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Variations in single/two stage thyroidectomies for cancer may be due to differences in thyroid fine needle cytology provision ☆

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Abstract

Background & aims: Recommended treatment for thyroid cancers >10 mm is single stage total thyroidectomy (SST). Cancers diagnosed by diagnostic lobectomy may need completion surgery resulting in two stage thyroidectomies (TST). We noticed significant variation in numbers of SST and TST between hospitals within our cancer network and explored reasons for this using a prospective database containing all cases from 2004 to 2011 (n = 1030). We therefore conducted a survey of thyroid cytology provision across the network during 2010–2011.

Methods: A central university hospital with the largest caseload (21.5% of total) was chosen as "benchmark". Of 14 remaining hospitals 3 were excluded from analysis due to low thyroid operation numbers and the remaining compared with benchmark. We used individual chi-squared tests with Bonferroni correction to explore variation in expected and observed numbers of SST/TST. Analysis of variance (ANOVA) was used to examine reasons for observed differences.

Results: Significant variance in SST/TST was seen between hospitals ($p < 0.00001$). Three hospitals had frequencies of SST statistically similar to reference hospital; each reported 201–300 thyroid cytology cases during the survey period. The remaining 8 had lower rates of SST, the 2 lowest performing hospitals having SST rates of 11% ($p = 0.0004$) and 9% ($p < 0.0001$). These eight hospitals reported fewer than 200 cytology cases each, shared amongst 4–7 pathologists per site. Differences were unrelated to patient age, gender, tumour histology or stage (ANOVA). Only the reference hospital had specialist cytopathologists.

Conclusion: Variation in thyroid cytology provision may increase TST rates. Thyroid cytology should be concentrated in high volume centres with specialist thyroid cytopathologists.

Keywords: Thyroid cytology; Differentiated thyroid cancer; Thyroidectomy

Introduction

The lifetime risk for developing palpable nodular thyroid disease is 5–10%, and is higher in iodine deficiency states.[1] The prevalence of thyroid nodules rises with age, increasing at 1% per decade of life for palpable nodules. Consequently, thyroid nodules, either solitary or as part of a multinodular goitre are very common. Furthermore

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the increasing use of radiological investigations has fuelled incidental discovery of impalpable thyroid nodules. Such nodules will be visible on ultrasound scanning of 20–40% of patients with palpably normal thyroid glands.[2] Approximately 16% of computerized tomography scans will show incidental thyroid nodules.[3]

Most authorities agree that, depending on ultrasonographic characteristics, thyroid nodules greater than 10 mm in size should be investigated[4] and that the investigation of choice is fine needle aspiration cytology (FNAC).[4–6] FNAC has a diagnostic accuracy, sensitivity and specificity exceeding 95%[7–10] and can be used to triage patients for thyroid surgery.[11,12]

In those patients in whom FNAC diagnoses thyroid cancer, and this is greater than 10 mm in size, then the treatment of choice is total thyroidectomy[4,5] with or without lymph node dissection according to local protocols. Accurate preoperative diagnosis of a thyroid cancer using FNAC will allow adequate pre-surgery counselling of patients and allow a total thyroidectomy as a single stage procedure (single stage thyroidectomy: SST). However, suboptimal or inaccurate FNAC will fail to diagnose a thyroid cancer preoperatively and the patient will be subject to diagnostic lobectomy. A proportion of these patients will then proceed to completion thyroidectomy thus having a two stage thyroidectomy (TST). The disadvantages of a TST for the patient include two separate admissions to hospital and delays in commencing adjuvant radio-iodine therapy, should this be indicated.

We have noticed significant variation in numbers of SST and two stage thyroidectomies between hospitals within our cancer network. We explored reasons for this variation using a prospectively collected database containing all thyroid cancer cases referred to a regional Thyroid Cancer multidisciplinary team (MDT) from 2004 to 2011 (n = 1030). Our findings led us to hypothesize that the observed variations may be due to differences in cytology provision. We therefore conducted a survey of thyroid cytology provision across the network during 2010–2011.

Patients & methods

The Greater Manchester & Cheshire Cancer Network and Lancashire & South Cumbria Cancer Network serve a combined population of 5 million people. All thyroid cancers from this region of the North West of England are referred to a central thyroid cancer multidisciplinary team (MDT) for treatment planning. From 2004 clinical data from all patients with thyroid cancer has been collected prospectively into the database maintained at the tertiary specialist cancer hospital. Data collected comprised age, gender, pre operative diagnosis and type of operation (SST or TST). The data included in this study covered the 8 year period from 2004 to 2011 inclusive. Referrals to this tertiary specialist cancer hospital were received from 15 hospitals in total. For this analysis we included all cases of differentiated thyroid cancer. Cases of anaplastic or medullary thyroid cancer or thyroid lymphoma were excluded from this study as were patients with differentiated thyroid cancer not undergoing thyroid surgery.

A central university hospital with the highest volume of thyroidectomies for thyroid cancer within our network was chosen as the "benchmark" hospital for subsequent comparisons. Three hospitals were excluded from further analysis due to low numbers of thyroid cancer operations.

The remaining 11 hospitals were compared with the benchmark hospital. We used individual chi-squared tests with Bonferroni correction to explore variation in expected and observed numbers of SST/TST. Analysis of variance (ANOVA) was used to examine reasons for any observed differences. We assessed the following variables to explore variance in TST and SST between hospitals: patient age at diagnosis, patient gender, tumour histological type, tumour TNM staging, speciality of surgeon (specialist endocrine surgeon vs otolaryngologist vs general surgeon[13]) and variability between surgeons within the same hospital.

For the survey of thyroid cytology provision we contacted the pathology department of each of the 12 study hospitals (reference hospital plus the 11 comparator hospitals) within our cancer network to elucidate, (i) whether there were facilities for immediate assessment of diagnostic adequacy of a thyroid cytology specimen in the outpatient clinic (OPC) such that inadequate specimens would result in immediate repeat of FNAC,[14,15] (ii) whether preparation of thyroid FNAC specimens in the OPC were undertaken by a cytopathology technician or by the clinician performing the FNAC, (iii) whether thyroid cytology was interpreted and reported (using the Royal College of Pathologists thyroid cytology reporting system[16]) by a specialist thyroid cytopathologist or by general pathologists, (iv) number of pathologists interpreting and reporting thyroid cytology samples and (v) the number of thyroid cytology specimens reported within an eighteen month period.

Results

A total of 1030 cases of differentiated thyroid cancer from 15 hospitals were prospectively entered onto the database over 8 years. Three hospitals contributed only 46 (4%) cases between them and were excluded from this analysis as they averaged only 2 thyroid cancer patients per annum per hospital over the study period. Therefore, the study cohort comprised 984 patients from 12 hospitals. The number of procedures performed at each hospital is shown in Table 1.

The benchmark hospital performed the highest volume of thyroid surgery (n = 212) during the study period. The proportion of SST to TST seen in the benchmark hospital (44%) is similar to that published by other large centres[17] and in the British Association of Endocrine and Thyroid Surgeons 4th National Audit.[18]