Investigation prior to thyroglossal duct cyst excision

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ABSTRACT

INTRODUCTION Investigation of the anterior midline neck lump has been debated over the years with little agreement on best practice. Thyroglossal duct cysts (TDCs) are the most common aetiology. A TDC may contain ectopic thyroid tissue, which may affect the decision to excise.

METHODS A computerised survey was sent to a representative sample of UK-based ENT surgeons to determine current practice in investigation of presumed TDCs and the incidence of ectopic thyroid tissue.

RESULTS Overall, 95% of those surveyed use ultrasonography, with 32% also arranging thyroid function tests. Fifteen per cent had encountered absent normal thyroid tissue in the presence of a midline neck swelling. In 64% of cases this represented the only functioning thyroid tissue. Thyroid function tests were normal in all but two cases.

CONCLUSIONS The results show a significant change in practice over the last decade. All surgeons would arrange some form of investigation of a presumed TDC, with the vast majority using ultrasonography. Radioisotope scanning should only be used if the ultrasonography or thyroid function tests are abnormal. The incidence of ectopic thyroid tissue in this survey was higher than previously calculated, with a 0.17% prevalence of midline neck lumps representing the only functioning thyroid tissue.

KEYWORDS

Thyroglossal – Cyst – Neck – Investigation

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The embryological development of the thyroid gland begins in the fourth week of gestation as a midline diverticulum of the pharyngeal floor between the first pair of pharyngeal pouches. The diverticulum becomes bilobed and descends into the neck, retaining its attachment to the floor of the pharynx by the thyroglossal duct, with a varied relationship to the hyoid bone. By the sixth week of embryonic life, the elongated thyroglossal duct becomes a solid stalk, usually undergoes degeneration and disappears.¹ Thyroglossal duct cysts (TDCs) result from a disorder of this developmental process and are the most common aetiology for midline neck swellings.

Other aetiologies for midline cervical cysts include sebaceous cysts, lipomas, lymph nodes, cystic hygromas, branchial cleft cysts and ectopic thyroid tissue.² The incidence of ectopic thyroid tissue in the anterior neck in the absence of normal thyroid tissue is unknown. Removal of the ectopic thyroid tissue in such cases would lead inevitably to hypothyroidism.² The overall incidence of ectopic thyroid tissue has been estimated as 1:100,000 to 1:300,000, with 90% occurring in the tongue base and 10% in the anterior neck.³

The use of thyroid function tests and various imaging modalities pre-operatively is still debated. Many advocate the routine use of ultrasonography.^{2,4} However, thyroid scintigraphy is still preferred by some⁵ while others would request cross-sectional imaging such as computed tomography (CT) and magnetic resonance imaging (MRI).

The aim of this survey was to discover current practice among ear, nose and throat (ENT) surgeons in the UK with regard to the management of TDCs. We were also interested in the number of surgeons who had come across ectopic thyroid tissue presenting as an anterior neck lump and the result of investigations in those patients.

Methods

A representative sample of ENT specialists in the UK was interrogated by a computerised questionnaire (Fig 1). This was emailed to all 303 members of the ENT UK expert panel. The panel includes consultants, staff grade surgeons and specialist registrars. They were questioned on frequency of performing TDC excision, which pre-operative investigations were requested routinely and their

- 1) How many thyroglossal duct cyst excisions do you perform per year?

0		6–10		15–20	
1–5		11–15		>20	

- 2) Which pre-operative investigations do you arrange routinely?

No investigations	Yes / No
Thyroid function tests	Yes / No
Ultrasonography of the neck	Yes / No
Radioisotope scan	Yes / No
Other (<i>please state which</i>)	Yes / No _____

- 3) a) Have you ever personally encountered a case *without* normal thyroid gland tissue in the usual anatomical location either pre-operatively or during surgery?

Yes / No

- b) If yes, how many? _____

- 4) If you answered yes to question 3, was this because the thyroglossal duct cyst was actually the only functioning thyroid tissue?

Yes / No

- 5) Were thyroid function tests normal in those cases?

Yes / No

- 6) Please indicate your grade:

Consultant		Specialist registrar	
Associate specialist		Other (<i>please specify below</i>)	
Staff grade			

- 7) Please indicate the number of years you have spent in ear, nose and throat practice:

1–5		21–25	
6–10		26–30	
11–15		>30	
16–20			

Figure 1 Survey sent to the ENT UK expert panel

experience of discovering an absence of normal thyroid tissue.

Results

A total of 194 members of the panel (64%) responded to the questionnaire. Of these, 150 respondents (78%) were consultants, 32 (17%) were specialist registrars and the remaining 12 (5%) consisted of associate specialists and staff grade surgeons. Twenty-six (13.4%) stated they do not perform this procedure. Nevertheless, their responses to the other questions were still included in the analysis as these surgeons can be involved in the investigation and diagnosis of anterior neck lumps, at which point they may refer the

patient to a colleague. The majority of respondents ($n=137$, 71%) perform 1–5 excisions per year; no one performed more than 15.

The most commonly requested investigation is ultrasonography (95%), followed by thyroid function tests (32%). The other investigations were radioisotope scanning (3%), fine needle aspiration (2%) and CT (1%). There were no surgeons who would not routinely arrange any investigations (Fig 2).

Overall, 165 surgeons (85%) stated they had always encountered normal thyroid tissue in its anatomical location in the presence of a TDC. Of the other 29 surgeons (15%), 21 had encountered the absence of normal thyroid tissue just once and 8 had seen it twice. In 64% of those cases, the presumed TDC contained the only functioning ectopic thyroid tissue. The other 36% revealed a lingual thyroid.

