



Seeding recurrence of follicular thyroid carcinoma after transoral endoscopic thyroidectomy vestibular approach: a case report

Moon Young Oh^{1^}, So Won Oh², Young A Kim³, Young Jun Chai^{1,4}

¹Department of Surgery, Seoul National University College of Medicine, Seoul Metropolitan Government - Seoul National University Boramae Medical Center, Seoul, Korea; ²Department of Nuclear Medicine, Seoul National University College of Medicine, Seoul Metropolitan Government - Seoul National University Boramae Medical Center, Seoul, Korea; ³Department of Pathology, Seoul National University College of Medicine, Seoul Metropolitan Government - Seoul National University Boramae Medical Center, Seoul, Korea; ⁴Transdisciplinary Department of Medicine & Advanced Technology, Seoul National University Hospital, Seoul, Korea

Contributions: (I) Conception and design: YJ Chai; (II) Administrative support: YJ Chai; (III) Provision of study materials or patients: YJ Chai, SW Oh, YA Kim; (IV) Collection and assembly of data: MY Oh; (V) Data analysis and interpretation: MY Oh; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Young Jun Chai, MD, PhD. Transdisciplinary Department of Medicine & Advanced Technology, Seoul National University Hospital, Seoul, Korea; Department of Surgery, Seoul National University College of Medicine, Seoul Metropolitan Government - Seoul National University Boramae Medical Center, 20 Boramae-ro 5-gil, Dongjak-gu, Seoul 156-70, Korea. Email: kevinjoon@naver.com.

Background: While track recurrence of thyroid cancer following endoscopic and robotic transaxillary surgeries has been reported previously, no such cases have been reported for transoral endoscopic thyroidectomy vestibular approach (TOETVA). This case report describes the first documented case of recurrence of thyroid cancer along the surgical track after TOETVA.

Case Description: The patient underwent right lobectomy via TOETVA for a 4 cm follicular thyroid carcinoma (FTC) initially diagnosed as benign follicular nodule on preoperative gun biopsy. The thyroid capsule partially ruptured within the surgical field during surgery. Ultrasonography and computed tomography conducted 27 months after surgery revealed seeding recurrence in the postsurgical thyroid bed, and subcutaneous layers of the right lower lip, submental area, and mid to right upper neck levels I, IIA, and VI. Two-stage re-operation was done to perform completion thyroidectomy, lymph node dissection, and excision of recurrent nodules, which were pathologically confirmed as metastatic FTC. The patient underwent two treatments of radioactive iodine therapy, and post-therapeutic whole-body scintigraphy and computed tomography showed no residual disease.

Conclusions: Careful monitoring after TOETVA is essential due to the rare but potential risk of seeding recurrence, especially when the thyroid gland ruptures during surgery. Surgeons should be aware of this atypical complication and be prepared to recommend surgical and/or medical strategies to manage any local seeding of thyroid tissue that may occur.

Keywords: Case report; follicular thyroid carcinoma (FTC); transoral thyroidectomy; thyroidectomy; seeding recurrence

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[^] ORCID: 0000-0002-8939-1735.

Introduction

Minimally invasive and remote access thyroid surgeries have become increasingly popular among thyroid cancer patients seeking improved cosmetic outcomes on top of oncologic outcomes (1). Remote access thyroidectomies can be performed via endoscopic or robotic approaches, including bilateral axillo breast, transaxillary, and transoral techniques (2-4). While these procedures offer several benefits over traditional open surgery, rare complications can still arise (5). One such complication is track seeding recurrence, which involves the regrowth of thyroid tissue or cancer cells along the surgical dissection site (6-8).

Seeding recurrence after thyroidectomy has been previously documented for remote access approaches, particularly in endoscopic and robotic transaxillary and bilateral axillo-breast approach surgeries (9-11). Reports included both malignant and benign implantations along the surgical track, and were treated with surgical re-exploration for excision of thyroid tissue and/or radioactive iodine (RAI) therapy (12,13).

