

## Inferior thyroid artery thrombosis: a potential mimicker of thyroid nodule

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### Abstract

The use of high-frequency ultrasound imaging in assessment of the neck abnormalities has led to the detection of various conditions in the general population. Inferior thyroid artery thrombosis is a very uncommon clinical condition, which might be misdiagnosed as a thyroid nodule. In this article, we present a case of a female patient who suffered from a sore throat presumably as a result of inferior thyroid artery thrombosis, which was imitating thyroid nodule. The diagnosis was made by gray-scale and color Doppler ultrasound. We aim to draw attention of physicians to this exceptionally uncommon diagnosis in order to prevent probable biopsy. Our literature search via PubMed showed only one reported case about inferior thyroid artery thrombosis imitating a thyroid nodule.

**Keywords:** Inferior Thyroid Artery; Thrombosis; Thyroid Nodule; Ultrasound.

### INTRODUCTION

The use of high-frequency ultrasound (US) imaging in assessment of the thyroid gland has led to the detection of numerous thyroid nodules in the general population. In addition to the presence of real thyroid nodules, there have been lesions of extrathyroid origin that may simulate a thyroid nodule. Inferior thyroid artery (ITA) thrombosis is a very rare clinical entity, which can be misdiagnosed as a thyroid nodule and a parathyroid lesion (due to its posterior and inferior location) without careful evaluation as the initial appearance may be puzzling. To the best of our knowledge, only one case has been reported in the literature. Both color Doppler US and computed tomography angiography (CTA) are fast and reliable diagnostic tools for initial approach and follow-up of ITA thrombosis (1). We present this case to draw attention of physicians to this extremely unusual pathology.

### CASE REPORT

A 46-year-old woman was admitted to otolaryngology department complaining of sore throat, which had started a few weeks before. Nothing significant was observed in her personal or family medical history.

Received: 07.06.2016

Accepted: 25.07.2016

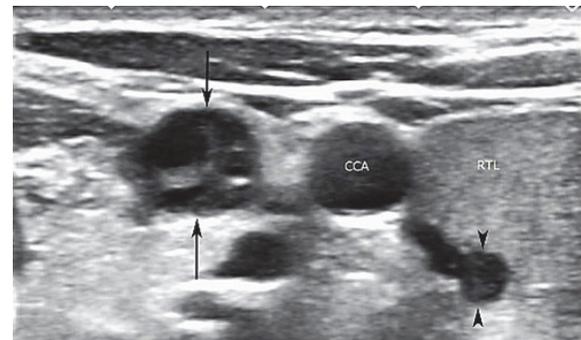
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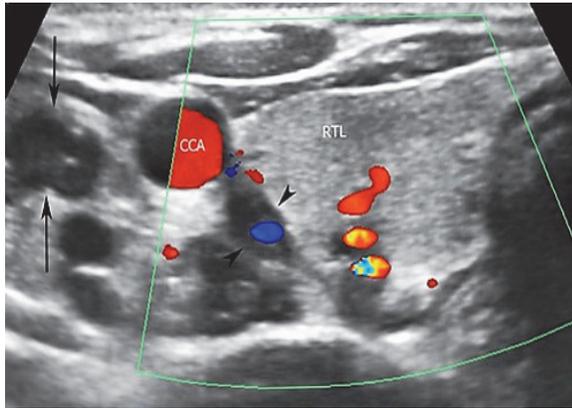
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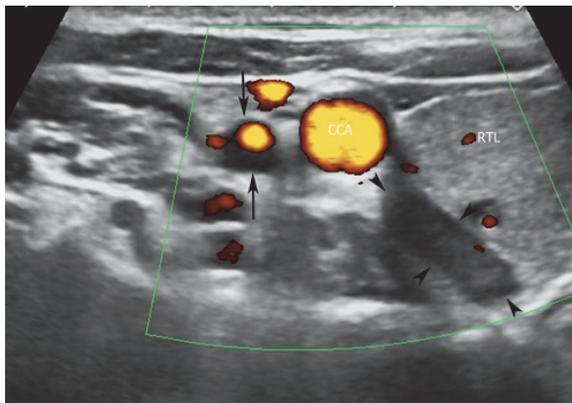
Physical examination and routine laboratory values were normal. Serum TSH, FT3 and FT4 levels were within normal limits (3.74 mIU/mL, 2.78 pg/mL and 1.12 ng/dL, respectively). She was referred to the radiology outpatient clinic for US examination of the neck. Transverse gray-scale US revealed a hypoechoic round shaped nodule-like lesion measuring 3x3 mm, which was located just posterior to the right thyroid lobe and imitating a thyroid nodule. Color Doppler US showed central vascularity within the lesion. The remaining parts of the thyroid gland was normal. Furthermore, there was a 8x8 mm round shaped hypoechoic-anechoic lesion adjacent to the right common carotid artery. It also showed vascularity in some areas on color Doppler US (Figure 1. A, B, C, D).



