Small-Sized Thyroid Cancers—a Single Institutional Experience in India

U. S. Vishal Rao¹ · Shrinidhi Koya² · Sowjanya Gandla¹ · Sataksi Chatterjee¹ · Ashutosh A. Patil¹ · Ravi C. Nayar¹ · Kumar Kallur³

Received: 23 August 2016 / Accepted: 8 June 2017 / Published online: 29 June 2017
© Indian Association of Surgical Oncology 2017

Abstract The incidence of small differentiated thyroid carcinomas is increasing worldwide in the recent years, especially tumours of size less than 2 cm in diameter. In this study, we have analysed the patterns of behaviour of small-sized thyroid carcinomas (<2 cm, T1 tumours) in comparison with large-sized thyroid carcinomas. This is a retrospectively analysed data of patients with thyroid carcinoma. The following parameters were analysed: distribution with regard to age, sex and the presence of metastasis based on radioiodine scan. The following histopathological details were collected: maximal tumour diameter, extrathyroidal extension and lymphovascular invasion. Out of 152 patients, 39 patients were excluded due to the non-availability of complete details. Among the 113 patients of thyroid carcinomas, 43 patients (28%) were presented with small-sized tumours (measuring less than 2 cm). In small-sized thyroid tumours, 21.6% showed extrathyroidal extension. 2.7% of the small-sized thyroid carcinomas showed perineural invasion as compared to 6.3% of the large-sized thyroid carcinomas. Twenty percent of the small-sized thyroid carcinomas showed lymphovascular emboli. 51.2% of the small-sized thyroid carcinomas were presented with nodal metastasis as compared to 40% of the large-sized thyroid carcinomas. 57.5% of the small-sized thyroid carcinomas showed extracapsular extension as compared to 57.8% of the large-sized thyroid

carcinomas. Despite small size, thyroid carcinomas have properties to behave aggressively as comparable to large-sized thyroid carcinomas. Taking the above facts into account, the small thyroid cancers should be treated with considerable caution as large thyroid cancers, especially since we have limited tools to predict the preoperative poor prognostic factors.

Keywords Small-sized thyroid carcinoma · Extrathyroidal extension · Nodal metastasis

Introduction

The incidence of the thyroid small-sized tumours is on rise in the recent years which has been attributed to increased detection rates due to improvement in the quality and availability of imaging [1]. A large proportion of these tumours is found incidentally during the treatment of the benign thyroid disease or during the evaluation of unrelated symptoms. The incidence of thyroid cancer continues to increase, with a majority of the tumours less than 2 cm [1]. Thyroid small-sized tumours are defined as tumours less than 2 cm in maximum diameter (T1 tumours).

The annual incidence of thyroid cancer varies considerably in different registries, ranging from 1.2 to 2.6 per 100,000 individuals in men and from 2.0 to 3.8 per 100,000 in women [2, 3]. Among the subtypes of thyroid carcinomas; papillary, follicular, medullary, anaplastic and poorly differentiated carcinoma; the incidence of papillary thyroid carcinomas constitutes the majority [4].

This study aims to review our institution's experience on thyroid small-sized tumours and the patterns of metastasis in small-sized tumours.

✉ U. S. Vishal Rao
drvishalrao@yahoo.com

¹ Department of Surgical Oncology, Health Care Global Enterprises Ltd., Bangalore, India

² Department of Academics, Health Care Global Enterprises Ltd., Bangalore, India

³ Department of Nuclear Medicine, Health Care Global Enterprises Ltd., Bangalore, India

Materials and Method

This is a retrospectively analysed data of patients with thyroid carcinoma who were treated in the Department of Head and Neck Surgical Oncology, Health Care Global Enterprises Ltd., Bangalore, from 2011 to 2014. The following parameters were analysed: distribution with regard to age, sex and the presence of distant metastasis based on radioiodine scan. The following histopathological details were collected: maximal tumour diameter, extrathyroidal extension, extracapsular extension and lymphovascular invasion.

Results

We have analysed the data of 152 patients of the thyroid carcinoma. The age group of the patients were in the range of 13–80 years.

