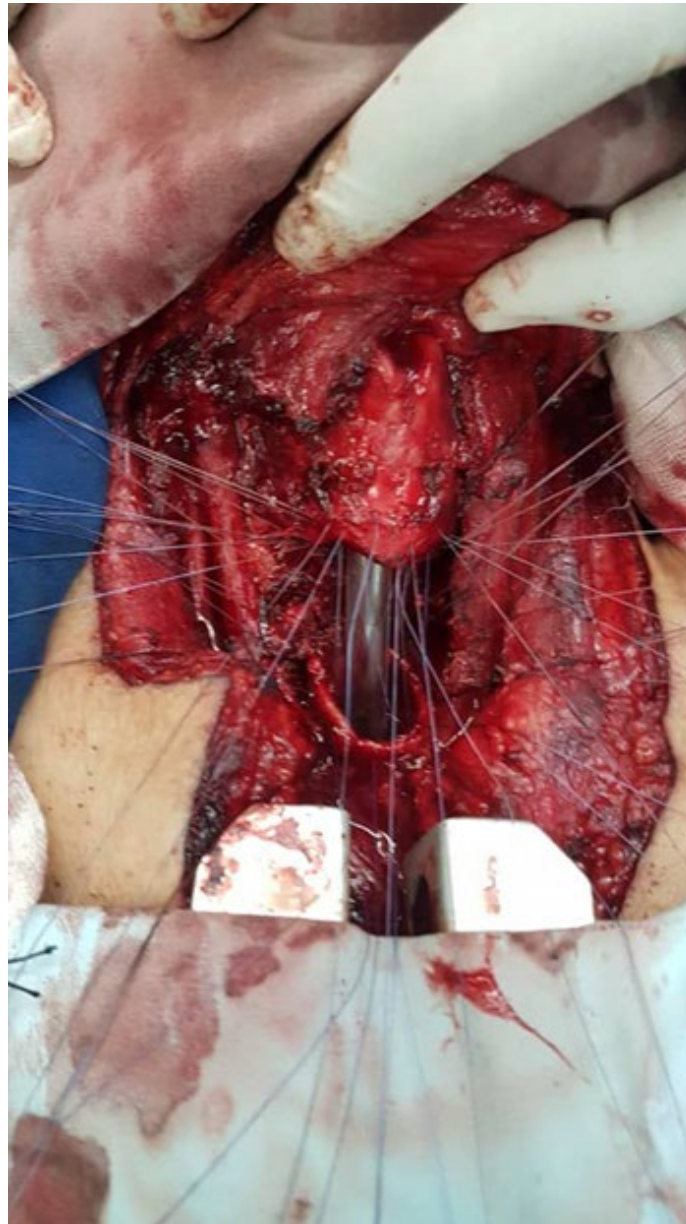
The case we are presenting was a 69-year-old man with a PTC history. He had a history of diabetes mellitus, ischemic heart disease, and benign prostate hyperplasia. His drug history included a metformin tablet, rivaroxaban tablet, tamsulosin tablet, levothyroxine tablet, and diclofenac tablet. He had a surgical history of laminectomy. He was an opium addict but not a smoker. He was first admitted to Besast Hospital, Hamadan, Iran, on August 8th, 2018, the patient referred to the hospital with hemoptysis. A bronchoscopic biopsy was taken from his tracheal mass. The pathology report indicated well-differentiated PTC. On October 9th, 2018, he underwent total thyroidectomy surgery and right cervical lymphadenectomy after a cervical V incision. Fixed thyroid cancer, along with tracheal involvement, was evident. Strep muscles were also affected by the cancer (figure1). Laryngoscopy was performed after total thyroidectomy,

and as there was no sign of larynx involvement, cervical lymph nodes of zones 2, 3, 4, 5, and 6 were excised after consultation with an otolaryngologist. He also had a mediastinal mass, which indicated metastasis; therefore, super anterior mediastinal lymphadenectomy was performed. Eight tracheal cartilages were affected by the malignancy. seven centimeters of the trachea was resected (figure 2). Then, anastomosis was performed in an intact area of the trachea. Specimens of the thyroid, trachea and LNs

were sent for pathological evaluation. Multiple lymphovascular invasion were identified. The trachea was also infiltrated by PTC. Fibroadipo-muscular tissue resected from anterior trachea was free of neoplasm. All of seven lymph nodes dissected from zone 5 were affected by metastatic tumor but one of two lymph nodes from zone 2 were affected. He was discharged from the hospital with no complications.



