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Research paper

Quality of thyroid referrals in Saskatchewan

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ABSTRACT

Background A thyroid nodule is a common presentation for thyroid pathology. A low proportion of thyroid nodules harbour malignancy and the investigation of these nodules should be performed in a cost-effective manner. The American Thyroid Association (ATA) has published guidelines which should aid physicians in performing the appropriate investigations.

Aim To determine the proportion of patients referred to thyroid surgeons in Saskatchewan with appropriate pre-referral work-up.

Methods Data were retrospectively collected from the charts of all new thyroid referrals seen between 8 June 2011 and 8 June 2012 by two thyroid surgeons in the Saskatoon Health Region, Saskatchewan, Canada. Main outcome measures were the presence of thyroid stimulating hormone (TSH) and ultrasound results, and the appropriateness of ultrasound report recommendations in referrals to thyroid surgeons.

Results Recent TSH results were done and sent to the thyroid surgeon in 55.1% of referrals. A recent ultrasound was performed in 92.3% of referrals. Of patients with a high or normal TSH, a radionuclide scan was inappropriately recommended in 11.5% of cases.

Conclusion There is room for improvement in pre-referral work-up of patients with thyroid nodules in Saskatchewan, in order to facilitate appropriate clinical decision making in a cost-effective manner.

Keywords: primary care, quality assurance, referral, surgery, thyroid cancer, thyroid nodule

How this fits with quality in primary care

What do we know?
Thyroid stimulating hormone (TSH) measurement should be the first investigation for patients found to have thyroid nodules. Radionuclide scans should be reserved for patients with hyperfunctioning thyroid glands.

What does this paper add?
A substantial proportion of patients referred to thyroid surgeons in Saskatchewan did not have a recent TSH measurement. There is an overuse of unnecessary radionuclide scans resulting in a significant waste of resources.

Introduction

Thyroid nodules are very common and often undiagnosed, with autopsy data showing a prevalence rate of 50% in people with no history of thyroid disease.[1] Nodules are frequently discovered on physical examination of the neck or incidentally during diagnostic imaging for other reasons.[2] Palpable thyroid nodules

have a prevalence of around 1.5% in males and 6.4% in females.[3] The causes of thyroid nodules vary from benign multinodular goitres, thyroiditis, cysts and follicular neoplasms to thyroid carcinoma in $\sim$ 5% of cases.[4,5] This low risk of malignancy warrants investigation using the most cost-effective and evidence-based diagnostic tools. To this end, the American Thyroid Association (ATA) has published guidelines for the investigation and management of patients with thyroid nodules.[6]

According to the ATA guidelines, the work-up of thyroid nodules detected by palpation or imaging begins with measurement of the patient's serum thyroid stimulating hormone (TSH) level as well as thyroid ultrasonography.[6] The TSH level is important to know as it indicates which investigation(s) should follow.[4] Patients with low TSH should be evaluated with a radionuclide thyroid scan to assess whether their nodules are autonomously functioning or non-functioning.[7] Since hyperfunctioning nodules are almost always benign, only nodules which are iso- or hypofunctioning should be evaluated with fine-needle aspiration biopsy (FNA).[4,8] Nodules in patients with normal or high serum TSH should be further investigated with FNA, depending on the size, cysticity and suspicious characteristics of the nodules as determined by ultrasonography (Figure 1).[9,10]

Thyroid surgeons in Saskatchewan receive referrals for patients with a variety of thyroid pathologies, often to provide expertise in the management of patients with thyroid nodules. We examined the quality of the initial work-up of patients and appropriateness of ultrasound report recommendations for cases referred to thyroid surgeons in Saskatchewan. More specifically, we investigated whether the ATA revised guidelines were followed in the work-up of patients referred for consideration of FNA or other appropriate examinations.

