Parathyroid cysts: a clinical and radiological challenge

Introduction

Parathyroid cysts are rare causes of neck swelling accounting for 0.6% of thyroid and parathyroid lesions. They may be functional, resulting in the release of parathyroid hormone, or non-functional. Non-functional cysts may be cosmetically unacceptable or cause dysphagia, dyspnoea or recurrent laryngeal nerve palsy as a result of compression. This article presents a young woman who was diagnosed with a thyroid cyst both on examination and imaging. However, the final histology confirmed this to be parathyroid in origin and this should be considered in the differential of such neck swellings.

Discussion

Parathyroid cysts are very rare and constitute 0.6% of all thyroid and parathyroid lesions (Rosenberg et al, 1982). The majority of cases (91%) are non-functioning (Layfield, 1991) with females being affected three times more commonly than males. They are most commonly found in the inferior parathyroids and occur 60% of the time on the left side (Waldron, 1990).

The aetiology of non-functioning parathyroid cysts is unknown but it has been hypothesized that they may be remnants of the third or fourth branchial pouch, cystic degeneration of parathyroid adenomas, the result of coalescence of microcysts or simple retention of parathyroid products (Pinney and Daly, 1999). Non-functioning parathyroid cysts are simple cysts lined by flattened-cuboid to low-columnar cells. Some or all of the three types of parathyroid cells may be found in the cyst; chief cells, water-clear cells and/or oxyphil cells.

As non-functioning parathyroid cysts do not produce parathyroid hormone they do not result in hypercalcaemia unlike functioning cysts. Thyroglobulin and parathyroid hormone levels should be measured for all cystic neck masses of presumed thyroid origin with clear aspirates (Rojdmark and Monchik, 1998). Some authors recommend aspiration of cystic neck masses for parathyroid hormone levels regardless of aspirate colour (McCoy et al, 2009). An elevated parathyroid hormone level in aspirated cyst fluid is said to be diagnostic of a parathyroid cyst and should be measured using an intact

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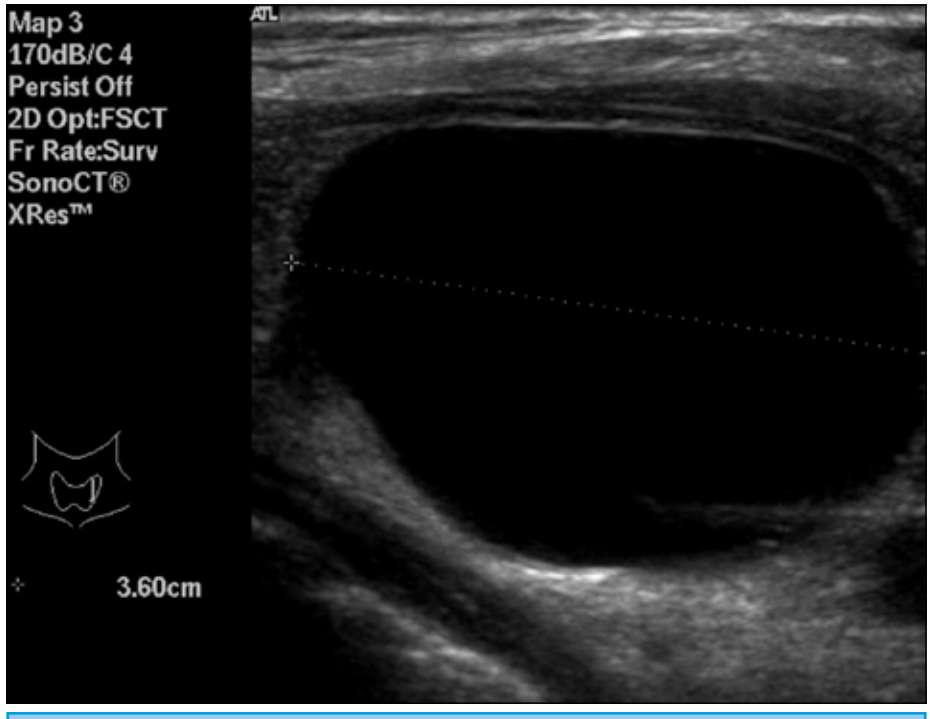
Figure 1. The cystic lesion which was thought to originate from the left lobe of the thyroid gland being aspirated.