**Figure 1:** Papillary Thyroid Cancer Invasion to Trachea



**Figure 2:** Seven Centimeters Resection of Trachea Due to Papillary Thyroid Cancer Invasion

On November 4th, 2018, the patient underwent a rigid bronchoscopy which showed no evidence of stricture, fibrosis or granulation in their trachea. On April 28th, 2019, the patient was admitted to the hospital due to progressive hoarseness. Once again, a rigid bronchoscopy was performed and there was no sign of tracheal stenosis. On November 16th, 2022, another surgery was performed to remove a relapsed cystic thyroid mass and right lateral cervical lymph nodes due to thyroid cancer. Pathological assessment of the biopsy taken from the cyst wall and the right-side neck mass revealed papillary thyroid carcinoma extended in adipo muscular tissue. The patient was admitted to Besat Hospital in Hamadan, Iran on April 15th, 2023 with chest pain and dry coughs, which had started 10 days prior. Occasionally, the patient reported seeing some blood in his sputum. The patient also

mentioned experiencing a minor loss of appetite.

Due to his poor oxygenation status, tracheostomy insertion was planned for him. On April 18th, he went to the operating room and underwent a rigid bronchoscopy. Evident stricture was witnessed. According to the patient's condition and extensive lung metastasis, tracheostomy was impossible. Therefore, he was intubated and transmitted to the Intensive Care Unit (ICU). On April 23th, cardiopulmonary resuscitation was done due to his O<sub>2</sub> saturation deceleration and bradycardia. The operation continued for 30 minutes, but unfortunately, he passed away.

Written informed consent was obtained from the patient's relatives for the possible publication of all pictures and data. The Medical

Center Institutional Review Board (IRB) approval was obtained for this study (IR.UMSHA.REC.1403.026), and all procedures were carried out as per their guidelines.

### 3. Discussion

The incidence of thyroid cancer is rising faster than other malignancies due to widespread use of thyroid ultrasonography and needle biopsy. PTC is the most common type of malignant tumor in the head and neck area. Its incidence is increasing globally [3]. The American Thyroid Association introduced the term "very low-risk" in 2015 to describe papillary thyroid micro carcinomas (PTMCs) measuring less than 1 cm. These tumors have a good prognosis and are usually slow-growing. Lobectomy is recommended for very low-risk PTCs and total thyroidectomy is an option for larger low-risk PTCs (1-4 cm). In 2015, the recommendations were updated to suggest avoiding RAI ablation for larger low-risk PTCs. Active surveillance without surgery is a viable option for selected patients with very low-risk PTCs. According to systematic review and meta-analysis, age (<45 years), male gender, multifocality, tumor size (>1 cm), tumor location (1/3 upper), capsular invasion, and extra-thyroidal extension were significant risk factors for metastasis in PTC patients [4]. The extra-thyroidal extension occurs when the primary thyroid tumor extends beyond the thyroid capsule and invades adjacent structures including muscles, trachea, larynx, veins, arteries, esophagus, and nerves. This is a poor prognostic factor and occurs in 5% to 34% of PTCs. The tumor, node, metastasis (TNM) classification is the most widely used staging system worldwide. Invasion of trachea and surrounding structures like larynx and esophagus is uncommon in papillary thyroid carcinoma and may indicate aggressive cancer behavior and poor outcome [5,6].

Failure to control extra-thyroidal extension in thyroid tumors can cause complications and death. Tumors with tracheal invasion may obstruct airways, leading to death. Preoperative clinical manifestations of tracheal invasion include hemoptysis, hoarseness, presence of cervical mass, and shortness of breath. The worst condition of PTC with tracheal invasion is when the tumor extends to end luminal trachea with an incidence of 0.5%–1.5% [5,7]. The tracheoscopic examination is crucial for determining the extent of tracheal invasion in patients with PTC. Additionally, the anesthetist should evaluate whether the tumor will affect tracheal intubation [8].

Ultrasound (US) is commonly used to assess thyroid disease, but its accuracy in detecting extracapsular extension (ECE) and lymph node metastasis (LNM) for PTC is limited. Diagnostic performance improvement is necessary for wider clinical use. Also, the utilization of contrast-enhanced ultrasound (CEUS) techniques has significantly progressed in the identification of endocrinological tumors. CEUS is a promising tool for evaluating ECE and LNM of PTC, with superior micro vascularity detection capabilities [9-11].