Method

A retrospective chart review was performed for two thyroid surgeons in Saskatchewan. All new thyroid referrals seen between 8 June 2011 and 8 June 2012 by either of the two surgeons involved in the study were included. Patients who were transferred for continued follow-up of an existing and unchanging thyroid concern were excluded. The patient charts were scrutinised and data were collected from the referral letters, laboratory results, imaging reports and pathology reports. Individual, de-identified data were entered into a database and descriptive analysis was performed using IBM SPSS Statistics 20.

There were a total of 238 patients. Six patients were referred with symptomatic Graves' disease or symptomatic hyperthyroidism and were excluded from the final analysis because they were not investigated for thyroid nodules. Similarly, 12 patients were referred for surgical treatment of significant structural symptoms of thyroid enlargement. These patients were treated without investigation of thyroid nodules and they were also excluded from the final analysis. Twenty-four patients were referred already having had a recent diagnostic FNA and were excluded. This resulted in a total of 196 patients, referred for consultation, and possible FNA.

Because thyroid nodules are commonly found incidentally on imaging and physical examination, referrals in our study came from a wide variety of specialists; however, the majority of the referrals (93%) to thyroid surgeons in Saskatchewan are from general practitioners (Figure 2). Because our study aimed to examine the current state of pre-referral work-up for thyroid nodules in Saskatchewan, general practitioners were not provided with a referral template and no additional education regarding ATA guidelines was provided prior to this study. Prior to this study,

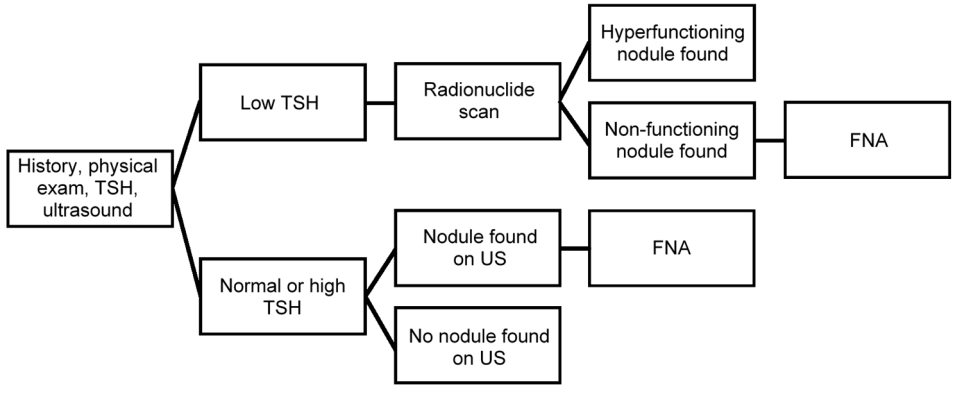

Figure 1 Flow chart illustrating the American Thyroid Association recommended sequence of investigations for the work-up of patients with thyroid nodules

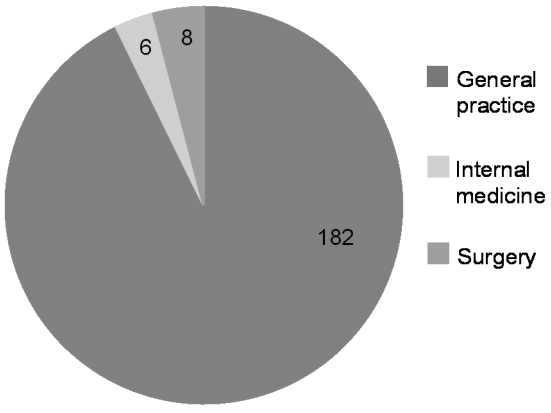

Figure 2 Pie chart showing the distribution of referring physician specialties for the 196 patients referred for further evaluation of thyroid nodules. Internal medicine specialties included dermatology, endocrinology, neurology, respirology, rheumatology and general internal medicine. Surgical specialties included general surgery, thoracic surgery, neurosurgery and orthopaedic surgery

the two thyroid surgeons did not screen their referrals or ask for missing investigations to be completed.

We defined recently performed investigations as investigations done within 180 days of the initial surgeon consultation. There were 14 referrals with TSH laboratory results older than 180 days, and nine referrals with ultrasonography reports older than 180 days.

