

Short Communication



Tract Site Seeding of Papillary Thyroid Cancer After Transoral Endoscopic Thyroidectomy: A Case Report

Youngjoo Kim ^{1,*}, Jin Seok Lee ^{2,3,*}, Hyeok Jun Yun ^{2,3}, Yong Sang Lee ^{2,3}, Hang-Seok Chang ^{2,3}

¹Yonsei University College of Medicine, Seoul, Korea

²Thyroid Cancer Center, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

³Department of Surgery, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

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Correspondence to

Yong Sang Lee

Thyroid Cancer Center and Department of Surgery, Gangnam Severance Hospital, Yonsei University College of Medicine, 211 Eonju-ro, Gangnam-gu, Seoul 06273, Korea.
Email: medilys@yuhs.ac

*Youngjoo Kim and Jin Seok Lee contributed equally to this article.

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ORCID iDs

Youngjoo Kim

<https://orcid.org/0000-0001-9365-641X>

Jin Seok Lee

<https://orcid.org/0000-0001-9755-9801>

Hyeok Jun Yun

<https://orcid.org/0000-0001-6004-0782>

Yong Sang Lee

<https://orcid.org/0000-0002-8234-8718>

Hang-Seok Chang

<https://orcid.org/0000-0002-5162-103X>

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

ABSTRACT

The transoral endoscopic thyroidectomy vestibular approach (TOETVA) is an effective treatment for thyroid nodules and cancer. The excellent cosmetic outcomes compared to conventional and other types of endoscopic thyroidectomies make TOETVA a highly popular choice in selected patients. However, the limited working space and indirect thyroid manipulation can result in unexpected complications. Here, we describe a case of tract site seeding in a 47-year-old woman who underwent left hemithyroidectomy via TOETVA. The pathological diagnosis changed from follicular adenoma to invasive encapsulated follicular variant papillary thyroid cancer after cancer recurrence.

Keywords: Video-assisted surgery; Neoplasm seeding; Papillary thyroid cancer

INTRODUCTION

Thyroid cancer is one of the most common types of cancers in women, and surgery is the treatment of choice in many cases. Considering the anatomical position of the thyroid, a prominent anterior neck scar is inevitable during conventional open surgery. Many methods, including endoscopic and robotic options, have been developed to reduce neck scarring. Remote access to the thyroid avoids neck scars by approaching the operating field through the axilla, areola of the breast, postauricular space, and most recently, the mouth. Transoral thyroidectomy is based on the concept of natural orifice transluminal endoscopic surgery, which further maximizes cosmetic outcomes by using mucosal rather than skin incisions (1). The most commonly used type is the transoral endoscopic thyroidectomy vestibular approach (TOETVA), in which 3 incisions in the vestibule of the mouth provide a pathway to the thyroid (1). Despite its many advantages, this relatively novel technique and the limited range of motion can result in unexpected complications.

Here, we present a rare case of track-site seeding after TOETVA in a patient who was subsequently diagnosed with papillary thyroid cancer.

Author Contributions

Conceptualization: Yong Sang Lee, Hang Seok Chang; Data curation: Jin Seok Lee, Hyeok Jun Yun, Yong Sang Lee, Hang Seok Chang; Formal analysis: Jin Seok Lee; Investigation: Youngjoo Kim, Jin Seok Lee, Hyeok Jun Yun; Methodology: Jin Seok Lee; Project administration: Yong Sang Lee, Hang Seok Chang; Supervision: Hyeok Jun Yun; Validation: Jin Seok Lee, Hyeok Jun Yun; Visualization: Youngjoo Kim; Writing - original draft: Youngjoo Kim; Writing - review & editing: Jin Seok Lee, Yong Sang Lee.

