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## Late recurrence of papillary thyroid cancer from needle tract implantation after core needle biopsy: A case report

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## Abstract

### BACKGROUND

Papillary thyroid cancer (PTC) has good prognosis so that the local recurrence or distant metastasis can occur later on the lifetime follow up. In this study, we report recurrence of PTC in subcutaneous area combined with lymph node metastasis. A suspicion of needle tract implantation after core needle biopsy was found.

### CASE SUMMARY

A 66-year-old female patients who underwent right thyroid lobectomy for PTC complained of palpable nodule on anterior neck area. The location of the palpable nodule was not associated with her postoperative scar. After excision of the skin tumor, it was diagnosed as recurrence of PTC. Furthermore, results of subsequent imaging showed lymph node metastasis on her right cervical area. According to the previous medical records, the patient received core needle biopsy through the neck of the patient midline and hematoma was noted after the procedure. The time interval from the first diagnosis to local recurrence or metastasis to the skin and lymph nodes was ten years. As treatment, the patient underwent lymph node dissection in the right and completion thyroidectomy for radioisotope treatment.

### CONCLUSION

Needle tract implantation can occur after core needle biopsy. Further studies are needed to compare core-needle biopsy and fine-needle aspiration.

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**Core Tip:** Local recurrence of papillary thyroid cancer can occur in the late period. Clinicians should pay attention to needle tract implantation related core needle biopsy.

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## INTRODUCTION

Papillary thyroid carcinoma (PTC) has good prognosis and the survivals have been assessed as 10 years, which is exceeding 90%. Smaller tumors can be incidentally found by ultrasound before evident symptoms emerged, PTCs less than 1 cm has excellent prognosis. The recurrence rate are higher in young age but the outcome is better than the older patients<sup>[1]</sup>. It has been known that the most common site of distant metastasis is lung, followed by bones and multiple organ involvement<sup>[2]</sup>.

Fine needle aspiration cytology (FNAC) is widely used for the diagnosis of PTC. It is considered safe and effective due to the low chance of fatal complications. Needle tract implantation (NTI) from FNAC was reported in less than 0.2% of the cases<sup>[3]</sup>. However, NTI from core needle biopsy (CNB) has not yet been investigated. In a retrospective analysis of 11745 PTC patients, 9.1% of NTI patients showed local recurrence, while 40.9% had distant metastasis during follow-up<sup>[4]</sup>.

The authors found late skin recurrence combined with lymph node metastasis of PTC, presumably from NTI after CNB.

## CASE PRESENTATION

### Chief complaints

A 66-year-old female patient with the chief complaint of an anterior neck mass sought consult from our surgical department.

### History of present illness

The mass was located midline to the right side. It was first noticed a few months ago. She claimed that it rapidly grew one month prior to consultation.

