The role of ultrasound in the diagnosis of a large, rapidly growing, thyroid mass

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Summary

The value of ultrasound in the diagnosis of a large rapidly growing thyroid mass was assessed in a study of 42 patients with a large (> 3 cm) rapidly growing (< two months) solitary mass. Haemorrhage into a thyroid nodule was present in 31 patients and thyroid malignancy in 11. Ultrasound of haemorrhage into a thyroid nodule revealed a large cystic mass in all 31 patients containing internal debris (22), septations (three), or a combination of both (six). The malignant causes of a large rapidly growing mass were lymphoma (two), anaplastic carcinoma (four) and metastasis (five). Ultrasound of these thyroid malignancies revealed a mass with a smooth, well-defined margin and strikingly low homogenous echogenicity in all cases. Patients with thyroid metastases had evidence of widespread metastatic disease elsewhere. Lymphoma was differentiated from anaplastic carcinoma on fine-needle aspiration cytology or surgical biopsy. Ultrasound was of value in differentiating between a benign haemorrhagic nodule and a malignant tumour. The various malignant tumours had similar appearances, however, and could not be distinguished on ultrasound.

Keywords: ultrasound, thyroid mass, malignancy

The most common indication for thyroid ultrasound is a small nodule, thyroid goiter or thyroid dysfunction. However, in our clinical practice we frequently see patients with a large rapidly growing thyroid mass. We therefore reviewed the case notes and the ultrasound findings in this group of patients with the aim of determining the cause of a rapidly enlarging mass and the value of ultrasound in diagnosis and management. The sonographic features are described and methods of differentiation are discussed.

Materials and methods

Ultrasound scans of 42 patients (15 male and 27 female, age range 24 to 84 years) with a history of a solitary, large (>3 cm), rapidly growing (< two months) thyroid mass were reviewed. Real time scans were performed with the patients supine and their necks hyperextended using a 7 and 10 MHZ transducer. Ultrasound-guided fine needle aspiration cytology with a 21G needle was performed on the

thyroid mass in all patients. The clinical notes were reviewed. Patients with a diagnosis of thyroid haemorrhage were only included if there were surgical correlation (9/31) or strong clinical evidence to support the diagnosis (22/31). In the latter case this required the aspiration of altered blood (mean 18 ml), followed by complete collapse or a reduction in the size of the mass, with no evidence of recurrence (9/22) or progression (13/22), on clinical follow-up for at least six months (range 6–55 months, mean 21 months) and no evidence of malignant cells on cytology. The diagnosis of malignancy was made on fine needle aspiration cytology (7/11) or surgical biopsy (4/11).

Results

The aetiology of the rapidly enlarging thyroid mass is shown in box 1. The size of the mass and duration of symptoms are shown in the table. All 31 haemorrhages revealed a large cystic area within a solitary nodule (21) or within a nodule of an adenomatous goiter (10). The nodules were hypo-echoic (28) or iso-echoic (three), with a halo in 12. The cystic area contained internal debris in 22, septations in three and a combination of internal debris and septations in six. There was no evidence of calcification and no cervical lymphadenopathy. No patients with the initial ultrasound diag-

Aetiology of thyroid mass (n=42)	
<i>Benign</i>	
• haemorrhage into a thyroid nodule	31
<i>Malignant</i>	
• metastases (2 sarcomas (lung and uterus), 2 squamous cell carcinomas from the lung, 1 adenocarcinoma from the breast)	5
• anaplastic carcinoma	4
• non-Hodgkin's lymphoma	2

Box 1

Table 1 Range (median) in size and duration of rapidly growing thyroid masses (n=42)

	Haemorrhagic nodule	Malignant tumour
Size (cm)	3–6 (3.6)	3.5–10 (6.5)
Duration (days)	2–60 (30)	14–60 (30)

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Clinical findings in thyroid malignancies (n=11)
<p><i>Metastasis</i></p> <ul style="list-style-type: none"> ● sarcoma of lung; brain metastases. ● sarcoma of uterus; skin and bone metastases ● squamous cell carcinoma of lung; bone and liver metastases. ● squamous cell carcinoma of lung; skin and bone metastases. ● adenocarcinoma of breast; lung, liver and nodal metastases. <p><i>Lymphoma</i></p> <ul style="list-style-type: none"> ● history of hemithyroidectomy for lymphoma ● Hashimoto's thyroiditis <p><i>Anaplastic carcinoma</i></p> <ul style="list-style-type: none"> ● goiters for 10, 20 and 50 years

Box 2

nosis of a haemorrhagic nodule were subsequently found to have malignancy.