We have assumed that the survey responses provide an accurate representation of the number of TDC excisions performed throughout the careers of these surgeons. The estimated incidence of an anterior neck swelling representing the only functioning thyroid tissue, based on the 18 confirmed cases in the survey, is 0.17%. The calculated incidence of ectopic thyroid tissue in this population is 0.35%.

In cases where the surgeon could recall accurately, thyroid function tests were normal in 22 of those with TDC and an absence of normal thyroid tissue. Only two cases were reported as showing abnormal thyroid function tests.

Discussion

The questionnaire was sent to a representative sample of ENT surgeons who investigate and operate on TDCs. There was a 64% response rate with 78% of respondents being consultants. The answers suggest that the respondents are responsible for performing approximately 670 TDC excisions per year (calculated using an average of the results). The Hospital Episode Statistics data for 2010–2011 show

TFT = thyroid function test

Figure 2 Most commonly arranged pre-operative investigations prior to thyroglossal duct cyst excision

1,006 episodes where surgery was performed on thyroglossal tissue.⁶ We feel these survey numbers are large enough to provide reliable data on current practice among ENT surgeons.

Virtually all surgeons (95%) would routinely request ultrasonography, with 32% arranging thyroid function tests. The other investigations such as radioisotope scanning, CT and fine needle aspiration were only performed by 6%. All respondents would arrange some form of investigation before operating on these cases. These figures show a marked change compared with a similar survey conducted in 2000 when only 60% of UK-based ENT surgeons would request ultrasonography routinely, 25% would request radioisotope scanning, 22% would request thyroid function tests and 24% would arrange no pre-operative investigations at all (Fig 2).⁵

The recommendations following a study on 100 children with a TDC published in 2001 were that pre-operative thyroid scanning is only indicated in patients with signs of hypothyroidism, abnormal thyroid function tests or raised thyroid stimulating hormone (TSH) levels.⁷ Furthermore, they state that the incidence of ectopic thyroid tissue is only 1–2% and the vast majority occur in the tongue base.

Stell and Maran's Head and Neck Surgery states that no imaging is required in the presence of a midline infrahyoid presumed thyroglossal cyst if the patient is clinically euthyroid and TSH estimation is normal.⁸ Nevertheless, in the case of a suprahyoid cyst, pre-operative imaging such as isotope (technetium-99m) scanning or MRI should be organised to exclude a lingual thyroid and prevent inadvertent removal.

A study of 54 children with ectopic thyroid tissue illustrated the wide range of thyroid function that can be present, from severe biochemical hypothyroidism to normal or near normal secretion of thyroid hormone.⁹ However, in all cases the TSH levels were elevated and all but one had severely elevated TSH levels.

The results from this survey showed abnormal thyroid function in just two cases where normal thyroid tissue was absent. Most responders to this question were referring to levels of free T₃ and T₄ with no mention made of TSH. A number could not remember the test result as it happened many years ago.

Virtually all hospitals possess the equipment for performing thyroid function tests. The cost of running each part of the test through the analyser in the biochemistry department at Northampton General Hospital is £2.67, which is the tariff for TSH alone. Adding in free T₃ and T₄ levels would cost £8.01. This relatively inexpensive test can help determine whether excision of a TDC is safe.

Neck ultrasonography can accurately identify normal thyroid tissue in the presence of TDC.^{3,7} A literature review found no cases of a non-functioning thyroid gland with normal appearance on ultrasonography.⁴ Further investigation with thyroid scintigraphy is only required if there is clinical or biochemical evidence of hypothyroidism or an abnormal appearance of the thyroid gland sonographically, suggesting an increased risk of ectopic thyroid tissue,¹⁰ although this practice is not universal.¹¹

In our survey, 15% of respondents ($n=29$) had encountered an absence of normal thyroid tissue in the usual anatomical location on at least one occasion in their career when investigating TDC. This equates to an incidence of ectopic thyroid tissue of 0.35%. Almost two-thirds (64%) of those cases showed the midline lump to be the only functioning ectopic thyroid tissue. The calculated incidence of this was 0.17%. Removal would result inevitably in the patient becoming hypothyroid, requiring thyroid hormone replacement for life. The other 36% were found to have a lingual thyroid. This highlights the need to search for ectopic thyroid tissue when it is not in the expected location as a functioning lingual thyroid could allow for safe removal of the TDC.

The incidence of ectopic thyroid tissue calculated following this survey (0.35%) is significantly higher than the figures quoted in the literature of 1:100,000 to 1:300,000.⁷ However, these figures were estimated originally in the 1970s¹² when imaging quality and access was inferior to current standards. More cases of ectopic thyroid tissue are probably being identified and further research into current rates with modern imaging would be of interest.

Conclusions

Standard practice among UK ENT surgeons for pre-operative investigation of TDCs is to arrange ultrasonography, with many also performing thyroid function tests. Only a small number of surgeons use other imaging modalities and we would only recommend the use of thyroid scintigraphy when ultrasonography suggests ectopic thyroid tissue or if thyroid function tests are deranged. These results show a significant shift from the practice of ten years ago.²

In the absence of thyroid tissue in the usual anatomical location, we would advise that sonographers should seek ectopic tissue along the entire length of the thyroglossal duct, including the tongue base. Excision of a TDC in the presence of lingual ectopic thyroid could be considered.

The current practice as shown in this survey is safe and evidence based. Anterior midline neck lumps do require investigation before excision. We found an incidence of 0.17% of the lump representing the only functioning thyroid tissue.

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