Case Report

A 21-year-old female student presented with a 4-year history of a lump in her neck which caused discomfort on swallowing. She had previously undergone two aspirations of the lesion under ultrasound guidance (*Figure 1*) where cytology showed squamous cells only. The lump recurred on both occasions. She was clinically and biochemically euthyroid with no family history of thyroid disease.

On clinical examination of her neck there was a large left-sided lump which appeared to move on swallowing. There was no lymphadenopathy. A repeat ultrasound was performed by a consultant radiologist with an interest in thyroid disease (*Figure 2*). The scan was reported to show a unilocular cyst arising from the lower pole of the left lobe of the thyroid measuring 3.4 cm containing a small amount of colloid peripherally.

This was therefore diagnosed as a recurrent thyroid cyst and the patient underwent a total left thyroid lobectomy with intraoperative rupture of the cyst. Histopathological analysis of the fibrous cyst wall showed focal attenuated cuboidal cells in the lining and parathyroid tissue within the wall and the lesion was diagnosed as a parathyroid cyst. Analysis of the thyroid gland confirmed benign thyroid tissue.

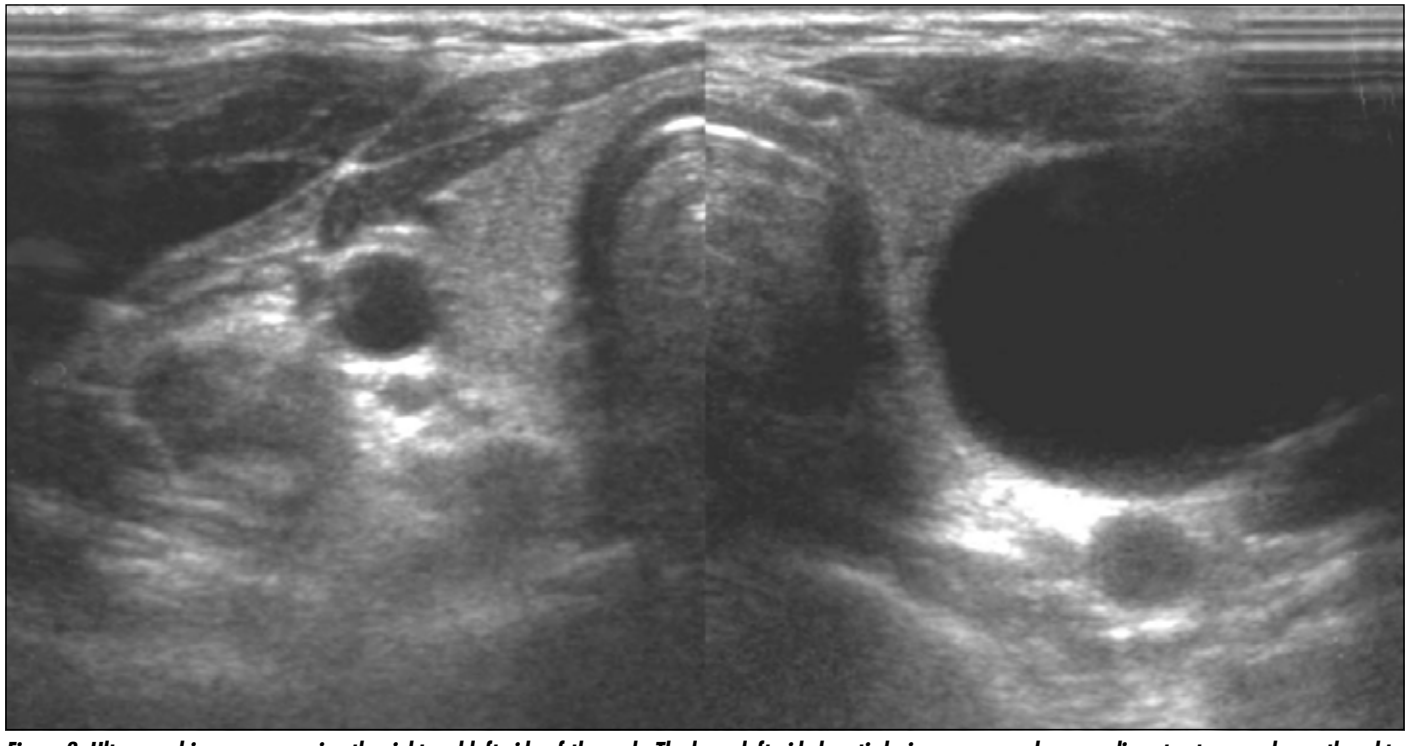


Figure 2. Ultrasound images comparing the right and left side of the neck. The large left-sided cystic lesion compressed surrounding structures and was thought to be thyroid in origin.