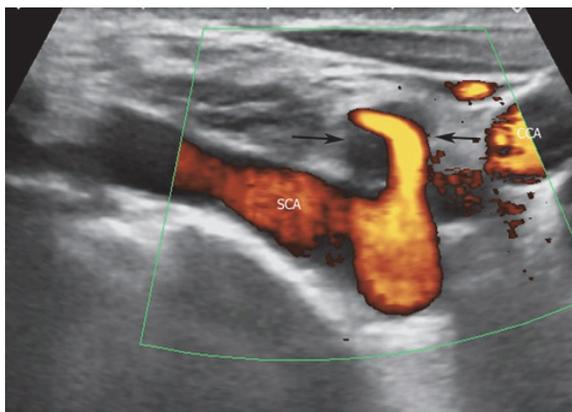
**Figure 1A.** Transverse gray-scale sonography shows hypoechoic round shaped nodular lesion (arrowheads), which is located just posterior to the right thyroid lobe (RTL) and mimicking a thyroid nodule. Also, there is a second round shaped hypoechoic-anechoic lesion (arrows) adjacent to the right common carotid artery (CCA).



**Figure 1B.** Color Doppler sonogram reveals central vascularity within the nodule-like lesion (arrowheads). Arrows again pointing the second round shaped lesion.



**Figure 1C.** Power Doppler ultrasound illustrates vascularity in second round shaped lesion (arrows) adjacent to the right common carotid artery (CCA). Arrowheads pointing the tubular shape of the nodule-like lesion and there is minimal vascularity within it.

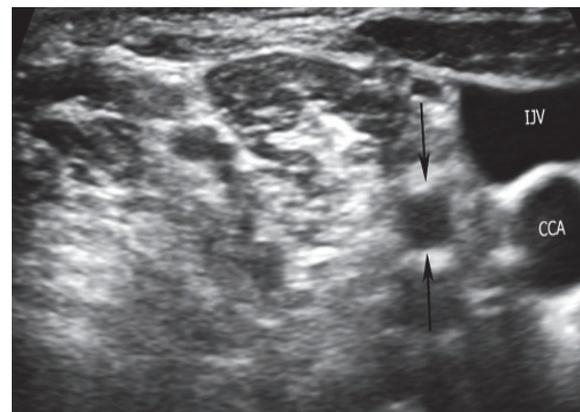


**Figure 1D.** Power Doppler sonogram showing central vascularity within the enlarged thyrocervical trunk (arrows) arising from subclavian artery (SCA), which is suggestive of partial thrombosis.