To the best of our knowledge, there have been no previous reports of seeding recurrence in patients undergoing transoral endoscopic thyroidectomy vestibular approach (TOETVA). We share our experience with the first reported case of recurrence of thyroid cancer along

the surgical track after TOETVA. We present this case in accordance with the CARE reporting checklist (available at <https://gs.amegroups.com/article/view/10.21037/gs-23-480/rc>).

Case presentation

A 19-year-old female presented with a palpable lump on the right side of her neck, without any other significant symptoms. Medical, family, and psycho-social histories were insignificant. Thyroid function tests were normal, and the tests for thyroglobulin (Tg) and thyroperoxidase antibodies were negative. Ultrasonography (USG) revealed a Thyroid Imaging Reporting and Data System 3 isoechoic solid nodule without marked vascularity, measuring 2.8 cm in the right lower thyroid. In January 2018, fine needle aspiration (FNA) cytology of the lesion showed as atypia of undetermined significance, and in February 2018, repeat gun biopsy reported the lesion as a benign follicular nodule. During follow up in the outpatient clinic, the nodule increased in size to 3.9 cm in greatest length on USG and computed tomography (CT) in February 2020 (*Figure 1*). After inter-department consultation, lobectomy was recommended because of the prominence of the nodule and its potential for malignancy. In the same month, the patient underwent a TOETVA to perform a right thyroidectomy. During surgery, part of the thyroid capsule ruptured, but all visible thyroid tissue was meticulously suctioned without distilled water irrigation. The specimen was inserted into a plastic specimen bag and pulled out through the middle port incision of the lower vestibule. Histopathology of the right thyroid gland revealed one minimally invasive follicular thyroid carcinoma (FTC) measuring 3.0 cm in greatest diameter with minimal capsular invasion and minimal venous invasion, and one papillary microcarcinoma measuring 0.4 cm in greatest diameter. The postoperative course was uneventful with normal laboratory findings and vocal cord examination results.

The patient was followed up in the outpatient clinic with USG every 6 months. In June 2022, which was 27 months after surgery, USG and CT showed multiple nodules in various areas including the postsurgical thyroid bed, and subcutaneous layers of the right lower lip, submental area, and mid to right upper neck levels I, IIA, and VI, and a 0.4 cm hypoechoic nodule in the left thyroid gland (*Figure 2*). FNA cytology of a soft tissue lesion at neck level IIA showed many bland-looking follicular cells. Re-review of the gun

Highlight box

Key findings

- This study reports the first documented case of thyroid cancer recurrence along the surgical track following a transoral endoscopic thyroidectomy vestibular approach (TOETVA).

What is known and what is new?

- Track seeding recurrence after thyroidectomy, which involves the regrowth of thyroid tissue or cancer cells along the surgical dissection site has been previously documented for remote access approaches, but no such cases have been reported for TOETVA.
- Seeding recurrence of thyroid cancer along the surgical track after TOETVA can also occur.

What is the implication, and what should change now?

- This case report highlights the importance of preventing thyroid gland rupture during TOETVA. In the event of such rupture, vigilant postoperative monitoring is essential to promptly identify any clinical signs of thyroid cancer recurrence.
- Surgeons should be aware of this uncommon complication and provide informed guidance to patients, including recommendations for medical strategies to manage potential local seeding of thyroid tissue.

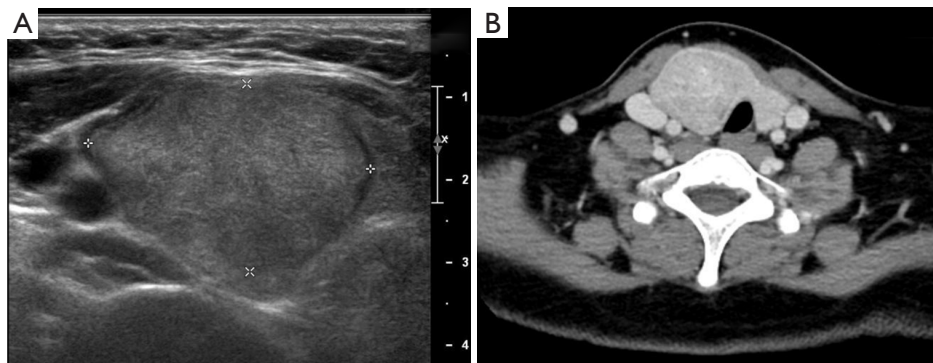


Figure 1 Preoperative imaging findings. Preoperative imaging studies show a large well-defined 3.43 cm × 2.28 cm × 3.91 cm sized isoechoic solid TIRADS 3 mass at the right lower thyroid lobe with left side tracheal deviation on (A) ultrasonography and (B) computed tomography. TIRADS, Thyroid Imaging Reporting and Data System.

