



Clinics in diagnostic imaging (101)

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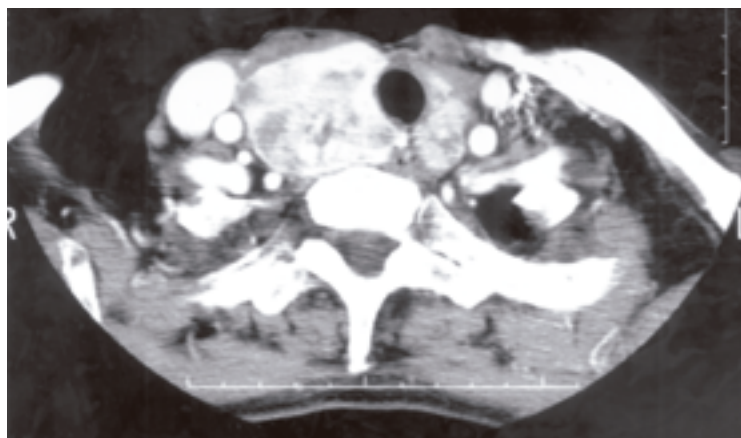


Fig. 1a Enhanced axial CT image of the lower neck.

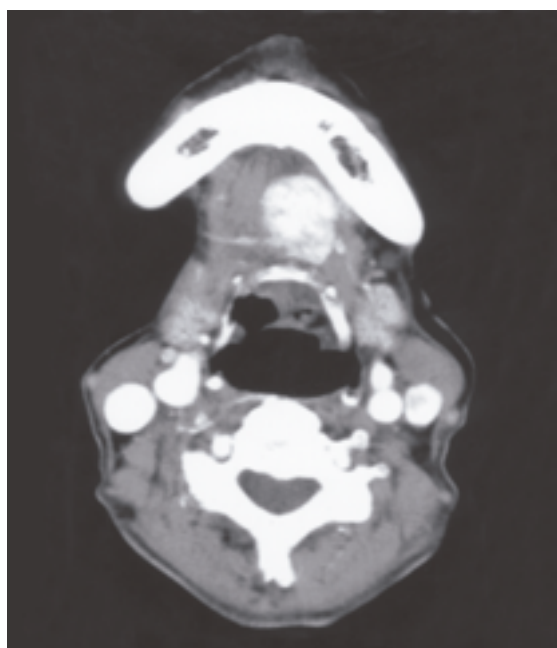


Fig. 1b Enhanced axial CT image of the upper neck.

CASE PRESENTATION

A 71-year-old woman with a strong family history of thyroid cancer presented with 3 months of constipation. A carcinoid tumour of the rectum was found at colonoscopy. On examination, she had a large

goitre and there was a palpable 3-4cm firm submental mass. A staging computed tomography (CT) scan was performed to include the neck (Figs. 1a-b). What is the differential diagnosis? What further imaging would be useful?

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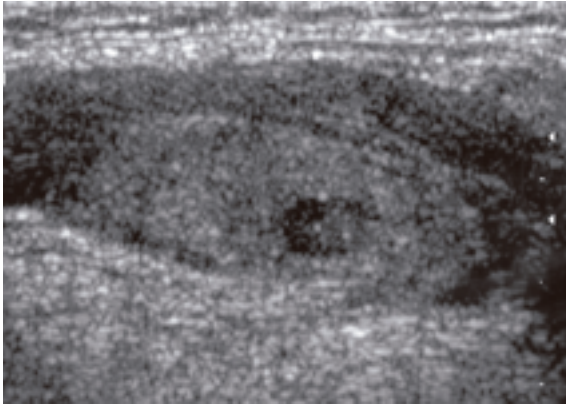


Fig. 2a Midline longitudinal US image of the submental mass shows a uniform fine echotexture similar to that of normal thyroid tissue. A small hypoechoic nodule is seen within it.