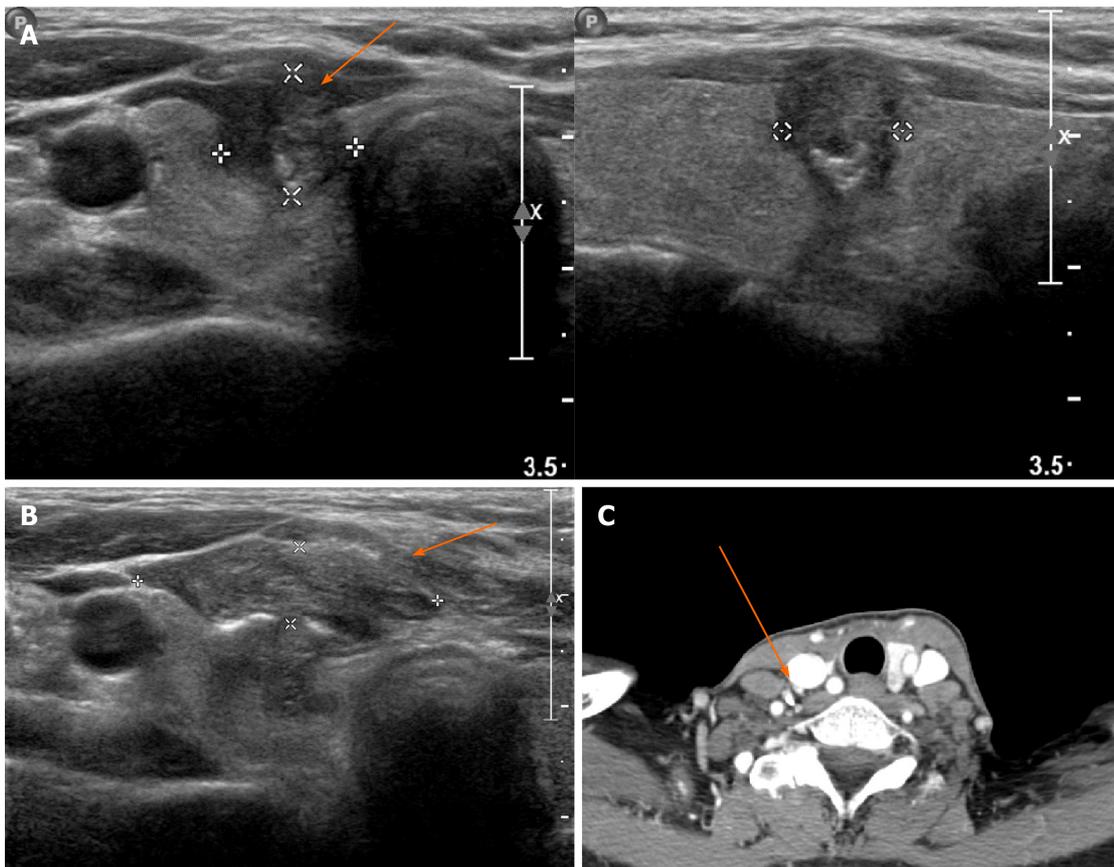
She had a 4-cm scar from her previous right thyroid lobectomy ten years ago. At her initial visit for the thyroidectomy, an irregular ill-defined mixed hypoechogenic nodule with internal calcification was found on the mid pole of the right thyroid (Figure 1A). FNAC along with CNB using a 20-gauge Franseen needle was performed at the time of diagnosis, there found a hematoma after procedure (Figure 1B). A pathologic report revealed an 8-mm papillary carcinoma with focal extension to perithyroidal soft tissue without resection margin involvement and lymph nodal metastasis. The patient was lost to follow-up for 115 months until she noted a soft tissue mass on anterior neck.

### History of past illness

She was taking medication for hypertension and hyperlipidemia few years ago, except that there were no other diseases diagnosed.

### Personal and family history

She did not have any other family members that have thyroid cancer, or other type of cancers.



**Figure 1 Radiologic images of initial diagnosis of papillary thyroid cancer.** A: Tumor located in right middle lobe of the thyroid; B: Postprocedural hematoma after core needle biopsy through isthmus observed by ultrasonography; C: Presents computed tomography of enlarged lymph node at level IV, performed after excisional biopsy of skin tumor.

### **Physical examination**

The 1.4 cm × 0.65 cm nodule was palpated 5 mm away from previous operative scar. The nodule was not, in any way or form, connected to the previous scar. The mass was located subcutaneously, slightly movable, and tense. Excisional biopsy without FNAC or CNB was performed under local anesthesia with an elliptical excision using previous scar. After excision, the mass was revealed to be a papillary carcinoma on soft tissue. Her previous medical records were reviewed.

