SCIENTIFIC RESEARCH

ULTRASONOGRAPHIC CHARACTERISTICS AND COMPARING WITH FINE-NEEDLE ASPIRATION CYTOLOGY RESULTS OF SUBACUTE GRANULOMATOUS (DE QUERVAIN'S) THYROIDITIS CASES

Nguyen Thi Thu Hang*, Lai Thu Huong**, Le Van Khang**

SUMMARY

Purpose: To describe the ultrasound imaging characteristics of subacute thyroiditis and compare them to fine needle aspiration thyroid cytology results.

Materials and methods: A retrospective and prospective cross-sectional descriptive study on patients diagnosed with subacute thyroiditis, who underwent ultrasound, and had fine–needle aspiration results at the Radiology Center, Bach Mai Hospital from January 2020 to April 2023.

Results: The study was conducted on 65 patients with fine needle aspiration results as subacute thyroiditis, 90.8% female, and 63.1% in middle age (40 to 60 years old). Clinical symptoms including neck pain, low-grade fever, and increased metabolism were observed in 63.1% of cases. 67.7% of cases had heterogeneous hypoechoic lesions, with ill-defined margins. In 45 cases Doppler color ultrasound was performed, 44 cases (66.2%) hypovascularity, and only 1 case (1.5%) hypervascularity. 35.4% of cases had hypoechoic thyroid nodules, of which 10.8% were classified as TIRADS 4 and 24.6% were classified as TIRADS 5.

Conclusion: Subacute thyroiditis can present as hypoechoic nodules, which can easily be confused with malignancies, challenging in differential diagnosis. Fine-needle aspiration thyroid cytology is an essential procedure in atypical cases. Clinical coordination with imaging and cytology will help achieve an accurate diagnosis.

Keywords: *Subacute thyroiditis, thyroid ultrasound, fine needle aspiration.*

** Hanoi Medical University*

*** Radiology Center-Bach Mai Hospital*

I. INTRODUCTION

Subacute thyroiditis, also known as De Quervain's thyroiditis, is a granulomatous inflammation of the thyroid gland, accounting for about 5-6% of thyroid diseases [1]. Subacute thyroiditis affects women 3 to 5 times more than men, especially in middle-aged women. The cause of the disease is not clear, viral infection is considered the most common one, often occurring about 2 weeks after upper respiratory infection [2],[3]. Common clinical features are swelling and pain in the neck, low-grade fever, and symptoms of hyperthyroidism, and spread to the ear and head on the same side, if severe. Clinical examination shows a soft and painful thyroid gland, tests show a decrease in TSH hormone concentration and an increase in erythrocyte sedimentation rate and C-reactive protein [4]. Subacute thyroiditis is self-limited and does not affect thyroid function, or can be improved with anti-inflammatory drugs and usually subsides within 24 hours [5].

Subacute thyroiditis is usually diagnosed clinically based on history, examination, and paraclinical tests. However, ultrasound is a useful imaging method in detecting and monitoring thyroid diseases, including thyroiditis[6]. In subacute thyroiditis, thyroid lesions are often noted as heterogeneous hypoechoic areas, unclear borders and boundaries, decreased flow signal on color Doppler ultrasound, sometimes in the form of hypoechoic nodules, which can be mistaken for malignant lesions, affecting the patient's treatment direction [6]. Therefore, fine needle aspiration (FNA) of the thyroid gland is a necessary method to confirm the diagnosis of subacute thyroiditis [7],[8]. According to the guidelines of the American Association of Clinical Endocrinologists (AACE), this is the "most trusted and effective method today in distinguishing benign and malignant thyroid nodules" with an accuracy of 95% [9].

Subacute thyroiditis is an uncommon disease, and there are currently very few studies on this disease in Vietnam. Therefore, we conducted this study to describe the ultrasound imaging characteristics of subacute thyroiditis and compare them with the fine needle aspiration thyroid cytology results.

II. MATERIALS AND METHODS

1. Patient selection

- *Selection criteria*: all ages, all genders, patients who had a thyroid ultrasound and had an FNA cytology result of subacute thyroiditis.

