

# Tuberculosis of the thyroid gland: magnetic resonance imaging appearances

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## ABSTRACT

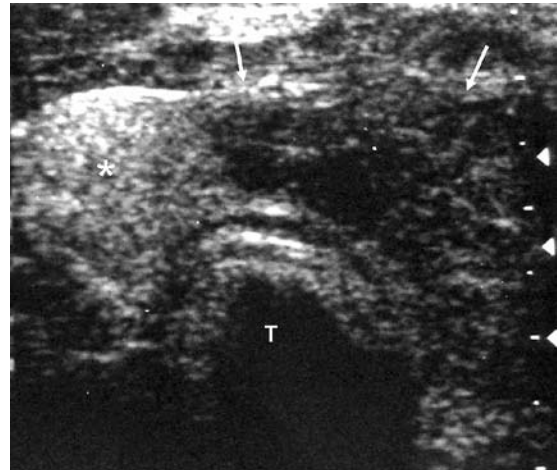
Tuberculosis involving the thyroid gland is a rare occurrence. We report a case of cytologically-diagnosed thyroid gland tuberculosis in a 21-year-old man who presented with thyroid swelling of short duration, and describe the magnetic resonance (MR) imaging appearances of the lesion, which to our knowledge, has not been previously described. We also report a rare complication of abscess formation in the track of the fine needle aspiration. The intermediate signal intensity of the lesions on both T1- and T2-weighted MR images may provide a clue about tuberculosis, as clinical suspicion is low due to the rarity of the disease.

**Keywords:** fine needle aspiration, magnetic resonance imaging, thyroid abscess, thyroid tuberculosis, tuberculosis

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## INTRODUCTION

Tuberculosis involving the thyroid gland is a rare occurrence. Rankin and Graham detected tuberculous bacilli in only 21 cases (forming 0.1%) on the histological examination of 20,758 resected thyroid specimens.<sup>(1)</sup> The incidence is low (about 1%), even in Asian countries where the prevalence of tuberculosis is high.<sup>(2)</sup> This is due to the ability of the gland to resist infection.<sup>(3)</sup> The involvement of the gland is mainly through haematogenous spread from an extra-thyroid focus or direct extension from adjacent nodes.<sup>(4)</sup> Isolated involvement of the thyroid is extremely rare.<sup>(5)</sup> Clinical and radiological features are nonspecific, and a histological examination is required for accurate diagnosis. The imaging features of thyroid tuberculosis are seldom described, and to the best of our knowledge, the appearance on magnetic resonance (MR) imaging has not been described previously. We present the MR imaging features of a histologically-proven case of thyroid tuberculosis which developed a subcutaneous abscess after fine needle aspiration.



**Fig. 1** Transverse US image of the neck swelling shows a hypoechoic lesion involving the left lobe and the isthmus (arrows). The right lobe is seen to be normal (\*). T: trachea.

## CASE REPORT

A 21-year-old man presented with a one-month history of painless swelling in the anterior aspect of the neck, associated with malaise and weakness. There was no history of fever or haemoptysis. There was a past history of BCG vaccination against tuberculosis. On examination, a non-tender, firm midline anterior neck swelling was noted, which moved with deglutition, suggesting that it originated from the thyroid. He did not have any clinical features of hyper- or hypothyroidism. Routine blood investigations showed that haemoglobin was 12 g/dL, and the total count was  $12,200 \times 10^3/\text{mm}^3$ , with neutrophils comprising 82%, lymphocytes 17% and eosinophils 1%. The erythrocyte sedimentation rate was 15 mm/hr. The remaining blood parameters were unremarkable. Thyroid function tests showed a total T4 of 8.63 (normal range 5.1–14.1)  $\mu\text{g/dL}$  and a thyroid-stimulating hormone of 0.51 (normal range 0.27–4.2)  $\mu\text{IU}$ . Chest radiograph was unremarkable.