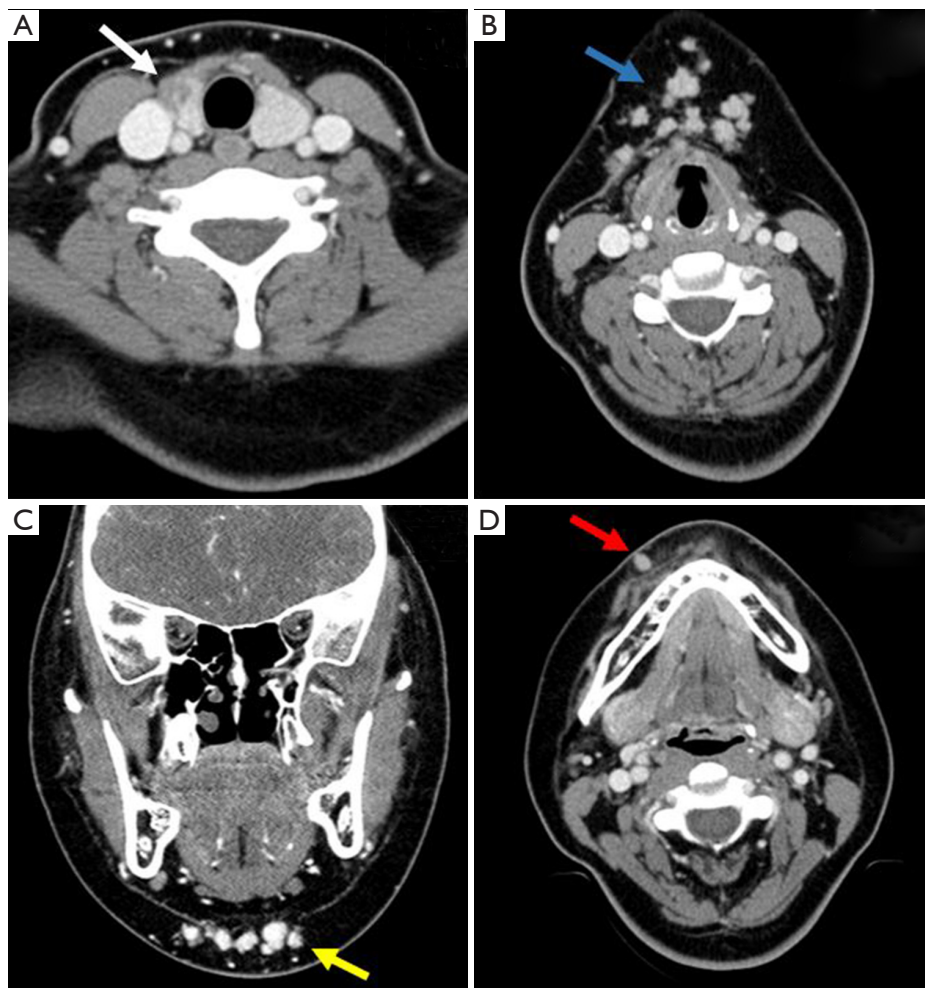


Figure 2 Recurrence imaging findings. Computed tomography shows (A) remnant soft tissue density with heterogeneous enhancement at initial right lobectomy site (white arrow), and multiple enhancing nodules, measuring 4.5 cm in greatest length, (B) at the midline upper neck subcutaneous layer (blue arrow), (C) at right chin subcutaneous layer (yellow arrow), and (D) at the lower lip subcutaneous layer (red arrow).