CASE REPORT

A 47-year-old woman presented to the Gangnam Severance Hospital Thyroid Cancer Center for evaluation of multiple metastatic neck lymph nodes confirmed as carcinomas of thyroid origin. The patient had undergone left thyroidectomy via TOETVA 4 years previously at another hospital because of a thyroid nodule diagnosed as a follicular adenoma. Two and a half years later, neck computed tomography (CT) at a separate hospital revealed several suspicious neck lymph nodes at levels Ia and VI, for which fine-needle aspiration biopsy results did not reveal any malignancy (**Fig. 1A**). However, follow-up ultrasonography (US) showed nodules increasing in size and number at these levels, and an excisional biopsy was performed (**Fig. 1B**). Eight palpable lymph node-like masses along the submental region of the thyroid bed under the platysmal and strap muscles were excised. All 8 were confirmed to be carcinomas of the thyroid origin in the final pathological report. No palpable masses were observed upon admission to our clinic. Thyroid function test results were within the normal range.

The locations of the masses in the anterior neck prior to the second surgery coincided with the surgical track of the central endoscope in the TOETVA (**Fig. 2**), and the patient did not have any history of surgery other than the previous left thyroidectomy. Therefore, further imaging studies and a review of pathological slides were performed under the impression of tumor recurrence from the transoral tract site seeding. US revealed multiple suspicious nodules of various sizes in the left thyroid bed and subcutaneous tissue at levels I, IIa, and VI. Positron emission tomography-CT revealed an approximately 4.2 cm cavitory lesion with mildly hypermetabolic walls in the submental area, matching the ultrasound findings. Thyroid CT revealed similar results. No suspicious nodules were observed in the right or lateral neck. Chest CT showed no signs of lung metastasis. A pathological review of a right neck lymph node from a previous mass excision confirmed the findings of metastatic papillary carcinoma. Subsequent review of the left thyroid gland from the initial thyroidectomy revealed tumor cells with nuclear membrane irregularity, intranuclear grooves, and clear nuclei consistent with papillary carcinoma, and the final diagnosis was invasive encapsulated follicular variant papillary thyroid cancer (EFVPTC).

Hence, a complete total thyroidectomy with regional neck lymph node dissection from the submental region to the left level III region was performed. Frozen pathologic reports during surgery revealed one subcutaneous specimen with multiple nodules of papillary thyroid carcinoma up to 2 cm in the left level III. The left central tissue was identified as benign thyroid tissue. Other subcutaneous specimens, lymph nodes, and strap muscles were tumor-free. The authors speculated that most of the lesions observed in the imaging study were postoperative findings from a previous neck mass excision. The patient was discharged without acute complications. Three months later, 180 mCi radioactive iodine treatment (RAIT) was administered, and a whole-body bone scan and single-photon emission computed tomography-CT revealed radioiodine uptake in the bilateral thyroid bed, confirming the presence of residual thyroid tissue. The stimulated thyroglobulin level was 8.72 ng/mL immediately prior to the RAIT. Therefore, further follow-up studies are warranted.

DISCUSSION

Cases of tract site seeding using laparoscopic approaches have been reported in various gastrointestinal, gynecologic, and urologic cancers (2-9). In the present case, the distribution