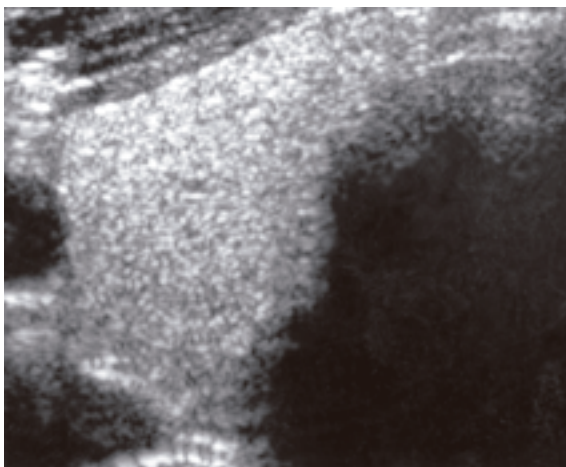


Fig. 2b Right transverse US image of a normal thyroid gland shows the texture of normal thyroid parenchyma.

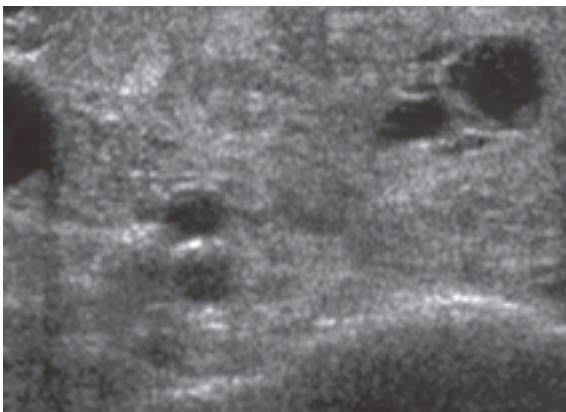


Fig. 2c Right transverse US image of the multinodular goitre shows an enlarged gland containing multiple heterogeneous nodules, some with cystic degeneration.

IMAGE INTERPRETATION

CT of the neck showed a large multinodular goitre with retrosternal extension (Fig. 1a) and a well-defined avidly enhancing submental mass (Fig. 1b). Ultrasonography (US) was performed to differentiate between accessory thyroid tissue and a carcinoid metastasis. The submental mass was well-defined with

a homogeneous background echotexture which was slightly hyperechoic to muscle (Fig. 2a) and similar in quality to normal thyroid gland (Fig. 2b). There were several heterogeneous nodules within the mass, resembling those seen in the multinodular goitre (Fig. 2c).

DIAGNOSIS

Multinodular accessory thyroid tissue.

CLINICAL COURSE

A fine needle aspiration biopsy (FNAB) was performed under ultrasound guidance which showed follicular cells suggesting thyroid tissue (Fig. 3). The patient underwent abdominoperineal resection of the carcinoid tumour and remains well at 1-year follow-up.

DISCUSSION

The majority of the structures in the neck and their associated pathologies are superficial and therefore ideal for examination by high-resolution ultrasonography. The use of ultrasound-guided FNAB to obtain tissue for cytology is well established. It is a simple, quick, safe, cheap and relatively pain-free test which, in the best hands, has a reported accuracy of >90%⁽¹⁾. In this case, ultrasonography and FNAB were used to determine the nature of a submental mass and in particular to differentiate between a carcinoid metastasis and accessory thyroid tissue, both of which are vascular structures that enhance avidly on CT.

Malignant neck masses in the neck are usually nodal and have some characteristic features⁽¹⁾. They are typically heterogeneous in echotexture and hypoechoic to the adjacent muscle. There may be evidence of necrosis, extracapsular spread, and matting or invasion into the adjacent tissues. Distortion of the normal vascular pattern at the hilum of the node and abnormal peripheral vessels may be seen on Doppler ultrasonography (Fig. 4). By contrast, the submental mass was well-defined with a homogeneous background echotexture which was slightly hyperechoic to muscles and similar in quality to normal thyroid gland. This was confirmed at cytology.