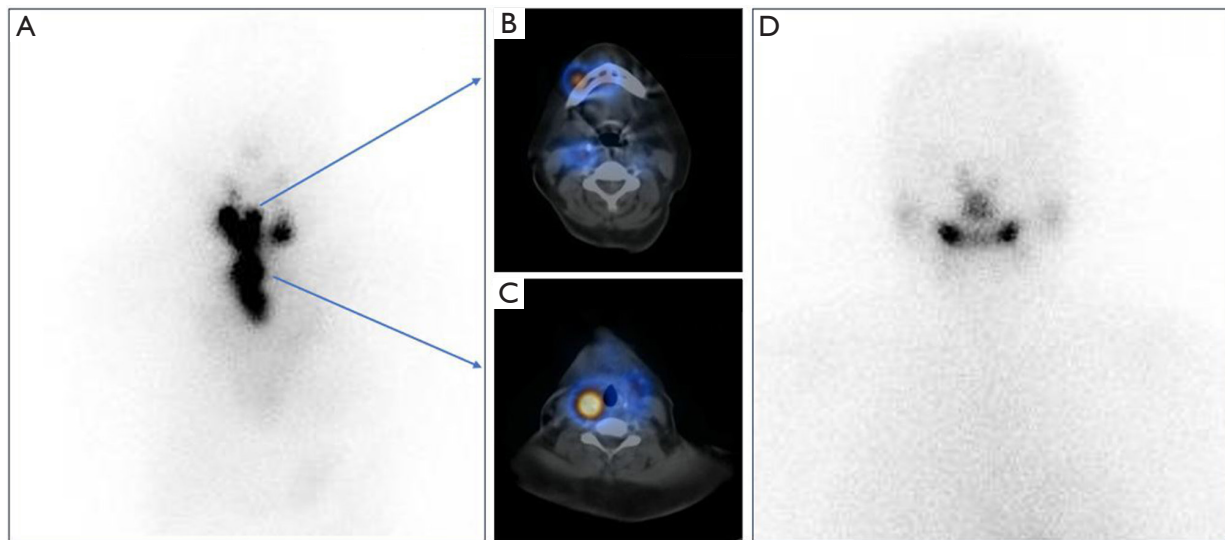


Figure 3 Radioactive iodine post-therapeutic imaging findings. Post-therapeutic WBS reveals multifocal uptake in the thyroid bed and extra-thyroid areas, following the initial RAI therapy (A). Additional single-photon emission tomography/computed tomography imaging obtained on the same day as post-therapeutic scintigraphy shows focal uptake in the submental area (B) and right thyroid bed (C). After the second RAI therapy, there was no abnormal uptake suggestive of remnant thyroid or tumor recurrence on the post-therapeutic WBS (D). WBS, whole-body scintigraphy; RAI, radioactive iodine.

biopsy of the initial lesion was conducted by an experienced endocrine pathologist (Y.A.K.), and the gun biopsy revealed an indeterminate microfollicular proliferative lesion lacking a fibrous capsule or the adjacent non-lesional tissue in the specimen.

In June 2022, completion thyroidectomy of the left thyroid, bilateral central lymph node dissection and excision of multiple nodules, as well as parts of the adjacent strap muscles, were performed through a new low-collar incision on the neck and a small incision in the lower lip. Histopathology confirmed metastatic FTC in the soft tissues in the lower lip, strap muscles, and neck levels I, IIA, and VI, with a combined measurement of all tumor foci up to 4.1 cm in greatest diameter. Papillary microcarcinoma measuring 0.6 cm in greatest diameter was also found on the left thyroid gland. No tumor involvement was observed in the 25 lymph nodes that were resected. Due to the challenges encountered in accessing the upper neck and chin recurrences through the incisions, a neck CT scan was conducted on the second postoperative day. The scan aimed to assess the extent of remaining nodules, revealing their presence in the subcutaneous tissue of the upper neck and chin, prompting consideration for a second-look operation. A neck re-exploration through a submental incision was performed two weeks later to remove the nodules. On

biopsy, the soft tissue lesions at neck levels I and VI were confirmed to be metastatic FTC, with the largest nodule measuring 1.5 cm in greatest length. The postoperative course was uneventful, and the patient was prescribed a daily dose of 100 mcg of levothyroxine.