Among the 152 patients, 36.8% (56/152) were males and 63.2% (96/152) were females (Fig. 1). Age and sex distribution were provided in Table 1. Among the 152 patients, 76% of the cases were papillary thyroid carcinomas, 14% of patients were follicular carcinomas, 7% were medullary carcinomas and the remaining 3% were anaplastic and poorly differentiated carcinomas. Out of 152 patients, 39 patients were excluded due to the non-availability of complete details. Among the 113 patients of thyroid carcinomas, 69 patients are females and 44 are males. Among these 113 patients, 43 patients (28%) were presented with small-sized tumours (measuring less than 2 cm). 21/69 (30%) of the female population and 22/44 (50%) of the male patients fell into this category of small-sized thyroid tumours (chi-square test—4.36, P value = 0.037). Of the 113 patients, 68 were in the age group of more than 45 years; of these 68 patients, 22 (32.4%) were small-sized thyroid carcinomas and 46 (67.6%) were large-sized thyroid carcinomas; and the rest 45 were in the age group of 45 years and less than 45 years. Of these 45 patients, 21 (46.7%) were small-sized thyroid

Table 1 Age and sex distribution

Age	Sex		Total
	Male	Female	
45 years and below	21 29.6%	50 70.4%	71
Above 45	35 43.2%	46 56.8%	81
Total	56 36.8%	96 63.2%	152

carcinomas and 24 (53.3%) were large-sized thyroid carcinomas. Patients with age group of more than 45 years have more incidence of both small- and large-sized thyroid carcinomas (chi-square test—2.35, P value is 0.125) (Table 2). 21.6% of small-sized thyroid tumours showed extrathyroidal extension as compared to 40.9% of large-sized tumours (P value = 0.047) (Fig. 2).

2.7% of the small-sized thyroid carcinomas showed perineural invasion, and 6.3% of the large-sized thyroid carcinomas showed perineural invasion (chi-square test—0.652, P value = 0.419). Twenty percent of the small-sized thyroid carcinomas showed lymphovascular emboli compared to 46.8% of the large-sized thyroid tumours (chi-square test—6.87, P value = 0.009) (Fig. 3).

51.2% of the small-sized thyroid carcinomas were presented with nodal metastasis as compared to 40% of the large-sized thyroid carcinomas (chi-square test—2.239, P value = 0.401). 57.5% of the small-sized thyroid carcinomas showed extracapsular extension as compared to 57.8% of the large-sized thyroid carcinomas (chi-square test—0.001, P value = 0.975). 2.3% (1/43) of the small-sized thyroid carcinomas showed distant metastasis, and 12.9% (9/70) of large-sized thyroid carcinomas showed distant metastasis (P value = 0.169) (Fig. 4).

Fig. 1 Age and sex distribution

Table 2 Age and tumour size distribution

Age	Tumour size		Total
	Small (<2 cm)	2 cm and >2 cm	
45 and below	21 46.7%	24 53.3%	45 100.0%
Above 45	22 32.4%	46 67.6%	68 100.0%
Total	43 38.1%	70 61.9%	113 100.0%

Discussion

The prevalence of non-palpable thyroid nodules has silently gained momentum over the past few decades [5, 6]. Thyroid nodules are most commonly manifested either by palpation or by increase in size of a pre-existing nodule, and about 5–10% of these nodules turn out to be malignant [7, 8]. Over the last few decades, the use of ultrasound scanning using high-frequency probes has revolutionized the management of thyroid nodules and can detect non-palpable nodules, thus moving from multinodular goitres to multinodular thyroids (non-palpable nodules). This allows the characterization of nodules and the evaluation of cervical lymph nodes which is said to change the management of more than 60% patients [9].

In 2006, Davies and Welch [10] reported that 87% of the thyroid cancer patients were presented with tumours measuring less than 2 cm. Only 28% of our cohort were presented with tumours less than 2 cm.

In our study, we found that the distribution rate of thyroid small-sized tumours was predominant in males compared to females (50 vs. 30%), despite the general predominance of the female patients in thyroid carcinomas. Davies and Welch [10] reported that the rate of distant metastasis was higher in men when compared to women (9 vs. 4%). Distant metastasis has been reported in 2.3% of our patients in the group of small thyroid cancers. Chow and Law et al. [11] reported a distant metastasis incidence of 2.5% among their patients.