Examination in the oblique and sagittal plane demonstrated that these two lesions were tubular

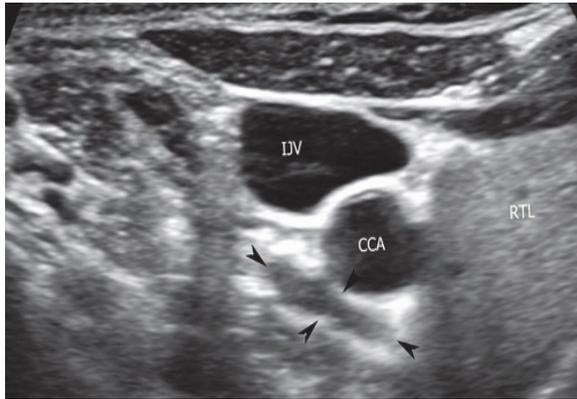
and/or fusiform in shape. In addition, careful examination showed the existence of continuity of these two tubular structures with each other and finally joining to the subclavian artery through the thyrocervical trunk. Color Doppler US demonstrated arterial flow in some areas through the course of the lesion that was in continuum with the subclavian artery. Initially, a diagnosis of partially thrombosed fusiform dilatation of the right thyrocervical trunk-ITA was made on the basis of gray-scale and color Doppler US findings. The left ITA was normal on color Doppler US.

The patient was consulted with a cardiovascular surgeon. She was hemodynamically stable. Detailed history taking to investigate possible causes of the thrombus and/or fusiform dilatation of the ITA did not reveal any history of connective tissue disorder, percutaneous procedure, previous neck surgery, or trauma. Laboratory examinations were further carried out to identify an association with rheumatologic diseases and vasculitides, such as rheumatoid arthritis, lupus, microscopic polyangiitis and Takayasu arteritis. Serum rheumatoid factor level was (RF) 8 IU/L (normal range: 0-15 IU/mL), erythrocyte sedimentation rate (ESR) was 6 mm/hr (normal range: 0-20 mm/hr) and serum C-reactive protein (CRP) level was 2.32 mg/L (normal range: 0-5 mg/L). The results of ANA (anti-nuclear antibody), cytoplasmic and perinuclear ANCA (anti-neutrophil cytoplasmic antibody) tests were negative. The patient received low-molecular-weight heparin and follow-up gray-scale and color Doppler US one month later revealed complete resolution of the thrombus after medical therapy. Further, the fusiform shape of the right ITA and thyrocervical trunk was absent (Figure 2. A, B, C).

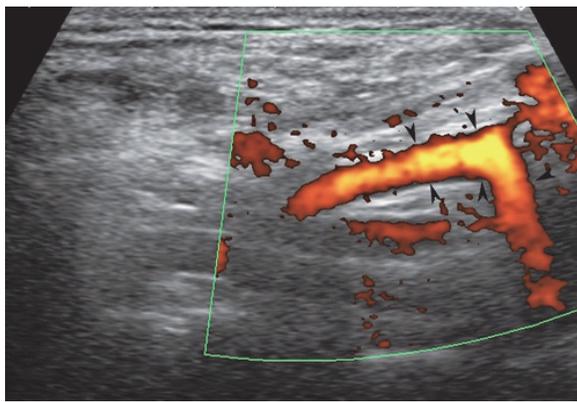


**Figure 2A.** Transverse gray-scale sonogram reveals decreased diameter of inferior thyroid artery (arrows), after resolution of the thrombus, next to the common carotid artery (CCA) and internal jugular vein (IJV).

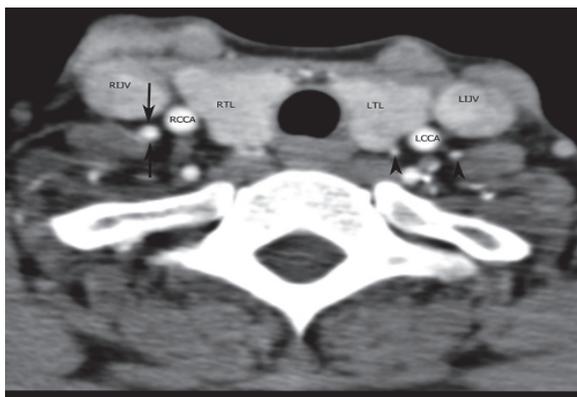
The measured diameters of the right thyrocervical trunk, middle and distal part of right ITA were 3 mm, 3 mm, 2 mm, respectively (5 mm, 8 mm, 3 mm, before resolution of the thrombus). The same measurements on the left were 2 mm, 1.5 mm, 1 mm, respectively. CTA with multiplanar reformations excluded vascular anomalies (Figure 3. A, B).