In September 2022, the patient received RAI with 150 mCi of I-131 following the withdrawal of thyroxine. The patient's thyrotropin (TSH) level was 105.4 mIU/L, Tg level was 59.04 ng/mL, and Tg antibody (Tg-Ab) level was 493 u/mL. Post-therapeutic whole-body scintigraphy (WBS) revealed focal uptakes in the right thyroid bed, upper mediastinum, and submental area. In April 2023, the patient received a second RAI with 100 mCi of I-131. The TSH level was 154.5 uIU/L, Tg level was <0.2 ng/mL, and Tg-Ab level was 91 U/mL. Post-therapeutic WBS showed no abnormal uptake (*Figure 3*). In October 2023, a follow-up neck CT scan showed no evidence of local tumor recurrence or definite remnant thyroid tissue (*Figure 4*). *Figure 5* shows a brief timeline of key events in chronological order.

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent for publication of this case report and accompanying images was not obtained from the patient or the relatives after all

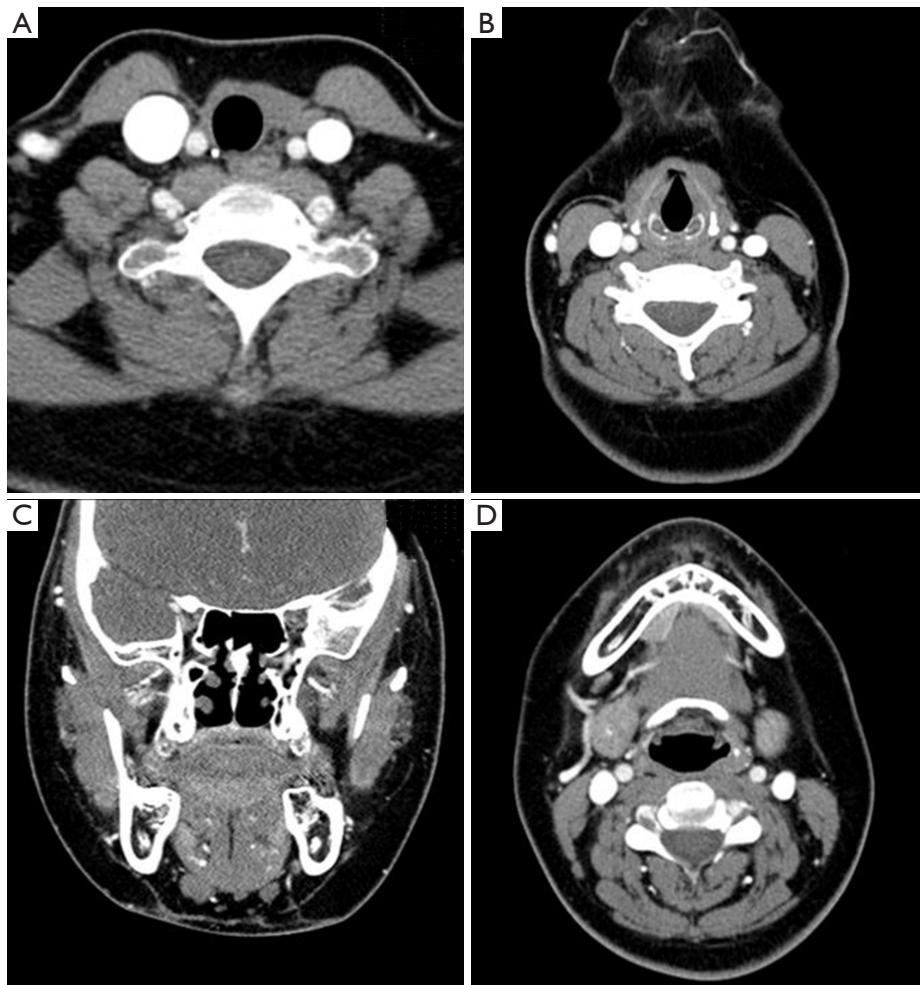


Figure 4 Follow-up imaging findings after treatment of recurrence. Computed tomography shows no definite remnant thyroid tissue (A) in the operative bed, and (B) in the neck subcutaneous layer, (C) chin, and (D) lower lip subcutaneous layer.