Two patterns of abnormal thyroid gland migration are described: thyroid gland ectopia and accessory thyroid tissue. It is important to differentiate between the two, as they are likely to represent different entities. The thyroid gland develops from the tuberculum impar, an endodermal swelling in the pharyngeal floor between the 1st and 2nd pharyngeal pouches that appears around the 24th day of embryogenesis. This invaginates to form a diverticulum, later to become the site of the foramen caecum. The diverticulum descends through and around the hyoid bone and

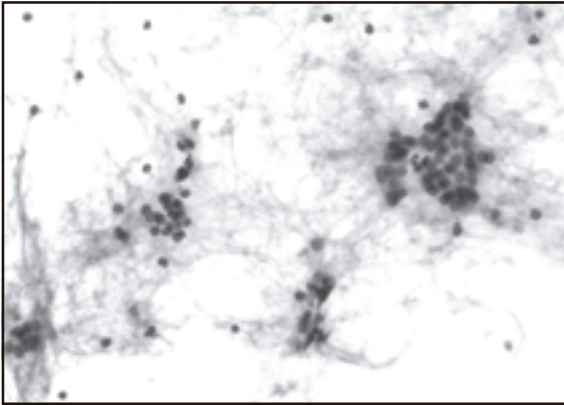


Fig. 3 Photomicrograph of the FNAB cytospin preparation shows bland-looking follicular cells arranged in follicles (x 400).

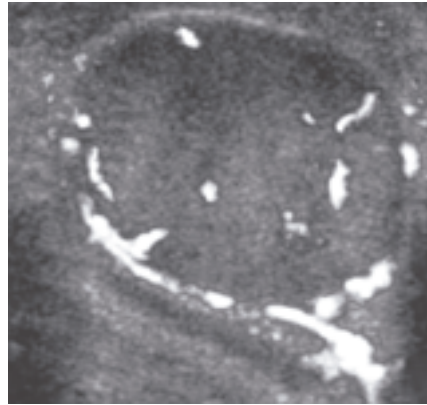


Fig. 4 Transverse Doppler US image of a malignant node shows a round heterogeneous hypoechoic mass, distortion of the hilar vascular pattern and abnormal peripheral vessels.