### **Laboratory examinations**

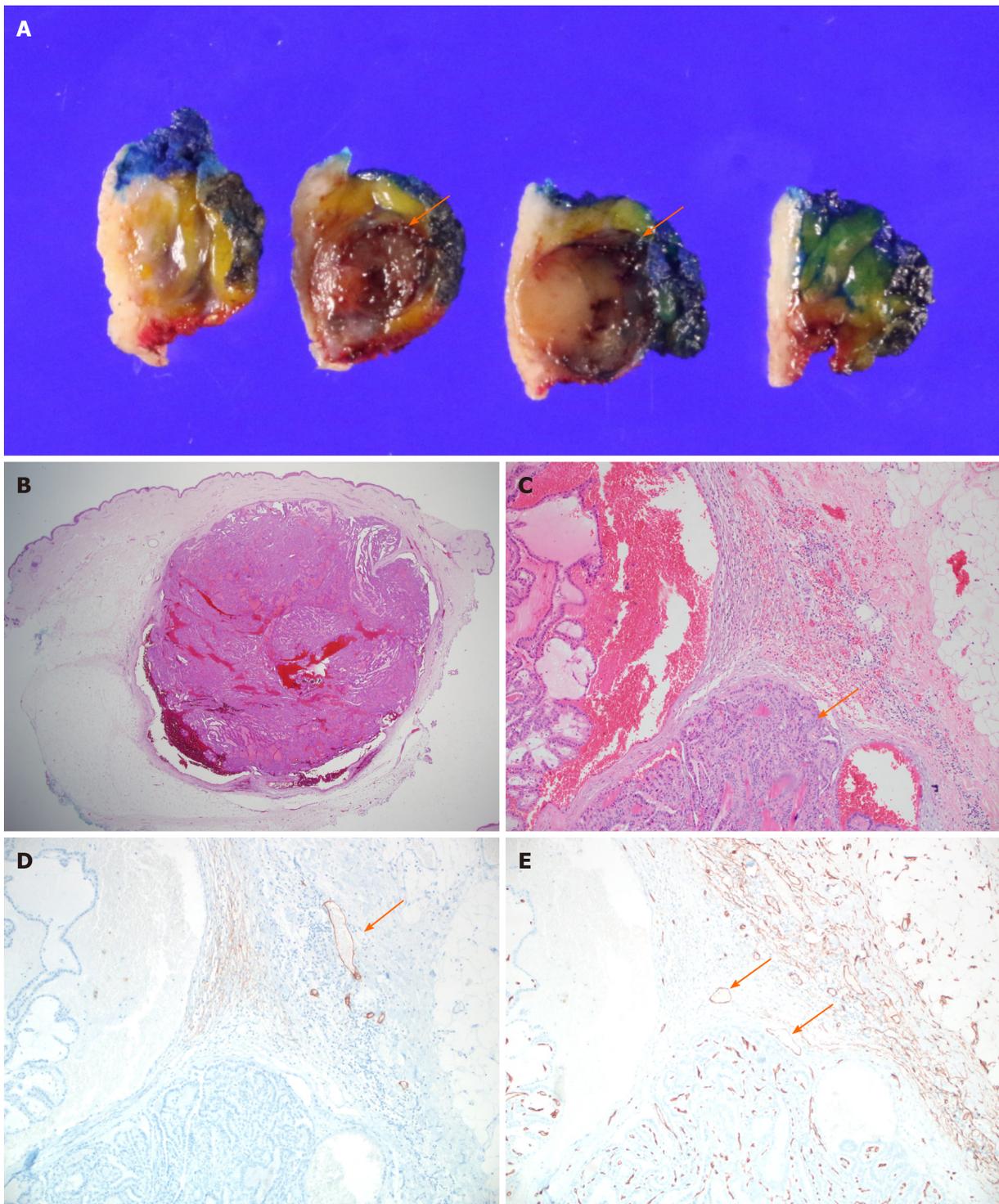
On the laboratory test before the second surgery, thyroid hormone test including TSH, free T4, T3 were within normal range. Serum thyroglobulin level was 13.8 ng/mL (3.5-77 ng/mL), and the antibody to thyroglobulin was 11.9 IU/mL (0-115 IU/mL).

### **Imaging examinations**

Additional imaging studies were performed to find out another metastatic lesion. A suspicious metastatic lymph node measured 5 mm on level IV was observed on the right cervical area through ultrasound and computed tomography imaging (Figure 1C). Furthermore, FNAC confirmed the presence of a metastatic lymph node. Thyroglobulin level were greater than 500 ng/mL in the aspirate.

## **FINAL DIAGNOSIS**

During the gross examination for excisional biopsy of skin and soft tissue, the specimen reveals a round light yellow to brown solid soft mass without necrosis in the superficial subcutaneous layer, measuring 1.4 cm × 1.0cm, Figure 2A. On microscopic examination, it shows a relatively well defined round solid mass in subcutaneous. It reveals neither lymph nodal architecture nor residual thyroid tissue in the submitted specimen, Figure 2B. The mass is composed of multiple papillary architecture showing



**Figure 2 Macroscopic finding and microscopic images of recurrent papillary thyroid carcinoma in soft tissue.** A: Shows a round light yellow to brown solid soft mass showing focal hemorrhage without necrosis in the superficial subcutaneous layer, measuring 1.4 cm × 1.0 cm; B: Shows a relatively well defined round solid mass in subcutaneous layer in low power field examination. No lymph nodal tissue or residual thyroid tissue was found in the submitted specimen [hematoxylin-eosin (H&E), × 12.5]; C: The mass shows multiple papillary architecture showing nuclear enlargement, nuclear groove and inclusion which is shown in typical papillary thyroid carcinoma (H&E, × 100); D and E: Neither lymphovascular nor perineural invasion was observed in tumor (D2-40, × 100 and CD34, × 100, respectively).

nuclear enlargement, nuclear groove and inclusion which is shown in typical papillary thyroid carcinoma, **Figure 2C**. The tumor reveals neither lymphatic nor perineural invasion using histologic features. And the results of immunohistochemical stainings, **Figure 2D** and **E**. Using the deeper cut section, the tumor reveals no lymph node architecture.