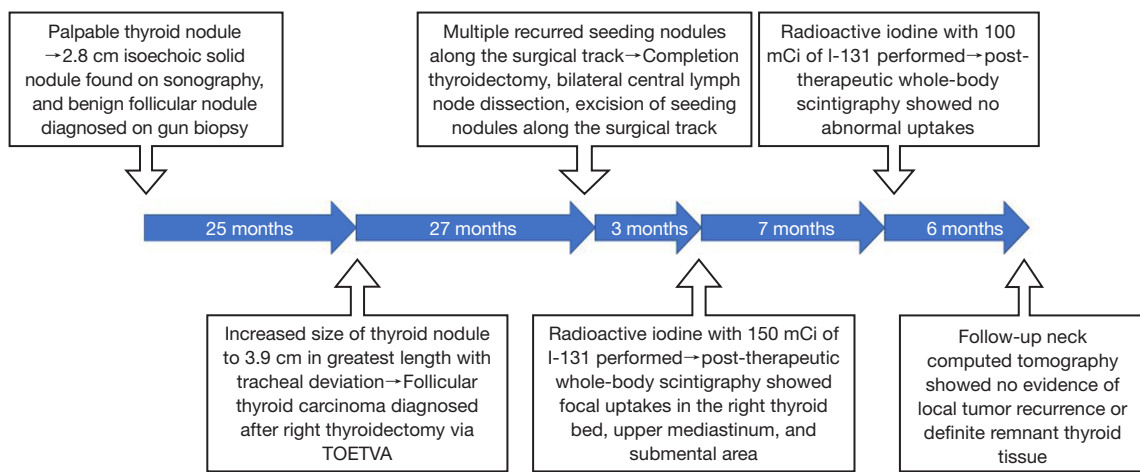


Figure 5 Case report timeline. The timeline shows a summary of key events in chronological order. TOETVA, transoral endoscopic thyroidectomy vestibular approach.

possible attempts were made.

Discussion

TOETVA has emerged as a promising technique for thyroid surgery due to its minimal scarring and comparable postoperative outcomes to open thyroidectomy (14). However, as with any surgical procedure, there are unique complications associated with TOETVA that should be carefully considered, such as mental nerve injury (15). This case report highlights another rare but significant complication of TOETVA—seeding recurrence. Seeding recurrence after TOETVA has not been previously reported in literature, likely due to the relative novelty of the procedure and the limited number of centers that perform large number of TOETVA procedures (16). While TOETVA has shown promise as a minimally invasive alternative to conventional open thyroidectomy, studies on the long-term outcomes and complications are still limited (17). Recurrence of thyroid cancer is also possible even many years after surgery, underscoring the need for careful long-term monitoring of patients who undergo TOETVA or any thyroid surgery (18). Seeding recurrence after TOETVA can be challenging because the surgical incision is located in the vestibule of the oral cavity and the surgical track down passed the submandibular area, which can make it difficult to detect recurrence using follow-up ultrasound.

Thus, preoperative diagnosis of thyroid nodules is crucial in determining the appropriate surgical approach for their treatment (19). However, in the case of FTC, preoperative diagnosis can be particularly challenging because it shares many characteristics with benign thyroid nodules (20). Although a preoperative FNAC indicates a benign result, there is still a possibility of malignancy, including FTC or follicular variant papillary thyroid carcinoma (21). The risk of malignancy for benign cytology results can range from 2% to 7%, particularly in cases where the nodule is larger in size (21,22). Likewise, the present case illustrates an example where a preoperative biopsy suggested the presence of a benign follicular nodule, but the final histopathology report confirmed the diagnosis of FTC. Seeding recurrence is possible not only in malignant nodules, but can also occur in benign disease or thyroidal tissue fragments, particularly if it ruptures during surgery (23,24). Therefore, it is important that the surgeon handle the thyroid gland with caution during endoscopic procedures to preserve the thyroid capsule and ensure complete and uniform removal of the specimen in all cases (25). If rupture

occurs, all fragments should be harvested. Regardless of the postoperative pathology results, close monitoring is necessary, especially in the case of malignancy.