- *Exclusion criteria:* no thyroid ultrasound or FNA cytology result, relative contraindications to cytology (clinical and laboratory thyrotoxicosis, other serious diseases), and patients who did not agree to participate in the study.

2. Methods: A retrospective and prospective cross-sectional descriptive study on patients diagnosed with subacute thyroiditis, who underwent ultrasound, and had FNA results at the Radiology Center, Bach Mai Hospital from January 2020 to April 2023.

3. Variables: general characteristics including age, gender, clinical symptoms, ultrasound imaging characteristics including location, number, echogenicity, boundaries, size, vascular flow on Doppler ultrasound, with localized nodules graded according to the American College of Radiology Thyroid Imaging Reporting and Data System- ACR - TIRADS 2021. The higher TIRADS grade nodule will be used for multiple nodules. The results of pathology will be classified according to the Bethesda system for reporting thyroid cytopathology 2018.

4. Implementation process

The patient is placed in a supine position with a slightly tilted head, and bilateral neck ultrasound is performed to expose the anatomical structures including the thyroid gland, esophagus, trachea, blood vessels, and adjacent soft tissues. Thyroid cell aspiration is performed under ultrasound guidance (ULTRASONIC LOGIQ S8, GE Healthcare, USA) with a fine needle (23G or 25G), obtaining specimens on at least 2 slides, the preparations are fixed in 95% alcohol, and stained with Papanicolaou. The techniques are performed and the results are read by a radiologist and pathologist with at least 5 years of experience.

5. Data processing: Data were entered and analyzed using descriptive statistics on SPSS 20 software (IBM, USA). Qualitative variables were described by frequency and percentage. Quantitative variables were described by mean and standard deviation. Results were presented in tables.

6. Research ethics: Information related to research subjects is kept confidential and is only used for research purposes and not for any other purpose.

III. RESULTS

The study was conducted on 65 patients with subacute thyroiditis who underwent ultrasound and FNA cytology. The general characteristics of the study subjects are presented in Table 1. 59/65 (90.8%) are female. Age ranged from 24 to 73 years, the mean age of the study was 47. Clinical symptoms including neck pain, low-grade fever, and increased metabolism were observed in 63.1% of cases, the remaining patients had no clinical symptoms and were only incidentally discovered during examination.

Table 1. General characteristics of the study subjects

Characteristics		N (%)
Gender	Male	06 (9.2)
	Female	59 (90.8)
Age group	<20	0 (0)
	20-40	17 (26.2)
	40-60	41 (63.1)
	> 60	7 (10.8)

The imaging features of subacute thyroiditis are presented in Table 2. 44 patients (67.7%) had heterogeneous ultrasound images, of which 52.3% and 15.4% had unilateral and bilateral lesions, respectively. Only one case of diffuse lesions involving the entire thyroid lobe was observed. The mean largest transverse diameter of the lesions was 14.2 mm (5 to 42).

There were 23 cases of hypoechoic thyroid nodules, of which one nodule was present in 27.7% of cases and two or more nodules in 7.7% of cases. These nodules were graded according to ACR – TIRADS, with 7 cases graded TIRADS 4 and 16 cases TIRADS 5. The average largest transverse diameter was 8mm, ranging from 4 to 22mm.

In the study, 43 cases (66.2%) had decreased vascular flow on color Doppler ultrasound, and only 1 case (1.5%) had increased vascularity.

All patients had FNA results as subacute thyroiditis (group II according to the Bethesda system for reporting thyroid cytopathology 2018).

Table 2. Ultrasound imaging characteristics of subacute thyroiditis.

Characteristics			n(%)
Heterogeneous hypoechoic areas, unclear boundaries. Two lobe		One lobe	34 (52.3)
		10 (15.4)	
Hypoechoic nodules	Number	One nodule	18 (27.7)
		Two nodules	5 (7.7)
	TIRADS grading	TIRADS 4	7 (10.8)
		TIRADS 5	16 (24.6)
Color Doppler Increase vascular flow		Decrease vascular flow	43 (66.2)
Not Implemented		1 (1.5)	
		21 (32.3)	
Follow - up Turn to normal		Subside	7 (3-12 weeks)
		3 (8- 32 weeks)	

IV. DISCUSSION

Subacute thyroiditis or De Quervain's thyroiditis is a granulomatous inflammation of the thyroid cells, accounting for about 5-6% of thyroid diseases[1]. The cause of the disease is not clear, viral infection is considered the most common cause, often occurring about 2 weeks after upper respiratory infection [2],[3].