parathyroid hormone assay but this would seem inappropriate for such a rare condition. Compression symptoms may, as in this patient, occur because of the size of the cyst resulting in dysphagia, dyspnoea and, rarely, recurrent laryngeal nerve palsy. The risk of intraoperative rupture of a parathyroid cyst is high but ideally should be avoided because of the risk of parathyromatosis (Clark, 2009; McCoy et al, 2009).

As illustrated in this case, aspiration of parathyroid (and thyroid) cysts usually results in rapid recurrence of the cyst and surgical excision is advocated if the patient is symptomatic. Cystic lesions large enough to cause compression of surrounding structures should be easily identified intraoperatively but accurate preoperative diagnosis may allow targeted surgery. Ultrasound should identify a cystic lesion but, as shown by repeat ultrasound scans in this case, it can be difficult to establish whether the cystic lesion originates in the thyroid or parathyroid gland. Preoperative imaging of parathyroid adenomas can be performed using (99m)Tc sestamibi scintigraphy and magnetic resonance imaging and may also be of use distinguishing parathyroid and thyroid cysts. On magnetic resonance imaging, adenomas are low in signal intensity on T1-weighted images, high in signal intensity on T2-weighted images, and enhance post-introduction of gadolinium (Weber et al, 2000). The emerging modality of single-photon emission computed tomography/computed tomography can improve the sensitivity of (99m)Tc sestamibi scintigraphy (Fakhran et al, 2008). In retrospect, the use of single-photon emission computed tomography/computed tomography or magnetic resonance imaging preoperatively in this patient may have enabled a minimally invasive surgical resection of the parathyroid cyst and avoided a total hemi-thyroidectomy. **BJHM**

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Clark OH (2009) Cystic Parathyroid Lesions-Invited Critique. *Arch Surg* **144**(1): 56

Fakhran S, Branstetter BF 4th, Pryma DA (2008) Parathyroid imaging. *Neuroimaging Clin N Am* **18**(3): 537–49

Layfield LJ (1991) Fine needle aspiration cytology of cystic parathyroid lesions; a cytomorphic overlap with cystic lesion of the thyroid. *Acta Cytologica* **35:** 477–80

McCoy KL, Yim JH, Zuckerbraun BS, Ogilvie JB, Peel RL, Carty SE (2009) Cystic parathyroid lesions. Functional and nonfunctional parathyroid cyst. *Arch Surg* **144**(1): 52–6

Pinney SP, Daly PA (1999) Parathyroid cyst: an unusual cause of a palpable neck swelling and hypercalcaemia. *West J Med* **170:** 118–20

Rojdmark JS, Monchik JM (1998) Concentrations of parathyroid hormone in functioning and non-functioning parathyroid cysts. *Eur J Surg* **164**(1): 65–7

Rosenberg J, Orlando R, Ludwig M, Pyrtak LJ (1982) Parathyroid cysts. *Am J Surg* **143:** 473–80

Waldron CA (1990) Face, lips, tongue, teeth, oral soft tissues, jaws, salivary glands and neck. In: Kissan JM ed. *Anderson's Pathology.* CV Mosby, St Louis, Mo: 1095–151

Weber AL, Randolph G, Aksoy FG (2000) The thyroid and parathyroid glands. CT and MR imaging and correlation with pathology and clinical findings. *Radiol Clin North Am* **38**(5): 1105–29

LEARNING POINTS

- Parathyroid cysts are rare and the majority are non-functional but they must be included in the differential diagnoses of neck swellings.
- Aspiration of these swellings usually results in recurrence of the cyst and surgical excision is advocated if the patient is symptomatic.
- Preoperative imaging with ultrasound may not be helpful whereas (99m) Tc sestamibi scintigraphy and magnetic resonance or single photon emission computed tomography/computed tomography may be required for diagnosis.