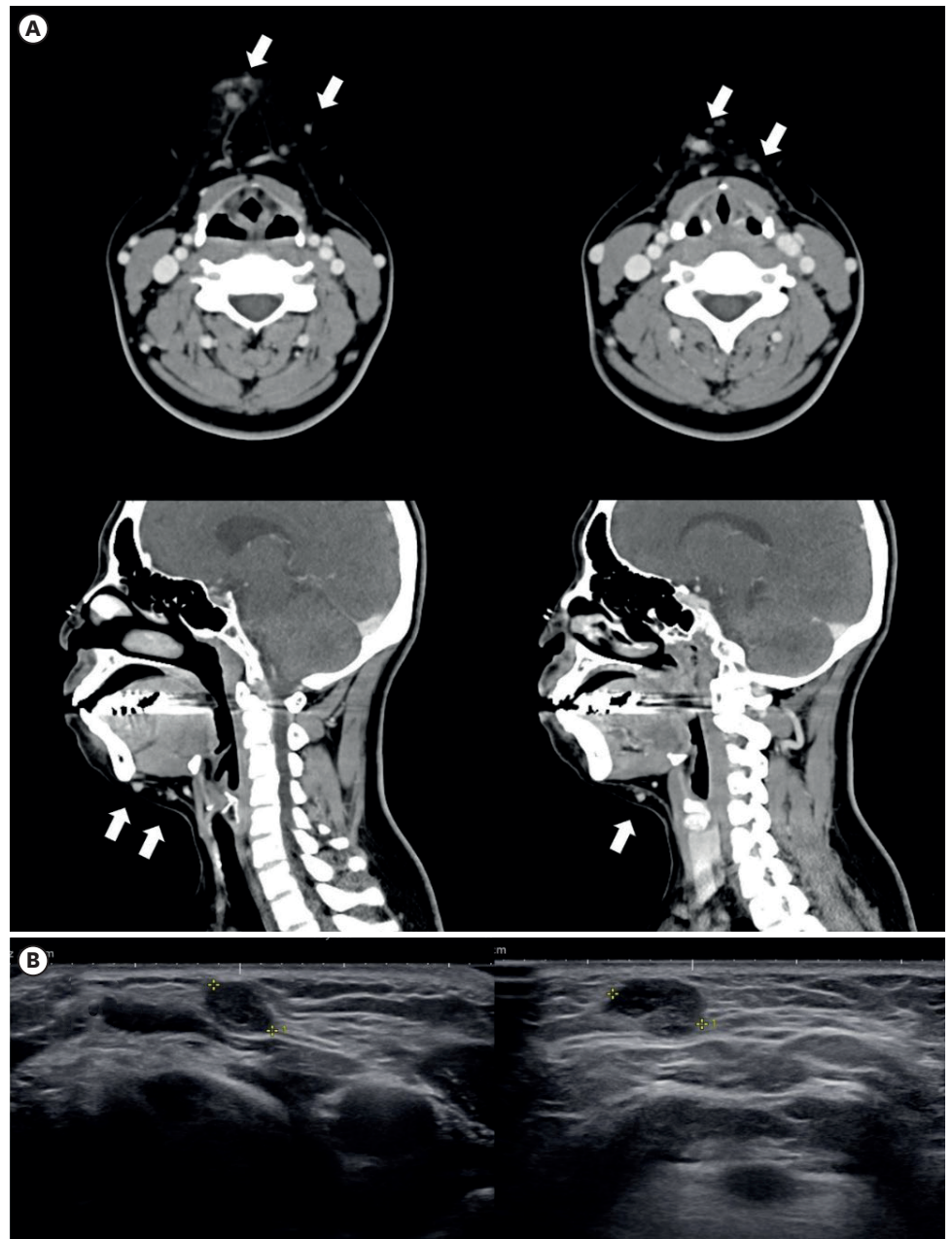


Fig. 1. Postoperative recurrence from tract seeding of papillary thyroid cancer after TOETVA (A) Neck computed tomography shows suspicious lymph nodes in the anterior neck (white arrow), 2.5 years after TOETVA. (B) Latest follow-up ultrasound before mass excision demonstrates multiple suspicious nodules in levels Ia and VI. TOETVA = transoral endoscopic thyroidectomy vestibular approach

pattern of the nodules and the rare incidence of submental lymph node metastasis in thyroid cancer strongly suggested postoperative recurrence from tract seeding along the central endoscope (6). The exact mechanism underlying postoperative recurrence of tract seeding remains clear (3,4). Direct tumor spillage at the operation site is likely, especially in thyroid cancer, due to the friability of the thyroid tissue, indirect handling using endoscopic devices, and limited working space (7,8). Surgical factors such as not using a bag when retrieving the tumor specimen, specimen fragmentation, and repeated retraction and insertion of a contaminated instrument may also contribute to seeding (5,9,10). Leakage of gas containing

