


BRIEF REPORT

Acute transient thyroid swelling after fine-needle aspiration biopsy: A case report of a rare complication and a literature review

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Abstract

Fine-needle aspiration biopsy (FNAB) is a safe and effective thyroid examination method with rare complications. Herein, we report a rare case of acute transient thyroid swelling that occurred after ultrasound-guided FNAB. The patient experienced acute pain with rapid thyroid swelling. Ultrasound imaging revealed a nodule with a linear, hypoechoic, and “patch-like” appearance, indicating edema without hemorrhage. After receiving anti-anaphylaxis and detumescence therapy for 1 day, the swelling regressed. Acute transient thyroid swelling is an extremely rare event that occurs shortly after FNAB and may frighten patients; therefore, clinicians should be aware of this complication in this context.

KEYWORDS

complication, fine-needle aspiration biopsy, thyroid, thyroid swelling, ultrasound

1 | INTRODUCTION

Thyroid nodules are quite common, with a prevalence of 40% in the adult population. It is more common in middle-aged women. The prevalence is higher in patients with chronic renal failure (60%–80%).^{1,2} Pathological examination of biopsied specimens is the gold standard for determining the nature of thyroid nodules. Fine-needle aspiration biopsy (FNAB) is a simple, efficient, and safe method.² The commonest complications of this procedure are local pain (92%) and minor

bleeding (3%–26%).³ Post-aspiration bleeding is mostly self-limiting.³ Severe complications, such as hemorrhage, infection, and respiratory distress, are rare; most of them can be controlled.³ To our knowledge, 13 cases of acute diffuse thyroid swelling after FNAB have been reported in PubMed from 1980 to 2021. Herein, we report a rare case of acute transient thyroid swelling after FNAB.

2 | CASE REPORT

A 56-year-old man was referred to the hospital for preoperative examination in preparation for kidney transplantation. He was

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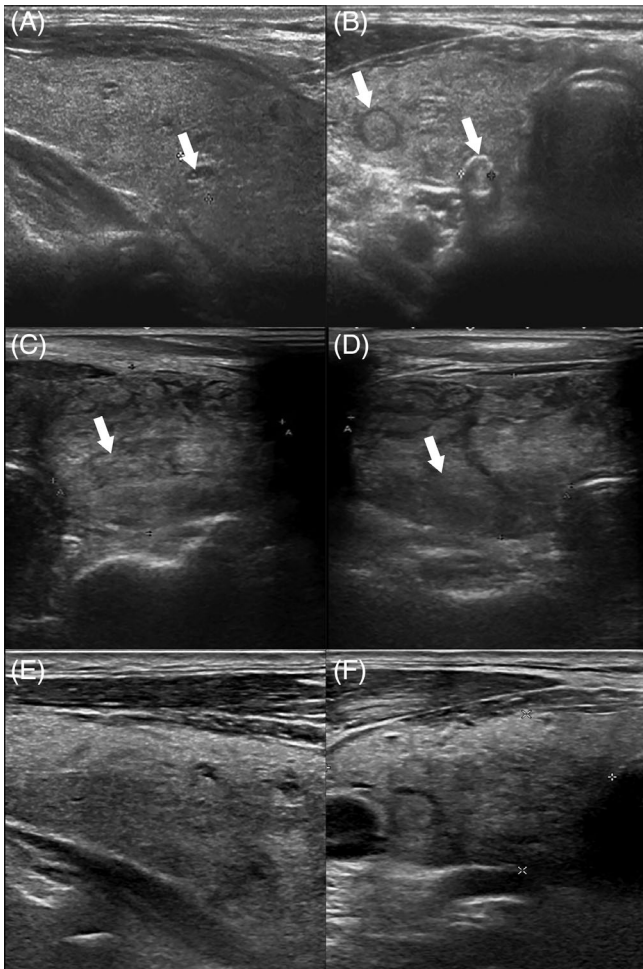