Ultrasonography (US) of the neck (Fig. 1) showed a hypoechoic nodule in the lower pole of the left lobe of the thyroid gland, having an exophytic component and extending into the isthmus. It was not vascular, and

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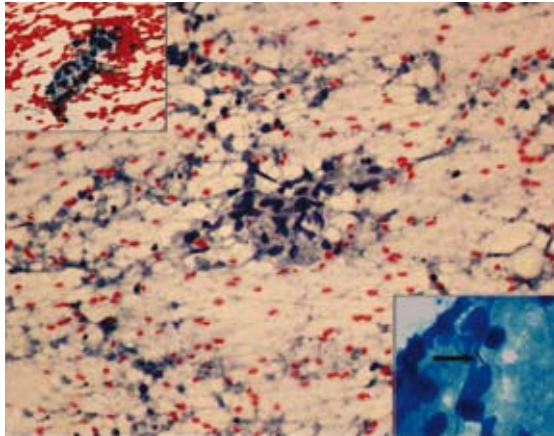
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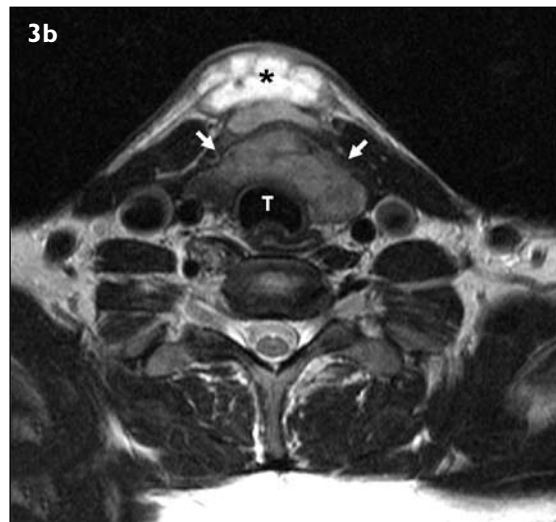
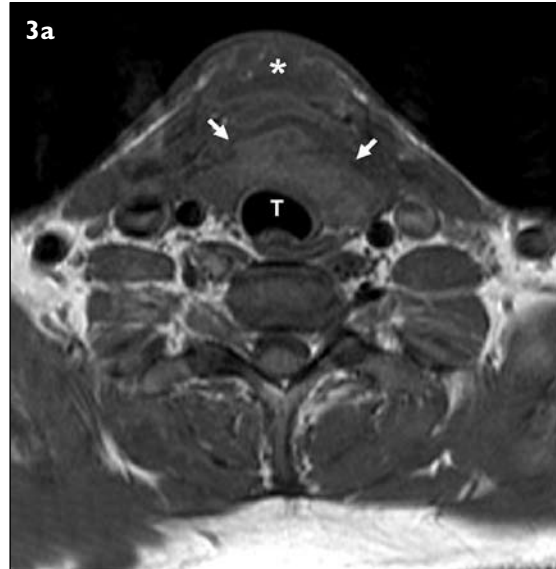


**Fig. 2** Fine needle aspiration shows epithelioid cell granuloma along with necrosis and inflammatory cells in the background (Paninicolaou stain,  $\times 40$ ). Left upper corner inset: benign thyroid follicular cells (Paninicolaou stain,  $\times 100$ ). Lower right corner inset: Ziehl-Neelsen stain ( $\times 1,000$ ) shows acid-fast bacillus (arrow).

no calcification was seen. Enlarged bilateral jugular chain lymph nodes were seen. On the technetium-99m pertechnetate thyroid scan ( $^{99m}\text{TcO}_4$ ), the thyroid gland was poorly visualised. The nodule in the lower pole of the left thyroid lobe and the isthmus showed deficient tracer uptake. The features were suggestive of thyroiditis. US-guided fine needle aspiration cytology (FNAC) of the thyroid nodule showed large areas of necrosis, epithelioid granulomas and occasional thyroid follicular cells (Fig. 2). A stain for acid-fast bacillus was positive, consistent with tuberculosis.