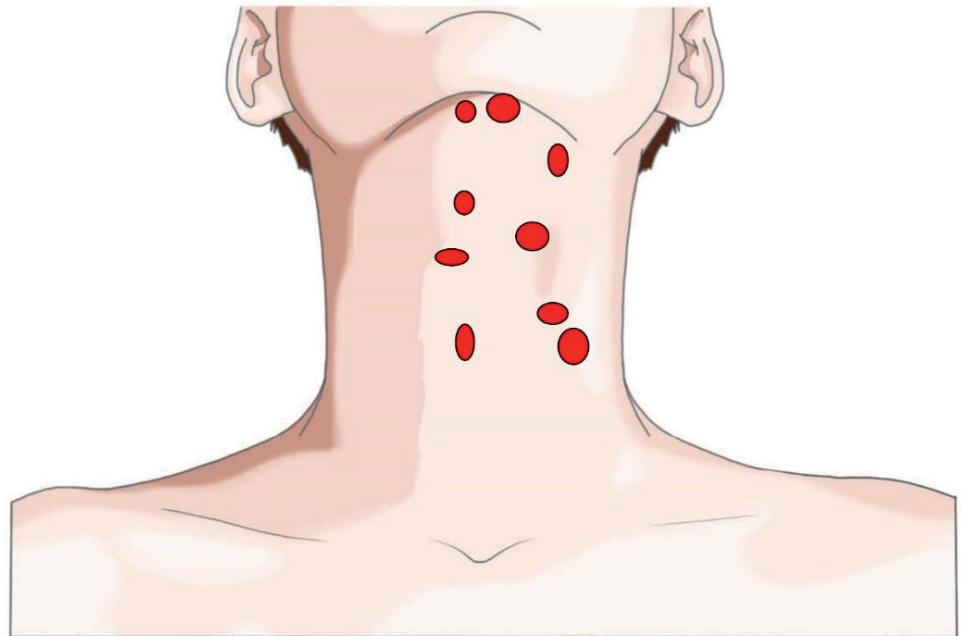


Fig. 2. Diagram demonstrates that the location of tumor recurrence (red dot) coincides with the surgical track of transoral endoscopic thyroidectomy vestibular approach.

aerosolized tumor cells has also been proposed, although recent studies have reported that the effect may be minimal compared to traumatic tumor handling itself (11,12). In this case, the initial pathological report for the TOETVA described the left thyroid as intact; whether there were any complications regarding plastic bags or peri-port gas leakage is unknown due to difficulties in obtaining surgical records. Tumor invasiveness is also theorized to be an association; however, the final pathological diagnosis in this case was invasive EFVPTC, a well-differentiated thyroid cancer (2,4). Hence, port site metastasis is most likely the result of various mechanisms, among which the surgeon's technique plays an important role.

There are several reports of rare thyroid cancer seeding using other modalities such as endoscopic and robotic thyroidectomy (7-9,13). Two patients had operative bed and tunnel recurrence of thyroid cancer despite an initial postoperative diagnosis of nodular hyperplasia (8,13). Implantation of normal thyroid tissue along the trocar pathway has also been documented, which can cause confusion and additional medical expenses (14,15). Therefore, meticulous surgical manipulation is essential, regardless of the pathological diagnosis.

While universal guidelines regarding patient selection for TOETVA have not been established, the indications proposed by surgeons who have developed the technique are as follows: An US-estimated gland width of ≤ 10 cm, a US-estimated gland volume ≤ 45 mL, a nodule size ≤ 50 mm, a benign tumor, follicular neoplasm and/or atypia of undetermined significance or follicular lesion of undetermined significance, and papillary microcarcinoma without evidence of metastasis (1). Several reports on port site thyroid cancer recurrence have emphasized the necessity of implementing stricter criteria for endoscopic thyroidectomy (13,14). A previous case report suggested that follicular neoplasms >4 cm are unsuitable for endoscopic surgery, while tumors 2–4 cm require further correlation with other clinical characteristics (13).

In conclusion, TOETVA has many advantages over conventional thyroidectomy, and the inherent limitations of remote surgery require surgeons to pay special attention to clean and careful surgical manipulation. Routine follow-up of post-thyroidectomy patients, regardless of malignancy, may also aid in the early diagnosis of such rare complications.