Patients with thyroid cancer who have tracheal invasion can undergo surgical management techniques such as shave excision,

window tracheal resection, and sleeve tracheal resection to increase their survival rate. However, shave excision is only recommended for superficial tracheal invasion, while more severe cases require window tracheal resection and sleeve tracheal resection. Although tracheal sleeve resection can lead to complications such as anastomotic dehiscence, laryngeal stenosis, and anastomotic site stricture, segmental tracheal resection with end-to-end anastomosis has lower mortality and morbidity rates than window segmental tracheal resection with flap reconstruction. Endotracheal invasion of recurrent thyroid carcinoma is not a contraindication for surgery. It is preferable to perform a full circumferential resection and end-to-end anastomosis instead of merely shaving the trachea. Anastomosis is safe for up to five cm defect length and provides long-term disease-free survival, in addition to relieving intratracheal bleeding and obstructive airways immediately [12]. but nevertheless, it was remarkable that in this case, seven centimeters of trachea was resected and then anastomosis was performed in intact area of trachea and the patient had no complaint.

Most scholars suggest postoperative 131I treatment for patients with laryngotracheal invasion by differentiated advanced T4 thyroid cancer, as it can reduce recurrence risk and improve survival rate [13,14].

### 4. Conclusion

surgery of PTC with tracheal invasion is challenging. Appropriate surgical management of tracheal invasion is of great importance for the operation and prognosis. This requires a high level of proficiency and extreme care to avoid any damage to the blood vessels in the trachea.

### Acknowledgement

The authors thank Hamedan University of Medical Sciences authors' contribution.

### References

1. Chéreau, N., Buffet, C., Trésallet, C., Tissier, F., Golmard, J. L., Leenhardt, L., & Menegaux, F. (2014). Does extracapsular extension impact the prognosis of papillary thyroid microcarcinoma?. *Annals of surgical oncology*, 21, 1659-1664.
2. Roka, R. (2020). Surgical treatment of locally advanced thyroid cancer. *Innovative surgical sciences*, 5(1-2), 27-34.
3. Ou, D., Chen, C., Jiang, T., & Xu, D. (2022). Research review of thermal ablation in the treatment of papillary thyroid carcinoma. *Frontiers in Oncology*, 12, 859396.
4. Mao, J., Zhang, Q., Zhang, H., Zheng, K., Wang, R., & Wang, G. (2020). Risk factors for lymph node metastasis in papillary thyroid carcinoma: a systematic review and meta-analysis. *Frontiers in Endocrinology*, 11, 265.
5. Aslam, W., Shakespeare, A., Jones, S., & Ghamande, S. (2019). Massive hemoptysis: an unusual presentation of papillary thyroid carcinoma due to tracheal invasion. *BMJ Case Reports CP*, 12(8), e229330.
6. Zhang, J., Fu, C., Cui, K., & Ma, X. (2019). Papillary thyroid



- carcinoma with tracheal invasion: a case report. *Medicine*, 98(38), e17033.
7. Gaissert, H. A., Honings, J., Grillo, H. C., Donahue, D. M., Wain, J. C., Wright, C. D., & Mathisen, D. J. (2007). Segmental laryngotracheal and tracheal resection for invasive thyroid carcinoma. *The Annals of thoracic surgery*, 83(6), 1952-1959.
  8. Zhang, W., Dai, L., Yu, K., Wang, Y., Le, Q., & Wu, X. (2023). Management of papillary thyroid cancer with tracheal invasion and lung cancer: A case report. *Oncology Letters*, 25(3), 1-5.
  9. Chen, L., Chen, L., Liang, Z., Shao, Y., Sun, X., & Liu, J. (2022). Value of contrast-enhanced ultrasound in the preoperative evaluation of papillary thyroid carcinoma invasiveness. *Frontiers in Oncology*, 11, 795302.
  10. Lee, D. Y., Kwon, T. K., Sung, M. W., Kim, K. H., & Hah, J. H. (2014). Prediction of extrathyroidal extension using ultrasonography and computed tomography. *International journal of endocrinology*, 2014(1), 351058.
  11. Zhang, Y., Zhang, X., Li, J., Cai, Q., Qiao, Z., & Luo, Y. K. (2021). Contrast-enhanced ultrasound: a valuable modality for extracapsular extension assessment in papillary thyroid cancer. *European Radiology*, 31, 4568-4575.
  12. Singh, V. P., Singh, A., Sircar, S., Choudhary, R., Ranjan, P., & Jha, A. (2023). Tracheal resection in locally recurrent differentiated thyroid cancer; a case report. *Authorea Preprints*.
  13. Mayson, S. E., Yoo, D. C., & Gopalakrishnan, G. (2015). The evolving use of radioiodine therapy in differentiated thyroid cancer. *Oncology*, 88(4), 247-256.
  14. Yang, Z., Flores, J., Katz, S., Nathan, C. A., & Mehta, V. (2017). Comparison of survival outcomes following postsurgical radioactive iodine versus external beam radiation in stage IV differentiated thyroid carcinoma. *Thyroid*, 27(7), 944-952

**Copyright:** ©2024 Behrooz Goli, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.