**Figure 2B.** Gray-scale ultrasound image depicts the longitudinal view of inferior thyroid artery (arrowheads) posterior to the common carotid artery (CCA), which is decreased in diameter after resolution of the thrombus.

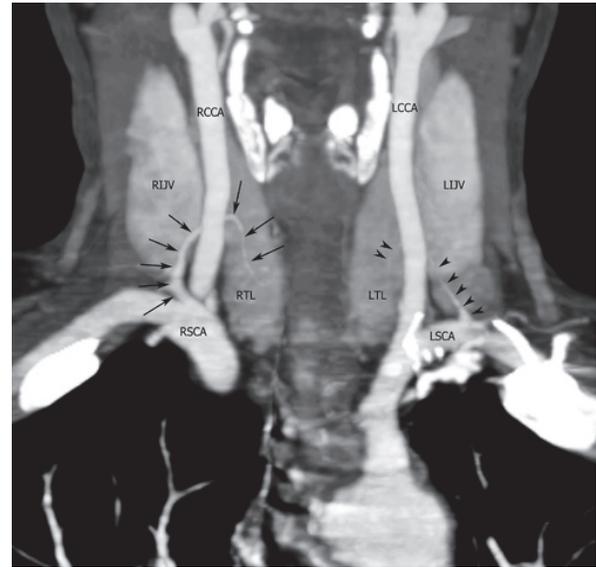


**Figure 2. (C)** Power Doppler sonography showing normal flow signal in the thyrocervical trunk and proximal part of the inferior thyroid artery (arrowheads), which are decreased in diameter after resolution of the thrombus.



**Figure 3A.** Axial intravenous contrast-enhanced computed tomographic images illustrate the right (arrows) and left (arrowheads) inferior thyroid arteries. Right inferior thyroid artery are wider than left.

The final diagnosis was isolated partial thyrocervical trunk-ITA thrombosis. The patient was asymptomatic and she was instructed to follow-up on an as-needed basis.



**Figure 3B.** Coronal intravenous contrast-enhanced computed tomographic images illustrate the right (arrows) and left (arrowheads) thyrocervical trunks and inferior thyroid arteries. Right thyrocervical trunk and inferior thyroid artery are wider than left.

## DISCUSSION

US of the neck, particularly thyroid gland has become increasingly common, with evaluation of thyroid nodules representing the main indication for its use. While detection of thyroid nodules with modern high-resolution sonographic equipment is generally not a challenge, pitfalls may occur by which normal structures or pathology in neighboring organs are mistaken for thyroid nodules. Abnormal perithyroidal structures such as nodular parathyroid lesions and esophageal diverticulum may mimic an exophytic thyroid nodule on gray-scale US (2). A literature survey via PubMed revealed only one reported case about ITA thrombosis imitating a thyroid nodule.

Normally, the ITA is a branch of the thyrocervical trunk that arises from the subclavian artery. It has an upward course in front of the vertebral artery and then turns medially behind the carotid sheath. Reaching the lower border of the thyroid gland, it divides into two branches, which supply the posteroinferior parts of the gland. It has a close relationship with the thyroid gland posteriorly (1).

Diagnosis of inferior thyroid artery abnormalities can be made by Color Doppler US, computed tomography angiography (CTA) or conventional angiography (3-4). In general, gray-scale US in combination with color or power Doppler is noninvasive, safe, fast, cost-effective and feasible technique for neck imaging, especially valuable for differential diagnosis, because ITA thrombosis would show a connection to arterial system. CT is also helpful in identifying the vascular origin because multidetector CT, now commonly used, provides better image quality with rapid image acquisition and various multiplanar image reformation.