FIGURE 1 Ultrasound images of the thyroid gland. Fine-needle aspiration biopsy (FNAB) of the anterior left thyroid lobe (A, 6.0 × 2.8 × 1.7 cm) and right lobe (B, 6.5 × 3.6 × 2.1 cm). The white arrows indicate the thyroid nodules (1.4 × 1.6 and 3.9 × 2.0 cm). The volumes of the left (C) and right (D) lobes increased by 4.9 and 2.9 folds, respectively (8.8 × 4.2 × 3.8 cm and 9.0 × 4.2 × 3.8 cm, respectively) after 4 h of FNAB. The white arrows show hypoechoic areas and “patch-like” changes; normal volumes of the left (E) and right (F) thyroid lobes observed 7 days after the FNAB (2.9 × 2.1 × 5.3 cm and 3.4 × 2.2 × 5.5 cm, respectively)

diagnosed with renal failure in November 2020 and with hyperthyroidism 14 years ago, for which he received thiamazole and levothyroxine sodium for 3 years until he regained normal thyroid function. He declared no history of malaria, viral hepatitis, tuberculosis, or allergy. He had severe anemia and received two units of suspended red blood cells on June 25, 2020 during his hospitalization for temporary dialysis catheter infection. Laboratory investigations performed after admission revealed weak positivity for the human leukocyte antibody (HLA) II genes (DQB1 and DQA1), normal coagulation tests, platelet counts of $112 \times 10^9/L$, and D-dimer levels of 8.88 mg/L FEU. He was dialyzed regularly—thrice a week with 0.4 ml of low molecular weight heparin. Preoperative ultrasound (US) revealed bilateral enlarged thyroid lobes with multiple, solid, hypoechoic or mixed echogenicity masses, with a size ranging from 0.5 × 0.5 cm to 3.9 × 2.0 cm (Figure 1A,B). Particularly, a solid,

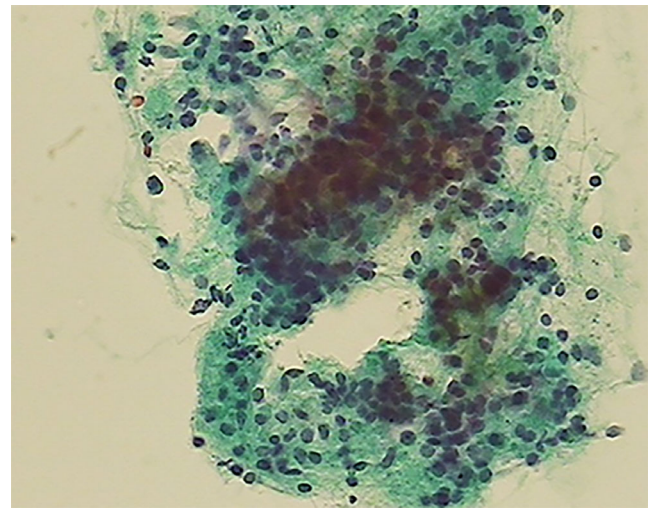


FIGURE 3 Findings of the pathological examination of the thyroid nodule in the right lobe. Liquid-based cytology reveals few monomorphic follicular epithelial cells with scant colloid and no heterotypic cells; the benign lesions are consistent with those of nodular goiter on pathological examination (Papanicolaou stain, original magnification ×200)