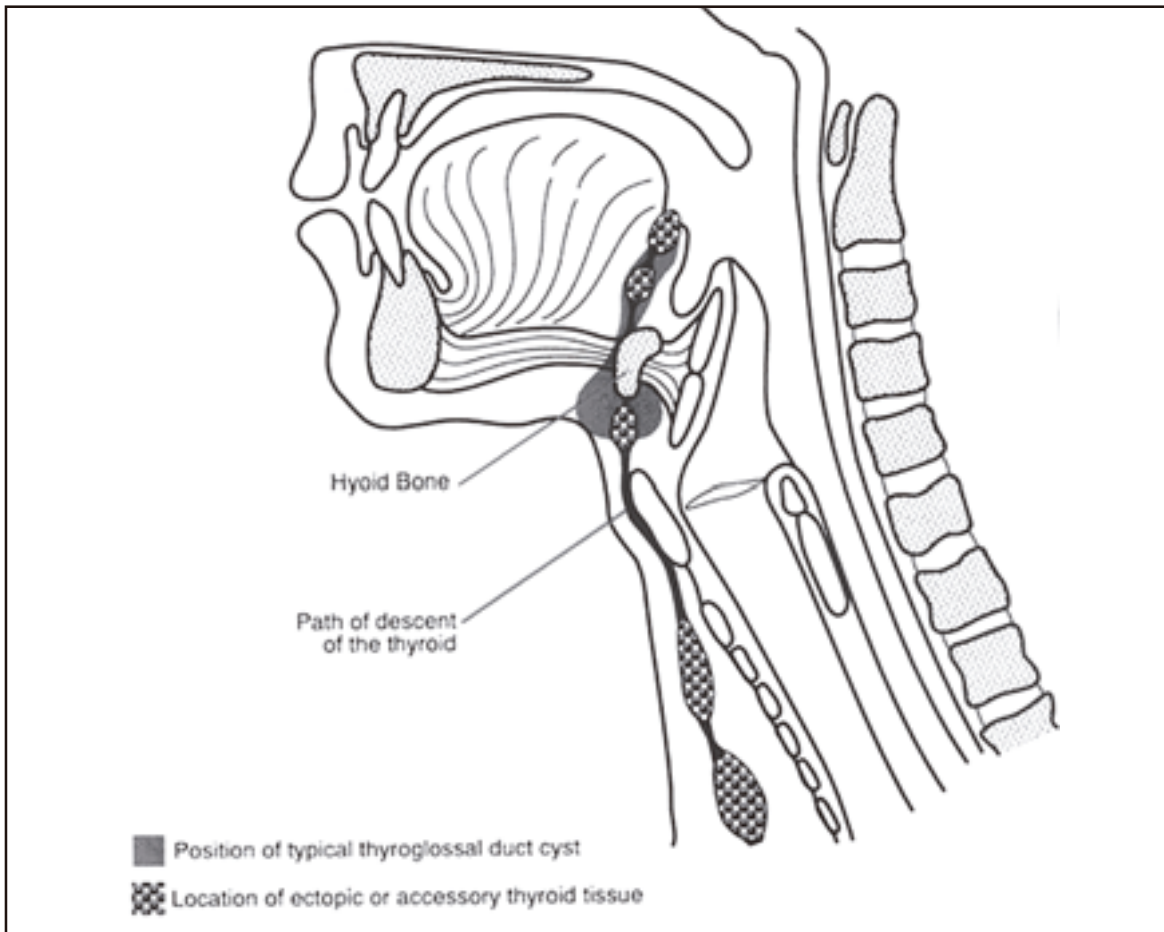


Fig. 5 Diagram shows normal embryological descent of the thyroid gland and patterns of abnormal migration.

laryngeal cartilages to form the normally-located pre-tracheal thyroid gland by the 7th embryonal week (Fig. 5).

A common variation of abnormal thyroid development is a thyroglossal duct (TGD) cyst, one of the most frequent causes of a midline cervical mass in the paediatric population (Figs. 5&6). The TGD is the embryological attachment of the thyroid gland

to the tuberculum impar and usually involutes after the 5th embryonal week. Failure to involute and atrophy results in persistence of a thyroglossal duct remnant or cyst, which is usually found at the level of the hyoid bone.

Thyroid gland ectopia is rare. It is defined by Radkowski et al as the presence of all functioning thyroid tissue in an aberrant location along the

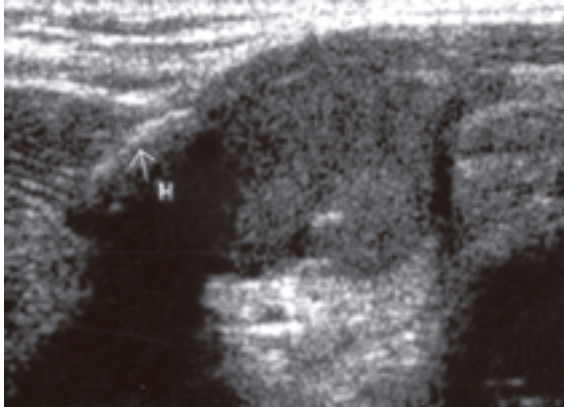


Fig. 6 Longitudinal US image of a well-defined anechoic thyroglossal duct cyst. An arrow marks the position of the hyoid bone which casts an acoustic shadow.

embryological line of descent of the gland⁽²⁾. The thyroid tissue is lingual in 90% of cases and usually dysgenic with deficient hormone production. Around 70% of patients will have sub-clinical hypothyroidism, often becoming clinical during periods of physiological stress such as puberty and pregnancy⁽³⁾.

Accessory thyroid tissue is defined as the persistence of thyroid tissue anywhere from the base of the tongue to the thyroid isthmus, with the majority of the functional thyroid gland in the normal pre-tracheal location. There have been a few case reports of accessory thyroid tissue appearing in more unexpected places, such as the oesophagus, trachea, mediastinum, heart and liver⁽³⁾. The incidence is unknown. Radkowski et al performed ultrasonography on 230 patients with a clinical diagnosis of TGD cyst and found 4 cases of accessory thyroid tissue compared with 3 cases of thyroid gland ectopia, suggesting they are equal in incidence⁽²⁾. However, pathologists describe accessory thyroid tissue more frequently. Post-mortem studies suggest that asymptomatic thyroid tissue may be found along the path of the TGD in as many as 7-10% of adults⁽⁴⁾.

The presence of hyperplastic nodules within accessory thyroid tissue in this case is not unusual. Both ectopic thyroid glands and accessory thyroid tissue are susceptible to the same potential diseases as a normally-situated gland. Indeed, accessory thyroid tissue may only become clinically apparent when the

normally-positioned thyroid gland becomes enlarged. There is no evidence to substantiate previous concerns of an increased risk of carcinoma in abnormally-located thyroid tissue.