The characteristics of thyroid nodules for which the ATA recommends FNA investigation is described in the revised ATA guidelines: > 5 mm nodules with suspicious features in patients with high-risk histories, all nodules in patients with abnormal cervical lymph nodes, $\geq$ 1 cm nodules with microcalcifications, > 1 cm solid hypoechoic nodules, $\geq$ 1–1.5 cm iso- or hyperechoic nodules, $\geq$ 1.5–2.0 cm mixed cystic–solid nodules with any suspicious features, $\geq$ 2.0 cm mixed cystic–solid nodules without suspicious features, and $\geq$ 2.0 cm spongiform nodules.[6] Suspicious features included: microcalcifications, hypoechoic echotexture, increased nodule vascularity, infilitrative margins and a nodule appearance that is taller than wide on transverse view.[6] If no suspicious features were mentioned in the utlrasonography report, it was assumed that none were present, and if no cystic components were described it was assumed that the nodule was solid.

Results

Of the 196 patients, 175 (89.3%) were female and 21 (10.7%) were male. The mean age of the patients was 55 $\pm$ 16 years with a range of 19–94 years of age. Thirty-four (17.3%) patients presented with structural symptoms from their thyroid enlargement. These symptoms included intermittent hoarseness, difficulty swallowing solids, discomfort and feeling of pressure in the neck. One hundred and sixty-two of the 196 patients were asymptomatic.

Recent TSH laboratory results were done and sent to the surgeon in 108 of 196 (55.1%) referrals. Most commonly, patients were euthyroid with 85 of the 108 (78.7%) patients with recent laboratory results sent having a normal TSH (Figure 3).

A recent ultrasound was performed and the report was sent to the surgeon in 181 of 196 (92.3%) referrals. Most commonly, with 128 of 181 patients (70.7%), the general impression was that of a multinodular thyroid (Figure 4).

Of the 196 referrals, 103 included a recently performed ultrasound (US) and TSH laboratory report. Of those 103, 75 (72.8%) had a nodule described by

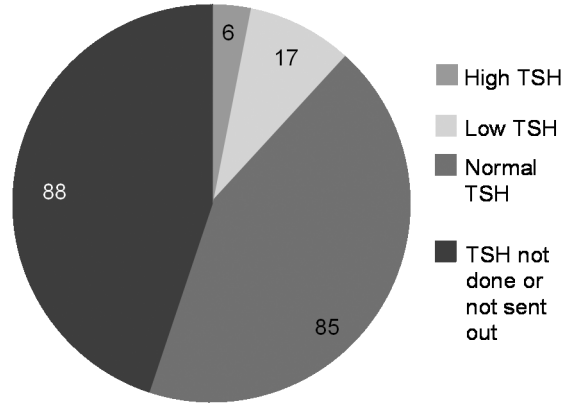

Figure 3 Pie chart showing the TSH results for the 196 referrals. Fourteen patients with TSH done but not within 180 days were considered to be not done

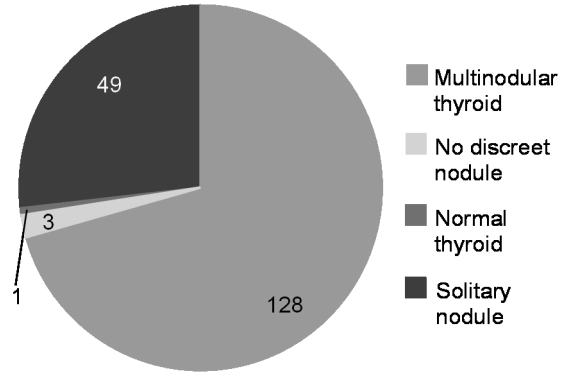

Figure 4 Pie chart showing the distribution of ultrasound impressions for the 181 patients with a recent US. Diffusely enlarged, heterogeneous glands with no definable nodules were said to have no discreet nodule

US that, according to ATA guidelines, warranted FNA investigation. Twenty-three (22.3%) had nodules which were too small for FNA investigation to be cost-effective, and five (4.9%) had US reports which did not provide nodule sizes.