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REFERENCES

1. Dionigi G, Chai YJ, Tufano RP, Anuwong A, Kim HY. Transoral endoscopic thyroidectomy via a vestibular approach: why and how? *Endocrine* 2018;59:275-9.
[PUBMED](#) | [CROSSREF](#)
2. Wang N, Wang K, Zhong D, Liu X, Sun JI, Lin L, et al. Port-site metastasis as a primary complication following retroperitoneal laparoscopic radical resection of renal pelvis carcinoma or nephron-sparing surgery: a report of three cases and review of the literature. *Oncol Lett* 2016;11:3933-8.
[PUBMED](#) | [CROSSREF](#)
3. Paolucci V, Schaeff B, Schneider M, Gutt C. Tumor seeding following laparoscopy: international survey. *World J Surg* 1999;23:989-95.
[PUBMED](#) | [CROSSREF](#)
4. Schaeff B, Paolucci V, Thomopoulos J. Port site recurrences after laparoscopic surgery. A review. *Dig Surg* 1998;15:124-34.
[PUBMED](#) | [CROSSREF](#)
5. Iwamura M, Tsumura H, Matsuda D, Kurosaka S, Yoshida K, Baba S. Port site recurrence of renal cell carcinoma following retroperitoneoscopic radical nephrectomy with manual extraction without using entrapment sac or wound protector. *J Urol* 2004;171:1234-5.
[PUBMED](#) | [CROSSREF](#)
6. Caron NR, Tan YY, Ogilvie JB, Triponez F, Reiff ES, Kebebew E, et al. Selective modified radical neck dissection for papillary thyroid cancer-is level I, II and V dissection always necessary? *World J Surg* 2006;30:833-40.
[PUBMED](#) | [CROSSREF](#)
7. Bakkar S, Frustaci G, Papini P, Fregoli L, Matteucci V, Materazzi G, et al. Track recurrence after robotic transaxillary thyroidectomy: a case report highlighting the importance of controlled surgical indications and addressing unprecedented complications. *Thyroid* 2016;26:559-61.
[PUBMED](#) | [CROSSREF](#)
8. Kim JH, Choi YJ, Kim JA, Gil WH, Nam SJ, Oh YL, et al. Thyroid cancer that developed around the operative bed and subcutaneous tunnel after endoscopic thyroidectomy via a breast approach. *Surg Laparosc Endosc Percutan Tech* 2008;18:197-201.
[PUBMED](#) | [CROSSREF](#)
9. Kim MR, Jo S, Shim HK. Port-site implantation diagnosed by iodine-131 post-ablation single-photon emission tomography-computed tomography after robotic thyroidectomy: a case report. *Am J Case Rep* 2019;20:1695-8.
[PUBMED](#) | [CROSSREF](#)
10. Ramirez PT, Wolf JK, Levenback C. Laparoscopic port-site metastases: etiology and prevention. *Gynecol Oncol* 2003;91:179-89.
[PUBMED](#) | [CROSSREF](#)
11. Halpin VJ, Underwood RA, Ye D, Cooper DH, Wright M, Hickerson SM, et al. Pneumoperitoneum does not influence trocar site implantation during tumor manipulation in a solid tumor model. *Surg Endosc* 2005;19:1636-40.
[PUBMED](#) | [CROSSREF](#)
12. Lee SW, Southall J, Allendorf J, Bessler M, Whelan RL. Traumatic handling of the tumor independent of pneumoperitoneum increases port site implantation rate of colon cancer in a murine model. *Surg Endosc* 1998;12:828-34.
[PUBMED](#) | [CROSSREF](#)

13. Hur SM, Kim SH, Lee SK, Kim WW, Choi JH, Kim JH, et al. Is a thyroid follicular neoplasm a good indication for endoscopic surgery? *Surg Laparosc Endosc Percutan Tech* 2011;21:e148-51.
[PUBMED](#) | [CROSSREF](#)
14. Lee YS, Yun JS, Jeong JJ, Nam KH, Chung WY, Park CS. Soft tissue implantation of thyroid adenomatous hyperplasia after endoscopic thyroid surgery. *Thyroid* 2008;18:483-4.
[PUBMED](#) | [CROSSREF](#)
15. Kim HS, Kim SH, Kim JH, Kim BT, Lee KH. Multifocal hot spots demonstrated by whole-body ¹³¹I scintigraphy and SPECT/CT after transaxillary endoscopic thyroidectomy. *Clin Nucl Med* 2015;40:260-2.
[PUBMED](#) | [CROSSREF](#)