Currently, there is no established guideline specifying the upper limit of thyroid nodule size for safe consideration of TOETVA. Generally, TOETVA is indicated for benign diseases, papillary microcarcinoma, and thyroid nodules smaller than 6 cm (26) with some surgeons suggesting a threshold of less than 4 cm (4). In this particular case, despite the relatively large size of the nodule, almost 4 cm, we chose TOETVA based on the benign preoperative biopsy results, the patient's age, and the patient's preference for this procedure. Although a large nodule size may not be a contraindication for TOETVA, surgeon judgment and expertise are crucial when dealing with larger nodule sizes.

Laparoscopic surgeries for other common cancers such as colon, ovaries, adrenal glands, and prostate cancers have reported seeding recurrence, such as port-site seeding and recurrence (27,28). The chances of direct tumor spillage during endoscopic thyroid surgery are high because of the friability of the thyroid tissue and the small working space available during surgery (29). The exact way in which tissue or tumor spreads at the point of trocar insertion during laparoscopic surgery is not yet known, but it is believed to be influenced by several factors. These may include the level of manipulation of the tumor during the procedure, the use of tumor morcellation to assist with extraction, the technique used for specimen removal, the use of gas insufflation and the possibility of a “chimney effect” (9,30).

In this present case, despite meticulous dissection and efforts to avoid trauma, the thyroid capsule was partially ruptured. There is a risk of non-visible seeding leading to prominent recurrences, even if all visible thyroid tissue is removed during surgery. Using a specimen bag to retrieve the resected specimen is a common preventative measure to minimize iatrogenic implantation, regardless of the type of disease (9). However, multifocal implantation along the surgical track still occurred in this present case even after removing all visible tissue fragments and using a plastic specimen bag during specimen retrieval, possibly due to cell exfoliation caused by repeated minor trauma from the endoscopic instruments and contact with the surgical track after the capsule rupture. While rinsing the surgical field with distilled water has been suggested to allow exfoliated cells to swell and rupture in a hypo-osmolar environment before concluding the procedure (13), further research is necessary before it can be recommended as a standard practice. Moreover, surgeons should also consider

converting to an open approach in situations involving tumor spillage or an inability to fully retrieve it, even when dealing with a benign preoperative diagnosis.

RAI therapy is a viable option for managing recurrent or residual disease in patients with differentiated thyroid cancer, as it specifically targets thyroid tissue and can help eliminate remnant thyroid tissue and identify recurrence (19). While the effectiveness of adjuvant RAI therapy after reoperation in patients with recurrent differentiated thyroid cancer remains a topic of debate, various organizations continue to recommend its use in certain patients (31), because RAI therapy has been known to be effective especially in well-differentiated thyroid cancers (32). In this present case, the patient received RAI therapy after reoperation and achieved excellent outcomes. This shows that RAI therapy can be a valuable option for managing seeding recurrence following TOETVA in well-differentiated thyroid cancer cases and may improve patient outcomes in certain patients.

Conclusions

This case report highlights the importance of avoiding rupture of the thyroid gland during TOETVA. However, if the thyroid gland ruptures during the surgical procedure, close and careful monitoring after TOETVA is necessary to detect any clinical suspicion of thyroid cancer recurrence. Surgeons need to be conscious of this atypical complication and it should be addressed as a potential complication of TOETVA when obtaining informed consent before operation. Surgeons must be prepared to counsel patients appropriately, including the recommendation of medical strategies to manage any local seeding of thyroid tissue that may occur. Continued research is needed to better understand the risk factors for seeding recurrence after TOETVA and to develop strategies for preventing this rare but significant complication.

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Footnote

Reporting Checklist: The authors have completed the CARE reporting checklist. Available at <https://gs.amegroups.com/article/view/10.21037/gS-23-480/rc>

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://gs.amegroups.com/article/view/10.21037/gS-23-480/coif>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent for publication of this case report and accompanying images was not obtained from the patient or the relatives after all possible attempts were made.

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