Incidental Thyroid Nodules Found during Carotid Doppler Ultrasonography at King Hussein Medical Centre

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ABSTRACT

Objective: To determine the incidence of thyroid nodules found during extra-cranial carotid Doppler examination.

Methods: Between March 2005 and December 2007, a total number of 791 patients (354 females and 437 males) underwent carotid Doppler examination for different causes. The study included thyroid gland examination with gray scale and color Doppler. Patients with incidental thyroid nodules were referred to endocrinology out-patient clinic for further evaluation. Patients were divided according to age group and prevalence per decade.

Results: Incidental thyroid nodules were found in 98 (12.3%) patient. Bilateral nodules were found in 61 and unilateral in 37 patients. Nodules equal or larger than one cm were found in 89 patients. Fifty eight nodules were solid, 24 were cystic and 16 showed mixed echogenesity. Fine needle aspiration biopsy was performed in 87 patients, and results showed 79 (91%) benign and 8 (9%) malignant nodules. Most malignant nodules were papillary carcinomas. Younger age groups (<55 yrs) were reported to have a higher rate of thyroid nodules (18.3% vs.7.3%, RR: 2.51) (95%CI: 1.68-3.75; P=0.0000028).

Conclusion: Incidental thyroid nodules are a common finding during carotid Doppler ultrasound examination and some of these nodules may represent clinically significant pathology. Younger age constitutes a group of people with higher risk for thyroid nodules.

Key words: Carotid Doppler, Thyroid cancer, Thyroid nodule, Thyroid ultrasound

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Introduction

Sonographic examinations of thyroid nodules is performed for evaluation of thyroid glands that seem abnormal on palpation and is indicated for case detection of malignancy in certain high risk situations.[1]

Thyroid nodules are common and frequently benign. Ultrasound (US) will detect incidental thyroid nodules in about 30-50% of population,[2-4] and thyroid nodules are present in 50-60% of population at autopsy.[5-7]

Thyroid cancer constitutes 1% of all cancers and 0.5% of cancer deaths.[8] There is a recent increase in prevalence of incidental thyroid nodules due to increase in US resolution, and now it is common to detect non-palpable nodules (less than one cm in diameter).[9] Incidental nodules are usually discovered during imaging studies for a various reasons such as neck and chest computed tomography and carotid Doppler examination. In a previous study by Khulaifat *et al.* the prevalence of incidental thyroid nodules detected by US in

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Table I. Prevalence of thyroid nodules per patients' age groups

Age group (No. of patients)	No. of patients with nodules (%)
27-35 (123)	18 (18.3)
35-45 (117)	20 (20.4)
45-55 (126)	29 (29.5)
55-65 (191)	18 (18.3)
65-71 (234)	13 (13.2)
≤55 years (366)	67(18.3)*
> 55 years (425)	31(7.3)

* p=0.0000028 ≤55 years vs. > 55 yrs. Odd ration =2.85; 95% Confidence Interval 1.77-4.59 and a Relative Risk of 2.51; 95% CI; 1.68-3.75.

Table II. Ultrasonic features of thyroid nodules

Nodule consistency	No. (%)
Mixed	16 (16.3)
Solid	58 (59.1)
Cystic	24 (24.4)

TableIII. Fine Needle Aspirate Biopsy results

Cytology Results	No. (%)
Benign colloid nodule	60 (68.9)
Benign thyroid cyst	18 (20.6)
Papillary carcinoma	6 (6.8)
Follicular carcinoma	2 (2.2)
Lymphocytic thyroiditis	1 (1.1)

Jordanian population was 32.1% which is in agreement with international data (10-41%).[3,10]

Fine needle aspiration biopsy (FNAB) is considered to be the most useful test for diagnosis of thyroid nodule because of its high sensitivity and specificity.[5,11] Although most of FNAB are diagnostic, 5-20% of biopsies are inadequate and insufficient for diagnosis and require repeated aspiration.[12]

The aim of this study was to determine the incidence of incidental thyroid nodules found during carotid Doppler examination at King Hussein Medical Centre (KHMC).

Methods

This is a prospective study performed at KHMC between March 2005 and December 2007, on a total of 791 patients (437 males and 354 females, age range: 25-79 years and mean age: 51.4 years) who underwent Doppler examination of their extra-cranial carotid systems in the Radiology Department for various reasons such as tinnitus, stroke evaluation and preoperative assessment prior to coronary bypass surgery. Examination was performed by an experienced radiologist.

Ultrasound examination was carried out using HDI 5000 ultrasound machine (ATL; Philips Medical Systems, Bothell, WA) with a CL 10-5 MHz linear array transducer. Following carotid system examination, incidental thyroid nodules were documented and evaluated for their location, number, size, consistency (solid, cystic or mixed), vascularity and the presence or absence of calcification. All incidental thyroid nodules ≥1 mm in diameter were documented. All patients with known thyroid disease or history of malignancy elsewhere were excluded from this study.

Patients with incidental nodules were evaluated and followed up at the endocrinology outpatient clinic. Follow-up ultrasound and FNAB were recommended to patients with suspicious nodules (Fig. 1).

Informed verbal consent was obtained from all patients. Patients were divided into two groups according to age (≤55 years or older than 55) and rates of thyroid nodules per age decades were reported.

Statistical analysis involved calculation of the mean, standard deviation, percentages, Odd ratio (OR) and Relative Risks (RR) using EPinfo 6 program. A *P* value <0.05 was considered as significant.