Completion thyroidectomy with modified radical neck dissection on the right cervical lymph node was performed. There were no further malignant findings on the

remnant thyroid tissue. Lymph node metastasis was found in 3 out of 19 nodes. The maximal size of lymph node metastasis is 1.2 mm without extranodal soft tissue extension. There were no immediate surgical complications. Due to the patient's clinical history and pathologic findings on the excisional biopsy (Figure 2), the anterior neck mass was suspected to be a local recurrence of her initial tumor, rather than metastasis to the skin.

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## TREATMENT

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Radioisotope treatment was provided after surgery (100 mCi).

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## OUTCOME AND FOLLOW-UP

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After the radioisotope treatment, serum thyroglobulin level maintained less than 0.1 ng/mL after 10 mo after surgery.

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## DISCUSSION

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We found a late recurrence of subcutaneous NTI after needle biopsy in PTC patients combined with lymph node metastasis. No significant findings suggested whether the nodule was NTI or metastasis. Cutaneous or intramuscular metastasis of thyroid cancer is rare<sup>[5]</sup>. Therefore, the direction of biopsy needle tract, seedings in linear fashion, seedings not accompanied by lymphoid or neurovascular tissue, and its presence away from the initial surgical incision, led us to a diagnosis of NTI, rather than soft tissue metastasis. NTI may be a manifestation of an underlying disease, particularly lymph node metastasis as presented in this case.

CNB has applied to thyroid nodule evaluation because of some inconclusive results from FNAC. Its routine use is not recommended by several guidelines because of limited evidence so far<sup>[6,7]</sup>. CNB use is accepted as complementary modality after FNAC, compared to repeated FNAC. Pain, hematoma, edema, hoarseness, and infection are common complications of CNB. It can be safely performed by an expert and under ultrasonography guidance.

The cumulative incidence of NTI after FNAC of PTC was reportedly 0.1% after five years and 0.3% after ten years<sup>[4]</sup>. The time interval between FNAC and NTI in PTC was reported to range from six months to seven years<sup>[8]</sup>. In this case, our patient exhibited symptoms at a relatively later time period of almost 10 years (115 mo). NTI can occur in any type of cancer, but it has been accepted as the benefit overrides the harm<sup>[9,10]</sup>. One of the factors related to NTI reported in other cancer types is needle diameter, suggesting that a similar pattern can occur during CNB in the thyroid. Although, it has not been established in any form of thyroid cancer.

Evaluation of 26 NTI patients showed that old age, lymph node metastasis, and extrathyroidal extension were related to NTI<sup>[11]</sup>. In this case, the patient was above 55 years old and had aggressive feature of extrathyroidal extension. For FNAC, there are a few tips from experts to avoid NTI such as removing negative pressure during needle withdrawal, removing sternothyroid muscle during thyroidectomy, or using ultrasound guidance to prevent seeding on the posterior part of thyroid<sup>[8]</sup>. Currently, there is no evidence to avoid NTI in CNB.

We found a post-biopsy hematoma due to CNB. The incidence of hematoma was found to be greater in CNB than in FNAC<sup>[12]</sup>, regardless of the nodule size, nodule composition, malignancy suspicion by ultrasound, or vascularity. There is no direct evidence that post-biopsy hematoma is related to NTI. Rather, a hypothesis that hematoma can prevent the healing of the needle tract suggests its action as a pool for disseminating tumor cells into the surrounding tissue.

The role of CNB can be less effective in other differentiated thyroid carcinomas<sup>[13,14]</sup>. In this case, although NTI may act as a clue to diagnose the patient with lymph node metastasis, using the FNAC and CNB simultaneously on initial diagnosis should be refrained when the ultrasound results shows a nodule highly suspicious for PTC.

## CONCLUSION

To directly compare the occurrence of NTI between FNAC and CNB, a larger population and a longer observation time is required. A late recurrence of PTC in a CNB site suggests that clinicians must carefully choose diagnostic method for PTC patients. Furthermore, signs of post-biopsy hematoma in NTI should be more thoroughly investigated in the future.

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