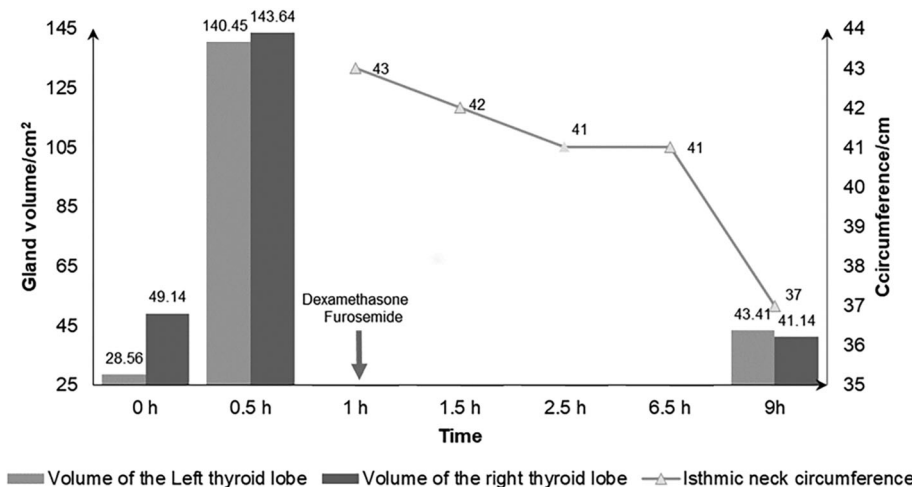


FIGURE 2 Changes in the isthmus neck circumference and thyroid volume

TABLE 1 Reported cases of acute thyroid swelling after fine-needle aspiration

Information of FNAB														
Time	Case	Country	Age/Sex	Anti-TPO	Anti-TG	Numbers of aspiration	Place of aspiration	Place of swelling	Start of swelling	Size of enlarged and symmetry	Cytological diagnosis	Etiology	Management	Duration of swelling
2015 ¹²	1	Japan	50/F	+	+	(1)	Right	Unilateral	0	2-3(Right), Asymmetry	Unsatisfactory	/	N	1 h
	2		60/F	-	-	(1)	Bilateral	Bilateral	0	/	Papillary carcinoma	Thyroid disease	N	A few hours
	3		70/F	-	-	(1)	Bilateral	Bilateral	1.5 h	/	Adenomatous goiter	Thyroid disease	N	A few hours
	4		40/F	-	-	(1)	Right	Unilateral	0	/(Right), Asymmetry	/	/	N	5 m
2016 ¹¹	5	U.S.A.	60/F	N/A	N/A	/	Left	Bilateral	1 m	2, Symmetric	Adenomatous goiter	Thyroid disease	Metoprolol, ibuprofen	1 m
2011 ¹⁰	6	Switzerland	27/F	+	+	(2)	Left	Bilateral	0	2(Left), /	Unsatisfactory	/	Diclofenac	3 h
	7		46/F	-	-	(1)	Right	Bilateral	5 min	/	Benign cystic colloid nodule	Thyroid disease	Paracetamol	1 h
2019 ⁹	8	China	31/F	N/A	N/A	3 (1)	Right	Bilateral	2 min	1.7, Symmetric	Papillary carcinoma	Thyroid disease	N	70 h
1982 ⁸	9	UK	47/F	N/A	N/A	6 (1)	Right	Bilateral	2-3 min	/	Class I negative	Thyroid disease	Cold compress for 15 min	1 h
2017 ⁶	10	China	68/F	N/A	N/A	(1)	Right	Bilateral	0	5, Symmetric	Follicular carcinoma	Thyroid disease	N	1 night
2007 ⁴	11	Belgium	56/M	N/A	N/A	2 (1)	Left	Bilateral	0	/, Asymmetry	Medullary carcinoma	Thyroid disease	N	4 h
2021 ⁷	12	China	30/F	N/A	N/A	1(1)	Left	Unilateral	0	1.5, Asymmetry	Benign cystic colloid nodule	Thyroid disease	N	0.5 h
2021 ⁵	13	Japan	26/F	-	-	1(2)	Left	Bilateral	0	/, Asymmetry	Papillary carcinoma	Thyroid disease	Hydrocortisone, H1 antihistamines	18 h

Note: F, female; M, male; N/A, not available; +, positive; -, negative. The number in parentheses refers to the number of puncture examinations. Abbreviations: FNAB, fine-needle aspiration biopsy; TG, thyroglobulin; TPO, thyroid peroxidase.