During the week after FNAC, the swelling showed a rapid increase in size, and was associated with pain and tenderness. MR imaging of the neck showed that the lesion involving the thyroid gland had intermediate signal intensity on both T1- and T2-weighted images, with the signal being higher than that of the normal thyroid gland (Fig. 3). A mild mass effect was seen on the trachea. A few small subcentimetric cervical lymph nodes were also noted. Anterior to the thyroid gland, there was a lobulated lesion in the subcutaneous plane, which was hypointense on T1-weighted and hyperintense on T2-weighted images, suggesting an abscess. In addition, MR imaging revealed a lesion in the C6 vertebra (Fig. 4) which had an intermediate signal on T1-weighted and a high signal on T2-weighted images, which involved the body, right pedicle and transverse process. No intraspinal extension was seen. The spinal cord was normal. US of the abdomen was normal. No other focus of involvement was found. Enzyme-linked immunosorbent assay for human immunodeficiency virus (HIV) was negative.

The final diagnosis was multifocal tuberculosis

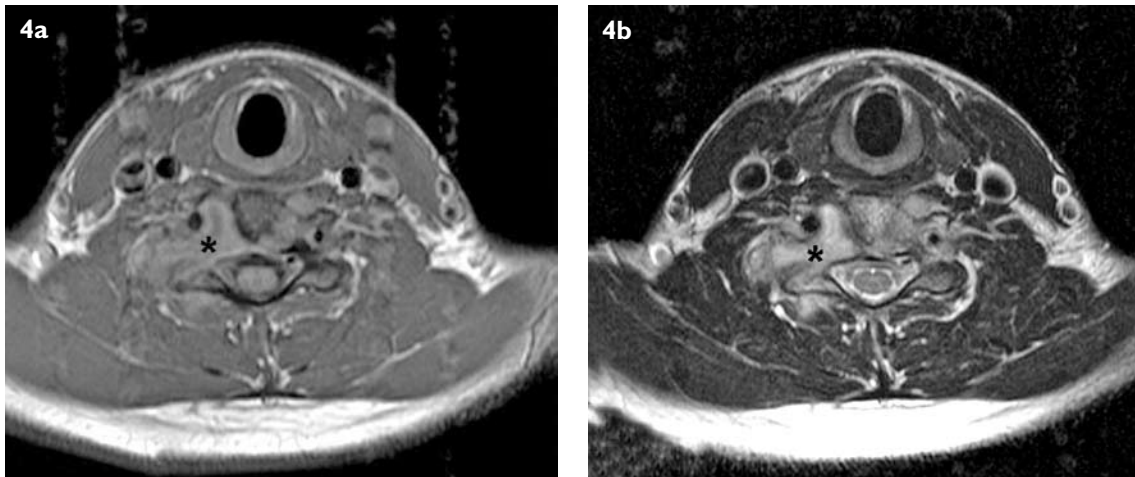


**Fig. 3** Axial (a) T1-W and (b) T2-W MR images show an intermediate signal intensity lesion involving the left lobe, isthmus and adjacent right lobe of the thyroid gland (arrows). A slight mass effect on the trachea (T) is noted. The subcutaneous abscess (\*) is hypointense on T1-W and hyperintense on T2-W images.

involving the cervical spine and thyroid gland. The subcutaneous abscess was aspirated, and the patient was started on antituberculous chemotherapy. At the end of six months of treatment, the neck swelling disappeared, and his general wellbeing was unremarkable.

## DISCUSSION

*Mycobacterium tuberculosis* infecting the thyroid gland is a rare occurrence.<sup>(1)</sup> The thyroid gland is known for its ability to resist infection, although this ability has never been explained. A few factors that are thought to be responsible for this antagonistic action of the gland are bactericidal action of the thyroid colloid material, high thyroid blood flow leading to its high oxygenation, and



**Fig. 4** Axial (a) T1-W and (b) T2-W MR images show expansion and altered signal intensity involving the right side of the vertebral body, right pedicle and transverse process of the C6 vertebra (\*).