In our study, subacute thyroiditis was mainly found in women (90.8%), and 63.1% in middle age (40 to 60 years old). This result is quite similar to previous studies [10],[11]. Common clinical symptoms are neck pain and swelling, mild fever, and increased metabolism in 63.1% of cases. The study by B Brkljacić et al. showed that hypoechoic lesions are suggestive of malignancy, however, hypoechoic and clinically non-palpable thyroid nodules are usually benign [12]. In our study, 67.7% of cases showed heterogeneous hypoechoic images with unclear boundaries, suggesting lava flow. Previous

studies by Mary [13] and Cappelli [14] showed the results were 77.8% and 100%, respectively.

Color Doppler ultrasound was performed on 44/65 patients, 43 patients had decreased vascular flow on Doppler ultrasound and only 1 case had increased vascularity. This result explains that in the early stage of subacute thyroiditis, a large number of inflammatory cells infiltrate the thyroid gland, destroy follicles and capillaries, and gradually form giant cells. In the recovery stage, mild increased vascularity can be seen on Doppler ultrasound [15].

Ultrasound images of subacute thyroiditis can also appear as hypoechoic nodules, causing misdiagnosis with malignant lesions [16],[17]. In this study, there were 23 patients with hypoechoic thyroid nodules, of which 27.7% had one nodule and 7.7% had two nodules. The nodules were classified according to ACR-TIRADS 2021, of which 10.8% were classified as TIRADS 4 and 24.6% were classified as TIRADS 5. FNA was indicated in these patients when the lesions produced hypoechoic nodules suspicious of malignancy and there was no clinical or laboratory evidence of thyrotoxicosis.

In cases with atypical clinical or ultrasound images, FNA is a necessary method to contribute to the definitive diagnosis[8]. The most typical cytological feature of subacute thyroiditis is giant cell granuloma, consisting of hundreds of large nuclei and colloids in the cytoplasm, in addition, many degenerated colloid follicular cells and dirty matrix, and neighboring inflammatory cells can also be observed [7],[8]. We also found that the majority of patients with ultrasound images in the form of thyroid hypoechoic nodules often do not have clear clinical symptoms (about 69.6%), which can easily lead to misdiagnosis with malignant lesions such as thyroid cancer, metastasis, etc.

Subacute thyroiditis is a self-limiting disease in mild cases, cases that cause dramatic clinical symptoms are indicated for treatment with anti-inflammatory drugs (steroids or non-steroids). The disease usually resolves within a few weeks to a few months[18]. In our study, 10 patients were followed up, of which 7 cases showed a decrease in clinical and ultrasound lesions within a period of 7 to 12 weeks, and 3 patients had lesions disappear completely within a period of 8 to 32 weeks.

V. CONCLUSION

Subacute thyroiditis can present as hypoechoic nodules, which can easily be confused with malignancies, challenging in differential diagnosis. FNA thyroid cytology is an essential procedure in atypical cases. Clinical coordination with imaging and cytology will help achieve an accurate diagnosis.