hypoechoic, and calcified nodule was found in the inferior pole of the right thyroid lobe (TI-RADS 5) (Figure 1B). Color Doppler flow imaging (CDFI) revealed blood flow signals in the mass, but not within the nodules. No abnormal lymph node signals were detected in the thyroidectomy zone. Triiodothyronine (T3) and thyroxine (T4) levels were normal: 1.41 ng/ml and 9.30 µg/dl, respectively. However, thyroid-stimulating hormone (TSH) levels were low (0.003 mIU/L, normal value: 0.550–4.780 mIU/L), while levels of anti-thyroglobulin (anti-TG) and anti-thyroid peroxidase (anti-TPO) antibodies were high (144.9 IU/ml and >600 IU/ml, respectively). He underwent US-guided FNAB of the right lobe successfully with three needle aspirations after local anesthesia with lidocaine.

Thirty minutes after the FNAB, the patient complained of pain in the neck and developed a diffuse neck swelling. His vital signs were stable. No ecchymosis was observed at the site of needle puncture. US was performed; there were no signs of hemorrhage. A bilateral thyroid swelling with multiple linear hypoechoic areas scattering in a “patch-like” pattern in both lobes was observed. The volume of the left and right thyroid lobes increased by 4.9 and 2.9 folds, respectively, compared to the US values before the procedure (Figure 1C,D). No abnormal blood flow was observed on CDFI. The patient had no symptoms of airway compression (e.g., dyspnea) and had an oxygen saturation of 100%. Besides, the patient had a history of heart disease with frequent atrial premature beats for 10 years, and a small amount of pericardial effusion and mild mitral/tricuspid regurgitation for 7 days. Therefore, a steroid was used for anti-allergic therapy and furosemide for detumescence. After symptomatic treatment with dexamethasone (intravenous, 10 mg) and furosemide (intravenous, 60 mg) with close monitoring for 1 day, the swelling reduced gradually (Figure 2). Two days later, T3 and T4 levels were normal (0.83 ng/ml and 8.10 µg/dl, respectively), TSH levels were still low (0.007 mIU/L), and anti-TG and anti-TPO levels were high (743.7 IU/ml, >600 IU/ml). US performed 7 days after FNAB revealed a normal thyroid gland structure (Figure 1E,F). Pathological examination of the right thyroid lobe revealed nodular goiter (Figure 3).

3 | DISCUSSION

Acute transient thyroid swelling is an extremely rare complication of FNAB. Only 13 cases have been reported in nine published articles so far. The clinical characteristics of all the reported cases are summarized in Table 1.^{4–12}

The average age of the patients was 47 (range, 26–70) years. A proportion of 92.3% (12/13) of the patients were women; this may be due to the higher incidence of thyroid nodules in females than in males. The incidence of thyroid nodules in the males was 11.5%, with the patient age ranging from 25 (4.5%) to 55 (17.5%) years. Meanwhile, the incidence in the females was 17% (ratio 1:1.48), with the patient age ranging from 25 (7.6%) to 55 (26.9%) years.¹³

The mean time for a diffuse thyroid swelling to occur after FNAB is 10 min. Previous reports have described one case that developed at the time of aspiration and another that developed 1 month after

FNAB (the longest recorded time). Bilateral swelling occurred in 8/11 patients who received unilateral puncture and 2/11 patients who received bilateral puncture. The patients had different levels of pain and discomfort in the neck. However, they had no other complications, such as airway obstruction or bleeding. Immediate US revealed a 1.5- to 5- fold (2.5-fold in average) increase of the thyroid volume, with one patient having an asymmetric enlargement. Inhomogeneous hypoechoic lesions with a “patch-like” or “crack-like” appearance scattered throughout the swollen thyroid gland were observed in all cases, indicating thyroid parenchymal edema. Regression was slow in patients with mild hemorrhage and mixed hypoechoic areas.⁶