Analysis by solitary nodule vs. multinodular thyroid

Of the 49 referrals with solitary nodule thyroids, 24 (49.0%) of the cases had a recently done TSH measurement sent to the surgeon.

Of the 128 referrals with multinodular thyroids, 77 (60.2%) of the cases had a recently done TSH measurement sent to the surgeon.

Analysis by TSH result (Figure 5)

Low TSH

Sixteen (15.5%) patients with both a US and TSH recently done were found to be biochemically hyperthyroid. Only one (6.2%) of the US reports for these 16 patients recommended a radionuclide scan.

High or normal TSH

Eighty-seven (84.5%) patients with both a US and TSH recently done were found to be biochemically euthyroid or hypothyroid. Ten (11.5%) US reports recommended a radionuclide scan.

Analysis by presence or absence of nodule warranting FNA

Five of the 103 US reports, of patients with both an ultrasound and TSH, did not provide nodule size and were excluded at this point.

Nodule warranting FNA

In the 75 patients for whom an FNA investigation was warranted, 27 (36%) recommended FNA. Thirty (40%) made no recommendations, and 18 (24%) recommended another investigation or follow up.

No nodule warranting FNA

In the 23 patients for whom an FNA investigation was not warranted, none of the US reports recommended FNA.

Discussion

This study summarises the work-up of patients with thyroid disease referred to two thyroid surgeons in Saskatchewan. The majority of patients referred to either surgeon were referred for consultation regarding thyroid nodules discovered on palpation or incidentally during neck imaging. The investigations done prior to referral and sent to the surgeon, if done appropriately, will guide the surgeon's decision making with respect to whether other investigations such as FNA or a radionuclide scan should be performed. The management of patients with thyroid nodules should be both prudent enough to avoid non-cost-effective investigations, while respecting the fact that 5% of nodules are found to be malignant.[5,6,11] Our study found that, in Saskatchewan, there is room for improvement in the quality of referrals received by thyroid surgeons.

The first recommendation of the revised ATA thyroid nodule management guidelines suggests that a serum TSH should be measured in the initial evaluation of patients found to have a thyroid nodule.[6] Serum TSH has been shown to be an independent

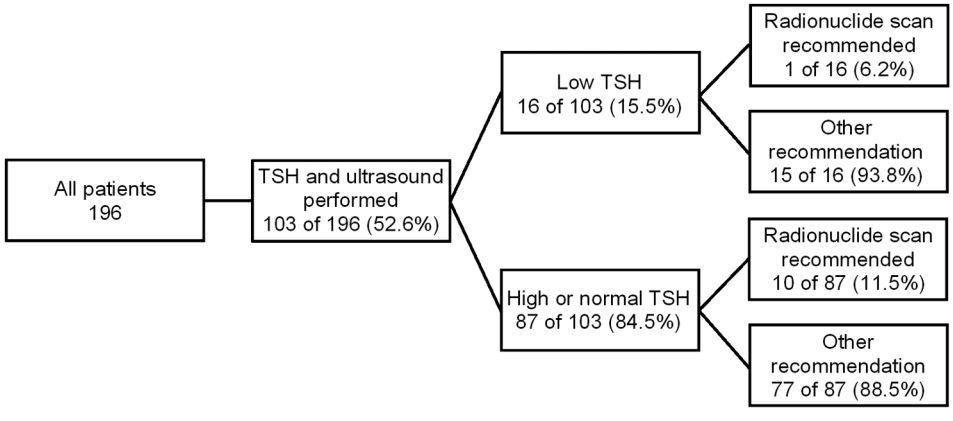

Figure 5 Flow chart illustrating the proportion of patients with appropriate investigations performed, as well as the proportion of patients who were recommended to have a radionuclide scan. A radionuclide scan was inappropriately recommended for patients with high or normal TSH in 11.5% of the cases. Other recommendations included FNA, US follow-up, biochemical correlation or no recommendation