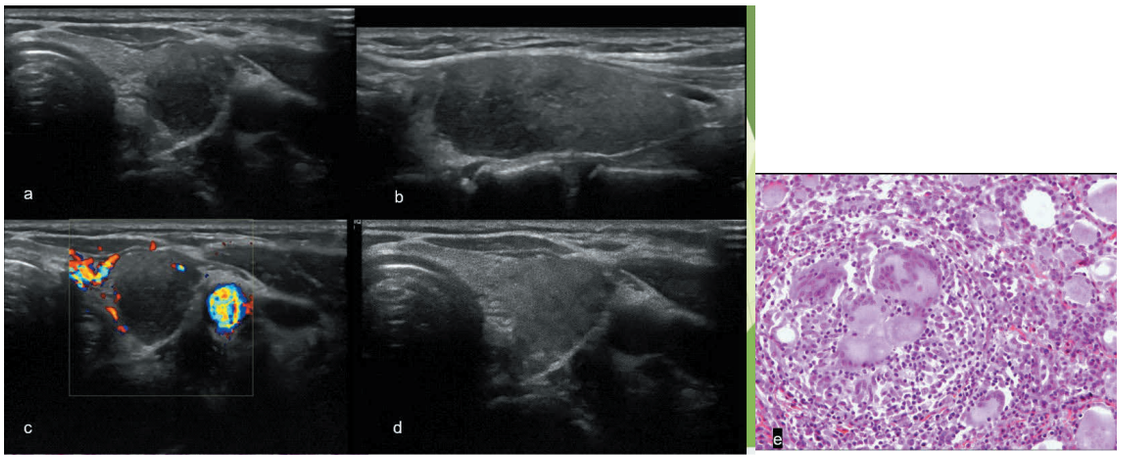

Figure 1. *A 56-year-old female patient had neck pain and swelling for 1 week with a low-grade fever. Laboratory tests showed normal thyroid function. Ultrasound of the left thyroid lobe, transverse section (a), longitudinal section (b), Doppler ultrasound (c), image after 4 weeks of anti-inflammatory treatment (d), cytology results showed central giant cells with right displacement interspersed with neutrophils and scattered colloid (group II according to the Bethesda system for reporting thyroid cytopathology 2018) (e).*

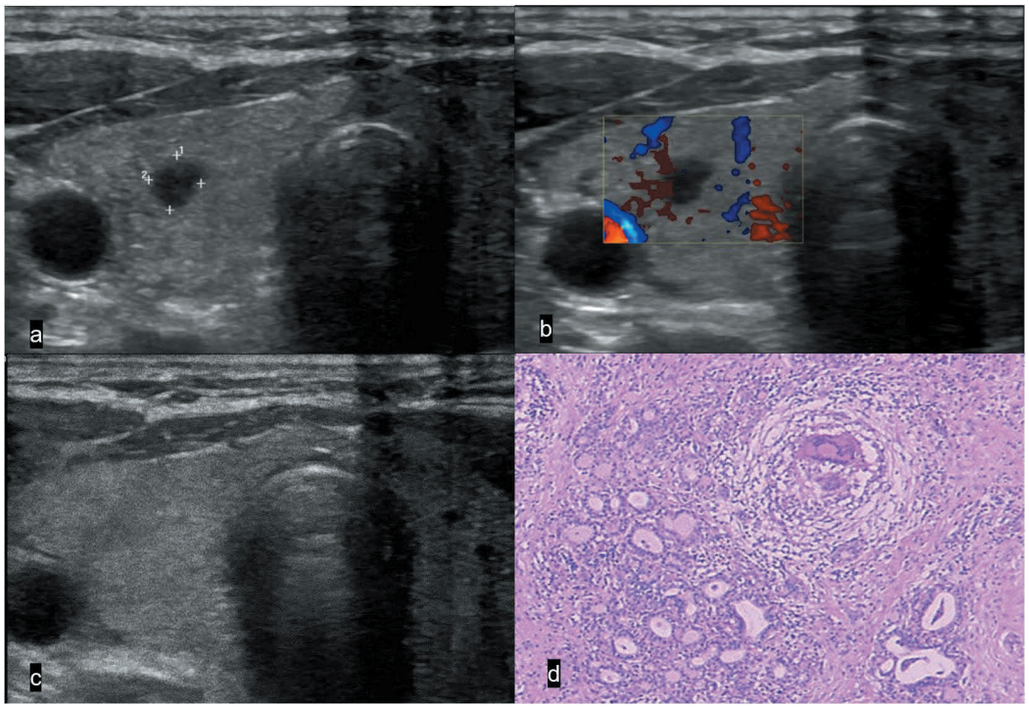

Figure 2. *A 57-year-old female patient, without clinical symptoms and normal thyroid function tests. Right thyroid lobe ultrasound, transverse section (a), Doppler ultrasound (b), 3-month follow-up without medications (c), cytology showed left-shifted central giant cells interspersed with neutrophils and scattered colloid (group II according to the Bethesda system for reporting thyroid cytopathology 2018) (e).*

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Correspondent: Nguyen Thi Thu Hang Email: nguyenthuhang097@gmail.com

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