Compared to massive hematomas and other complications, acute diffuse thyroiditis is characteristically self-limiting, with rapid recovery and no airway obstruction.³ Polyzos et al. mentioned that although this complication is worrisome, it is self-limiting, and there is no need to give patients specific treatment.¹⁴ The recovery time ranged from 1 h to 5 months, with an average of 10.7 h. Most patients recovered spontaneously within a day. The thyroid volume and US characteristics returned to normal, as seen on follow-up US images. Five of these patients received the following treatment: neck cooling for 15 min (Case 9), hydrocortisone combined with H1 antihistamines (Case 13), metoprolol plus ibuprofen (Case 5), diclofenac (Case 6), and paracetamol (Case 7). However, whether the recovery times were shortened in the treatment groups remains unclear.

Pathological diagnoses varied: medullary thyroid carcinoma ($n = 1$), follicular thyroid neoplasm ($n = 1$), papillary thyroid carcinoma ($n = 3$), adenomatoid goiter ($n = 3$), benign cystic colloid nodule ($n = 2$), and Class I negative ($n = 1$). Besides these, unsatisfactory biopsy was reported for two patients.

The mechanism of acute transient thyroid swelling after FNAB remains unknown. Three hypotheses have been proposed; one is the local release of calcitonin gene-related peptide (CGRP). CGRP is a potent endogenous vasodilator produced by the nervous system, which is highly expressed in medullary thyroid cancer.⁴ Another hypothesis is based on vascular leakage. To reduce patient discomfort and diagnostic errors, we performed three needle passes with an on-site evaluation of cytology specimens, increasing the adequacy of cytology specimens substantially and decreasing the number of required needle passes.¹⁵ Nevertheless, repeated puncturing can cause vascular injury and the local release of a vasodilator, which further induces vascular leakage.¹⁰ We think that the complication in our patient might be due to vascular leakage. The third one is that the complication is a hypersensitivity reaction mediated by thyroglobulin, even without an allergic history.^{7,16} In such reactions, as the aspiration needle touches the patient's skin (external physical stimulation), mast cells are activated. Thus, histamine and other inflammatory mediators are released, contributing to the changes of vascular permeability, which finally induce diffuse thyroid swelling. After the elimination of the stimulus, patients recover spontaneously with the substance being cleared up by the body gradually. Hence, hypersensitivity reaction cannot be ruled out in this case while vascular leakage cannot explain the spontaneous and quick recovery of the swelling well.¹⁰ In addition, the large unilateral thyroid nodules might explain the asymmetric bilateral enlargement. As the nodules are

fixed with envelopes, the increase in volume in the concerned lobe is less than that in the contralateral lobe.

In summary, acute transient thyroid swelling is an extremely rare and self-limiting complication of FNAB. It is characterized by symmetrical neck swelling, pain, and dyspnea, without airway obstruction or hemorrhage. US reveals a 1.5- to 5-fold increase of the thyroid volume, with a hypochoic and “patch-like” appearance of the thyroid gland. It is not life-threatening and should resolve spontaneously. Psychological guidance, comfort, and reassurance are essential for patients after exclusion of airway obstruction and hemorrhage. No underlying pathogenesis or clear mechanism has been identified.

CONFLICT OF INTEREST

All the authors declare no conflict of interest related to this work.

AUTHOR CONTRIBUTIONS

Designed the study: Wenli Zeng, Jinming Lu, Ziyan Yan, and Yun Miao. *Participated in the performance of the research:* Wenfeng Deng, Yi Zhou, Wenwei Xu, and Jian Xu. *Made the figures:* Jinming Lu and Yuchen Wang. *Drafted and revised the manuscript:* Wenli Zeng, Jinming Lu, Ziyan Yan, and Yanna Liu. All the authors contributed to the article and approved the submitted version.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

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