Our patient's initial presentation was puzzling, because partially thrombosed and dilated ITA with its close relationship to the thyroid gland posteriorly caused false appearance. However, after witnessing connection to the arterial system of the mass, the vascular etiology was clear. Moreover, in this case, hypoechogenicity and intranodular vascularity would meet sonographic criteria for recommending biopsy. Nonetheless, careful examination and identification of the ITA prevented biopsy of this lesion, which might have caused potential hazards (eg, bleeding, neck hematoma, compression of trachea etc.). While biopsy should not be performed, risks may be low or inexistent in case of an ITA presenting with total thrombosis and more important in cases of an ectasia with a partially occluding thrombus in ITA.

Although the first reported article did not include follow-up data, such as resolution of the thrombus and whether there was a change in diameter of ITA or not. In their case, the diagnosis of partially thrombosed fusiform aneurysm of ITA was made and the authors preferred to follow-up the patient without any medication. Our case is almost similar to their case. But they did not show follow-up images. The thrombosed ITA diameter of their case was 10 mm. The main feature that differentiate the present case from previously reported one is the reduction in ITA diameter after complete resolution of the thrombus. In our case, the thrombosed ITA was measuring 8 mm at the widest part (which was also middle part of the ITA) and was decreasing towards the both thyrocervical trunk and distal part of the ITA. The dimensions of the thrombosed thyrocervical trunk and distal end of ITA were 5 mm and 3 mm, respectively. After complete resolution of the thrombus, the diameter of the right thyrocervical trunk and ITA reduced but were still wider than the left. However, the fusiform shape of the artery was absent. We think that the dilatation and fusiform appearance of the artery was secondary to the thrombosis. In other words, the lumen diameter first increased, then decreased in size with repermeabilization. Nevertheless, thrombosed arteries do not usually increase in size.

We have found only one study that mentions the diameter of ITA in the literature (5). Xiao et al. have found the average diameters of ITA 3-3.75 mm in patients with Graves' disease, measured using radiographs from angiography. However, we could not find any study that was performed in normal individuals. Generally, coronary artery and abdominal aortic aneurysms are defined as arterial dilatation which exceed the diameter of normal adjacent segments by at least 1.5 times (6-7). According to these criteria, in our case, the difference in lumen diameters between the right and left thyrocervical trunk-ITA after resolution of the thrombus was considered as a physiological variation similar to variability in vertebral artery diameters. Thus, we did not make a diagnosis of aneurysm of the thyrocervical trunk-ITA. In the present case, the etiology of an isolated ITA thrombosis in a middle-aged woman remains unclear, because no apparent cause for the thrombosis was evident. Besides, owing to the rarity of this entity, there is no standard treatment protocol for

ITA thrombosis. Our case was successfully treated with anticoagulant therapy.

Additionally, although true aneurysm of the thyrocervical system is a rare condition, the ITA is the most common site for thyrocervical trunk aneurysms (8). Importantly, due to the high mortality and morbidity of an ITA aneurysm (eg, rupture, compression of adjacent structures, suffocation, etc.), it is essential to make an accurate diagnosis of ITA aneurysm. Besides, it requires prompt treatment, such as surgical or interventional procedure (9).

In conclusion, ITA thrombosis is an extremely rare disorder, which may mimic a solid and cystic mass of the thyroid gland on gray-scale and color Doppler US, a very common sonographic finding of the thyroid nodule. Non- or minimally invasive imaging techniques (color Doppler US and CTA) are valuable in establishing the diagnosis promptly. To abstain from possible risks of biopsy, a careful examination should be performed to detect whether the lesion has a vascular origin. Medical therapy seems to be a feasible and safe method for ITA thrombosis. Besides that, therapeutic abstention and/or follow-up may also be considered.

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