the high concentration of iodine.<sup>(6)</sup> The gland is involved by the spread of the mycobacterium haematogenously or by direct spread from an adjacent focus, usually lymph nodes. Primary involvement of the gland is even rarer.<sup>(5)</sup>

Clinical presentation is variable and can be in the form of diffuse goitre, a solitary nodule with or without cold abscess, and acute abscess.<sup>(3,6,7)</sup> Owing to its rarity, it is seldom considered in the differential diagnosis of thyroid swellings.<sup>(6)</sup> US and computed tomographic (CT) features of thyroid tuberculosis have been described only sporadically due to its rare occurrence. US may show a solitary nodule which may mimic a carcinoma, multiple nodules, diffuse goitre or rarely, abscess formation. The lesion involving the gland is usually hypoechoic. An abscess is anechoic and may show internal echoes.<sup>(4,8,9)</sup> Regional lymphadenopathy is usually noted. CT may show an enlarged thyroid gland; the parenchymal lesions become conspicuous on administration of a contrast agent and appear hypodense against the enhancing normal thyroid.<sup>(4,9)</sup> Abscesses, either within the gland or in the subcutaneous plane, show peripheral rim enhancement. In addition, CT aids in the detection of any other focus of infection in the neck.

Features of thyroid tuberculosis on MR imaging have not been described before. The normal thyroid gland is homogeneously hyperintense relative to the neck muscles on both T1- and T2-weighted images.<sup>(10)</sup> The tuberculous lesion in our patient showed an intermediate signal on both T1- and T2-weighted images; the signal intensity was higher than the normal glandular parenchyma. The intermediate signal is probably due to the presence of densely cellular inflammatory granulation tissue, with tuberculous granulomas with or without minimal necrosis. However, this appearance in the thyroid gland is not specific, and thyroid carcinoma can have

a similar feature.<sup>(10)</sup> The subcutaneous abscess appeared hypointense on T1- and hyperintense on T2-weighted images, and may show peripheral rim enhancement on contrast-enhanced MR imaging. Regional lymph nodes are better seen on T1-weighted images.

Pathologically, five varieties of tuberculous infection of the thyroid gland have been described.<sup>(11)</sup> They are: multiple lesions throughout the gland in association with miliary tuberculosis; goitre with caseation; a cold abscess formation sometimes presenting on the surface of the gland; chronic fibrosing tuberculosis (which mimics deQuervain's thyroiditis due to the presence of giant cells, lymphocytes and variable fibrosis); and acute abscess formation. A FNAC is required for diagnosis. It shows groups of epithelioid cells, necrotic material with or without Langhans giant cells and lymphocytes. Acid-fast bacilli may be demonstrated on Ziehl-Neelsen stain.<sup>(2)</sup> Although epithelioid granulomas are seen in sarcoidosis and subacute thyroiditis, the presence of caseation and the demonstration of acid-fast bacilli are specific to tuberculous thyroiditis.<sup>(3)</sup> Complications which develop after FNAC of the thyroid gland are rare, and include subcutaneous haematoma, accidental tracheal injury and local infection.<sup>(12)</sup> Subcutaneous abscess formation at the site of the FNAC, as was seen in our patient, is unusual.

Our patient presented with anterior neck swelling which increased in size after FNAC and which, on MR imaging, showed the involvement of the left lobe and isthmus of the thyroid gland with a subcutaneous abscess. He had an extra-thyroid focus in the cervical spine which was not contiguous; hence the spread of infection to the thyroid was likely to be haematogenous. MR imaging thus revealed cervical spine involvement which was not detected clinically. The tuberculous aetiology of the thyroid lesion was confirmed on FNAC.

The subcutaneous abscess formed after FNAC required aspiration.

In conclusion, thyroid tuberculosis is rare, and diagnosis is difficult based on clinical and imaging features. Although the MR imaging appearance is non-specific, intermediate signal intensity on a T2-weighted image may provide a clue. The possibility must be considered in a patient who has an extra-thyroid tubercular focus. Definitive diagnosis requires cytological examination. An abscess may occasionally form in the track after FNAC. The response to anti-tuberculous therapy is good.

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