Results

At least one incidental thyroid nodule was demonstrated in 98 (12.3%) of the 791 patients referred for carotid Doppler examination. The mean age for these patients was 58.14 and their age ranged between 27 and 71 years, 64 (65%) were females and 34 (35%) were males.

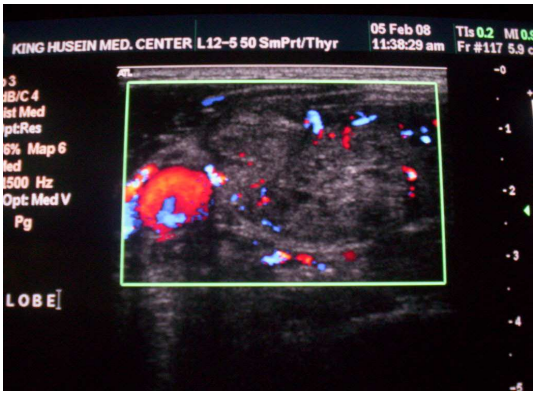

Fig.1. Large right thyroid solid nodule with spots of calcification and abundant vascularity. FNAB revealed papillary tumor

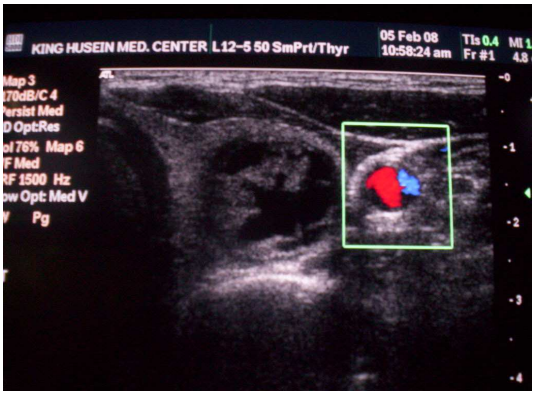

Fig. 2. Carotid Doppler examination showing incidental left thyroid nodule of mixed echogenesity. FNAB revealed benign colloid nodule

Patients were categorized into five age groups as shown in Table I. The higher number of thyroid nodules was found in the 45-55 age group followed by the 35-45 age group. The older age group (>55 years, n=425) showed the lowest rate of incidental nodules of 7.3% vs. 18.3% in those ≤55 years (Odds ratio =2.85; 95% Confidence Interval 1.77-4.59 and a Relative Risk of 2.51; 95% CI; 1.68-3.75.p=0.0000028).

Thyroid nodules were bilateral in 61 (62%) and unilateral in 37 (38%) patients. Eighty nine (91%) patients had nodules equal to or larger than one cm, while nine (9%) had nodules less than one cm. Nodules were solid in 58 (59%), cystic in 24 (24%) and 16 (16%) showed mixed consistency (Table II).

US guided FNAB was performed in 87 patients and repeated in 17 (19.5%) due to inadequate specimens. Table III shows the results of these biopsies. Both solid and cystic lesions were biopsied. No major complications were present. Minor complication included local discomfort and subcutaneous hematoma.

Seventy nine (90.8%) patients had benign nodules (Fig. 2) and eight (9.2%) had malignant nodules (Fig. 1). Malignant and suspicious FNAB were scheduled for surgery and received the standard surgical, radioactive iodine ablative and appropriate medical treatment as per international guidelines.[1]

Malignant nodules were papillary carcinoma in six patients (75%) and follicular carcinoma in two (25%) (Fig.1). Most benign nodules were colloid lesions (Fig.2). One patient had lymphocytic thyroiditis and 18 had simple thyroid cysts. Five patients with malignancy were above 55 years (16.13%) vs. 4.5% of those below 55 years with thyroid nodules who had FNAB (p=0.0322).

Discussion

Although the incidental thyroid nodules are common findings on ultrasound examinations and cross-section imaging, the incidence of incidental thyroid nodules found during carotid Doppler is relatively unknown in our part of the world. Five percent of the populations have palpable thyroid nodules and an additional 30-40% has non palpable nodules that can be found by imagining studies. Thyroid cancer is found in only 8% of palpable nodules thus the appropriate interpretation of incidentally discovered thyroid nodules found on imaging studies obtained for other indications is important.[1-4]

Imaging of head and neck by ultrasound, MRI, and CT scan for different causes other than thyroid examination will reveal these incidental nodules, and with the ongoing technical improvement of ultrasound machines, the incidence of discovered nodules will increase.[13,14]

In this study we identified eight new cases of thyroid malignancy which represent 9.2% of patients with incidental nodules. The relatively high malignancy rate in this study compared with national thyroid cancer prevalence is explained by selection of highly suspicious nodules on ultrasound findings and older subjects in this study; however this result is still in agreement with regional and international data.[15,16]

There is no optimal strategy for treatment of the so called thyroid “incidentaloma”, and the management of these nodules present a significant challenge to both endocrinologists and surgeons as many recommendations on how to further investigate and approach these nodules are available.[15,17]

In our view, incidental thyroid nodules found

during carotid Doppler or other head and neck imaging should be reported and appropriately evaluated since they may affect patient outcome. A special attention should be paid for younger age groups as they constitute a higher risk for development of thyroid nodules with higher chance of malignancy on long term depending on their longevity. The older group has significantly higher rates of malignancy. We recommend routine thyroid view during carotid Doppler especially in elderly patients.

Conclusion

Incidental thyroid nodules found during carotid Doppler examination are common and should not be overlooked since they may represent clinically significant pathology and harbor malignancy. Appropriate workup should be considered for patients with nodules especially when these nodules are larger than one cm in diameter or look suspicious on ultrasound examination.

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