predictor of the presence of thyroid malignancy and to be an effective criterion for stratifying patients' further investigations according to their risk of malignancy.[7] The value of measuring serum TSH in the work-up of patients with thyroid nodules is reflected in three major sets of published guidelines.[6,12,13] Our study found that serum TSH was recently measured and the report sent to the thyroid surgeon in only 55% of referrals. In order for the patient work-up to follow the ATA guidelines, serum TSH must be measured to determine whether a radionuclide scan or an FNA is the appropriate next step and seeing patients without this information results in delays and unnecessary consultations. For those patients travelling a distance to see the surgeon this can be a significant inconvenience. We believe that increasing the proportion of patients referred at initial consultation with recent TSH results is the area of greatest improvement for initial management of patients with thyroid nodules in Saskatchewan.

The second recommendation of the ATA guidelines suggests that ultrasonography should be performed during the initial work-up of patients with known or suspected thyroid nodules.[6] Ultrasound allows more accurate representation of the size of nodules which may be poorly estimated by palpation alone.[10] This helps to avoid unnecessary biopsy of small lesions as well as ensuring that large but non-palpable nodules or nodules with suspicious features are not missed. Referrals in our study included thyroid US reports in 92% of cases.

The ATA guidelines suggest that radionuclide scans should be limited to patients who have been found to be biochemically hyperthyroid.[6] The use of scintigraphy for the routine investigation of thyroid nodules is unnecessary and non-cost-effective as it does not provide additional information useful in clinical decision making for euthyroid or hypothyroid glands.[8,14] In our study, nine of the 87 (10.3%) patients with ultrasound and TSH measurement done who were found to have high or normal TSH also had a radionuclide scan done prior to referral to a surgeon. A radionuclide scan was recommended by the US report in ten of the 87 (11.5%) cases. According to the ATA guidelines, performing a radionuclide scan after measuring a patient's TSH, without first doing a US, is acceptable[6] but only one referral in our study included a hyperthyroid TSH report without a US report and this case did not have a radionuclide scan done. We believe that decreasing the number of unnecessary radionuclide scans being performed represents the second important area for improvement for the initial management of patients with thyroid nodules in Saskatchewan.

Recommendation 3a of the ATA guidelines provides the thyroid nodule characteristics which warrant further investigation by FNA.[6] Ultrasound can provide a description of the presence or absence of these characteristics[6,9,12] and the US report recommendations should direct the referring physician in appropriately referring to a surgeon or directly ordering a US-guided FNA. There were 98 cases in which the patient's TSH and US were done, and the US report also provided nodule size(s). In 23 of those 98 cases, there was no nodule warranting FNA investigation and none of the 23 US reports incorrectly recommended an FNA. For the 75 of 98 cases in which an FNA was warranted, 27 US reports accurately recommended biopsy; however, it should be noted that a significant proportion made no recommendations. In determining whether nodules warranted investigation, we treated nodules in multinodular thyroids as well as solitary nodule thyroids using the same criteria since nodules in multinodular glands have been reported to have the same risk of malignancy as solitary nodules.[10,15]

Limitations of our study include only examining data from two tertiary centre surgeons, which may limit generalisation of these results to other health regions. In addition, only reports sent to the study surgeons were examined which did not account for the possibility that referrals did have TSH and US investigations which were not sent to surgeons.

Conclusion

There is room for improvement to be made in the work-up of patients newly referred to thyroid surgeons in Saskatchewan. In particular, improving the number of patients with serum TSH measurement done and sent to surgeons will facilitate decision making that is cost-effective as well as optimal for patient care and satisfaction. In addition, reducing the number of unnecessary radionuclide scans would be desirable. Thyroid surgeons should screen referrals and request that referring physicians complete any missing investigations. Information regarding the revised ATA guidelines should be disseminated to general practitioners, perhaps in the form of a referral template.

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ETHICAL APPROVAL

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PEER REVIEW

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CONFLICTS OF INTEREST

None.

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