All 11 malignant tumours had a smooth, well-defined margin; they were strongly hypo-echoic and homogenous in 10/11 patients and predominantly homogenous in the eleventh patient. Necrosis was not seen but there were single foci of calcification in three patients (one metastasis and two anaplastic carcinomas). Cervical lymphadenopathy was present in four (one metastasis, one anaplastic carcinoma and two lymphomas). The clinical details are shown in box 2. Fine needle aspiration cytology was diagnostic in seven; the remaining three cases of anaplastic carcinoma and one case of lymphoma were diagnosed on biopsy.

Discussion

A rapidly enlarging thyroid mass creates much anxiety for the patient and is a frequent clinical problem. Clinical examination alone is unable to identify the nature of the mass. The differential diagnosis is usually between haemorrhage into a thyroid nodule and thyroid malignancy. The latter includes the less common tumours such as lymphoma and anaplastic carcinoma. In evaluating thyroid nodules, the role of ultrasound and fine needle aspiration cytology is well established. In differentiating benign from malignant disease, ultrasound has a sensitivity of 96%, specificity of 91%, and accuracy of 94%.¹ It is therefore an ideal initial investigation.

Haemorrhage into a thyroid nodule was the commonest cause of a rapidly enlarging mass. However this study does not reflect the true incidence as many haemorrhages are aspirated in the clinic without the need for imaging and some patients who underwent ultrasound were excluded because of incomplete follow-up. On ultrasound, haemorrhage into a nodule appeared as a predominately cystic lesion with internal debris and/or septae (figure 1). These appearances have previously been described^{2,3} but only a few studies have included pathological correlation^{4,5} or long-term clinical follow-up.⁶

No malignant tumours in this study contained cystic areas. However, cystic change may occur in some malignant tumours, such as papillary carcinoma. Although we found no case of papillary carcinoma presenting as a rapidly enlarging mass, this diagnosis should be suspected if the cystic mass contains punctate calcification⁷ or fixed internal solid areas,⁸ or if there is cervical lymphadenopathy. The nodes frequently are echogenic (compared to adjacent muscle) and show punctate calcification.⁹ In the absence of the above features, a predominantly cystic mass with internal debris, and aspiration of altered blood (with no evidence of malignant cells on cytology) can be treated as a benign haemorrhagic nodule and followed-up.

We have shown that the malignant causes of a rapidly enlarging mass include metastases, as well as anaplastic carcinoma and lymphoma. On ultrasound these three malignant tumours revealed a sharply defined mass of surprisingly uniform homogenous echo pattern for their large size and strikingly low echogenicity (figures 2–4). The extremely low echogenicity should not be mistaken for a cyst,^{10,11} and the sharply defined margin should not be mistaken for a sign that the tumour is benign. Previous studies have shown that hypo-echoic lesions are present in 85% of anaplastic carcinomas⁴ and 100% of lymphomas.¹⁰ The more com-

Figure 1 Longitudinal scan of the thyroid showing a haemorrhagic nodule with cystic change (curved arrow) with internal debris (arrow head) and septation (double curved arrows)

Figure 2 Transverse scan of the thyroid showing a solid, well-defined, very hypo-echoic metastatic sarcoma (arrow head). Curved arrow identifies the common carotid artery

Figure 3 Longitudinal scan of the thyroid showing a solid, well-defined, very hypo-echoic anaplastic carcinoma (arrow head). Note the patent common carotid artery posteriorly (curved arrow)

Figure 4 Longitudinal scan of the thyroid showing a solid, well-defined, very hypo-echoic primary lymphoma (arrow head)

mon thyroid malignancies such as papillary and medullary carcinoma also cause hypo-echoic nodules on ultrasound, however these tumours usually present as cervical nodes or a small, slowly growing, nodule.

Anaplastic carcinoma, lymphoma and thyroid metastases can have similar ultrasound appearances. However, the initial diagnosis may be suggested before biopsy on the basis of clinical history. Patients with thyroid metastases usually have evidence of a primary

tumour and metastatic disease elsewhere.¹² Differentiation between the primary tumours is more difficult but lymphoma often occurs in patients with Hashimoto's thyroiditis,^{11,13} and anaplastic carcinoma may arise in a long-standing goiter.¹⁴ Fine-needle aspiration cytology is usually sufficient for the diagnosis of metastases. Surgical biopsy may be required for diagnosis of primary tumours, especially lymphoma, where specific typing is required.¹⁵

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