TGD cysts are frequently found to contain accessory thyroid tissue at histology. Occasionally, however, this thyroid tissue may actually be ectopic. It is important to reiterate the need for pre-operative ultrasonography in all patients with non-pre-tracheal thyroid tissue or thyroglossal duct cysts in order to confirm the presence of a normal thyroid gland and prevent removal of the only functioning thyroid tissue^(2,5).

ABSTRACT

A 71-year-old woman with a strong family history of thyroid cancer presented with 3 months of constipation. A carcinoid tumour of the rectum was found at colonoscopy. On physical examination, she had a large goitre and there was a 3-4 cm firm submental mass. The differential diagnosis was accessory thyroid tissue or a carcinoma metastasis. Staging computed tomography was performed to include the neck, followed by ultrasonography and aspiration biopsy of the submental mass, which confirmed the diagnosis of multinodular accessory thyroid tissue. Differences in aetiology and pathophysiology of accessory thyroid tissue and ectopic thyroid glands are discussed.

Keywords: accessory thyroid, ectopic thyroid, thyroglossal duct cyst, thyroid gland, ultrasonography

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SINGAPORE MEDICAL COUNCIL CATEGORY 3B CME PROGRAMME

Multiple Choice Questions (Code SMJ 200411B)

	True	False
Question 1. Ultrasonography is the investigation of choice for thyroid disease because:		
(a) Iodine-based contrastagent is not required.	<input type="checkbox"/>	<input type="checkbox"/>
(b) Ultrasound-guided FNAB is simple, quick, safe and cheap.	<input type="checkbox"/>	<input type="checkbox"/>
(c) The special resolution of high frequency probes is greater than MR imaging or CT.	<input type="checkbox"/>	<input type="checkbox"/>
(d) It is useful in the diagnosis of autonomous nodules.	<input type="checkbox"/>	<input type="checkbox"/>
Question 2. The following ultrasonographical features suggest that a lymph node is metastatic in nature:		
(a) Calcification.	<input type="checkbox"/>	<input type="checkbox"/>
(b) Necrosis.	<input type="checkbox"/>	<input type="checkbox"/>
(c) Echogenic hilum.	<input type="checkbox"/>	<input type="checkbox"/>
(d) Peripheral vascular supply.	<input type="checkbox"/>	<input type="checkbox"/>
Question 3. Regarding thyroid gland development:		
(a) The thyroid gland develops from a pharyngeal swelling between the 1 st and 2 nd pharyngeal pouches.	<input type="checkbox"/>	<input type="checkbox"/>
(b) Thyroid gland ectopia is more common than accessory thyroid tissue.	<input type="checkbox"/>	<input type="checkbox"/>
(c) The thyroglossal duct usually descends behind the hyoid bone.	<input type="checkbox"/>	<input type="checkbox"/>
(d) Accessory thyroid tissue has been described in the oesophagus and liver.	<input type="checkbox"/>	<input type="checkbox"/>
Question 4. Ultrasonography of thyroglossal duct cysts is performed:		
(a) Because of the increased risk of malignancy.	<input type="checkbox"/>	<input type="checkbox"/>
(b) To confirm the presence of a normal pre-tracheal thyroid gland.	<input type="checkbox"/>	<input type="checkbox"/>
(c) To demonstrate the relationship of the cyst to the cricoid cartilage.	<input type="checkbox"/>	<input type="checkbox"/>
(d) To demonstrate the lingual course of the thyroglossal duct.	<input type="checkbox"/>	<input type="checkbox"/>
Question 5. The following statements are correct:		
(a) Thyroglossal duct cysts only become apparent if there is infection.	<input type="checkbox"/>	<input type="checkbox"/>
(b) The thyroglossal duct descends from the foramen magnum of the tongue.	<input type="checkbox"/>	<input type="checkbox"/>
(c) A pre-operative isotope scan is required in all patients with a thyroglossal duct cyst.	<input type="checkbox"/>	<input type="checkbox"/>
(d) A multinodular goitre can develop in lingual thyroid tissue.	<input type="checkbox"/>	<input type="checkbox"/>

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