Fig. 2 Presence of extrathyroidal extension **Fig. 3** Presence of lymphovascular emboli

A study conducted on papillary microcarcinoma patients showed that 21% had extrathyroidal extension [11]. Twenty-two percent of our patients with small-sized thyroid tumours had extrathyroidal extension suggesting probable similar trends. In the study by Mazzaferri and Kloos on 1501 patients of papillary carcinoma and follicular carcinoma of thyroid with median follow-up of 16.6 years, extrathyroidal extension was significantly associated with an increased rate of tumour recurrence (hazard ratio 1.4, confidence interval 1.1–2.2, *P* value = 0.02) and with an increased disease-specific mortality rate [12]. Extrathyroidal extension can be a possible factor affecting the prognosis of this disease as some studies suggest that it is significantly associated with tumour recurrence [13]. Extrathyroidal extension is also considered as a risk factor in majority of risk stratification classifications for thyroid malignancy. Twenty to twenty-five percent of small-sized thyroid tumours can show extrathyroidal extension showing aggressiveness of these tumours.

Lymph node metastasis is another prognostic indicator for the locoregional recurrence of tumour. The chances of distant metastasis become really high if the lymph nodes are affected. A study conducted on papillary microcarcinoma patients reported that 26% of the patients showed lymph node metastasis

Fig. 4 Presence of distant metastasis

[11]. In our study, 51% of small thyroid carcinoma patients showed lymph node metastasis. One large study on papillary thyroid microcarcinoma found that the risk of cervical lymph node recurrence increased to 6.2-fold when lymph node metastasis was present at the time of initial diagnosis.

The above data shows that despite the tumours being small and being considered indolent, they behave with considerable aggressiveness. Delayed diagnosis and subsequent delay in treatment can adversely affect the prognosis. Davies and Welch [10] reported that 75% of the microcarcinoma patients underwent total thyroidectomy. A study on papillary thyroid microcarcinoma patients reported that 732 patients were given the option to forgo a surgery, but approximately 78% opted for a surgery. Lymph node metastasis was confirmed in 626 (85%) of these patients [11]. Eighty-four percent of our patients underwent total thyroidectomy.

Total thyroidectomy must be considered as the treatment plan even in small-sized thyroid tumours in view of changing patterns of behaviour of these tumours. Studies have shown that a combination of total thyroidectomy and I-131 therapy are highly effective in reducing the recurrence rate in well-differentiated thyroid carcinoma patients [8, 12]. All of our patients underwent radioiodine ablation following total thyroidectomy. Despite their aggressiveness, small-sized tumours have an excellent prognosis if they are diagnosed and managed early and efficiently [13].

Conclusion

Despite being small in size, these thyroid cancers behave aggressively with extrathyroidal extension in 21.6%, lymphovascular invasion in 20%, nodal metastasis in 51.2% and extracapsular extension in 57.5%. Taking the above facts into account, the small thyroid cancers should be treated with considerable caution as large thyroid cancers, especially since

we have limited tools to predict the preoperative poor prognostic factors.

References

1. Momesso DP, Vaisman F, Pessa CH, Corbo R, Vaisman M (2012) Small differentiated thyroid cancer: time to reconsider clinical management and treatment. *Surg Oncol* 12:257–262
2. Franceschi S, Boyle P, Maissonneuve P et al (1993) The epidemiology of thyroid carcinoma. *Crit Rev Oncog* 4:25
3. Parkin DM, Muir CS, Whelan SL, Gao Y-T, Ferlay J, Powell J (1992) Cancer incidence in five continents, Vol. VI. IARC scientific publications, No. 120. IARC, Lyon
4. Papini E et al (2002) Risk of malignancy in nonpalpable thyroid nodules: predictive value of ultrasound and colour-Doppler features. *J Clin Endocrinol Metab* 87(5):1941–1946
5. Enewold L et al (2009) Rising Thyroid Cancer Incidence in the United States by Demographic and Tumor Characteristics, 1980–2005. *Cancer Epidemiol Biomarkers Prev* 18.3:784–791
6. Tan GH, Gharib H (1997) Thyroid incidentalomas: management approaches to nonpalpable nodules discovered incidentally on thyroid imaging. *Ann Intern Med* 126:226–231
7. British Thyroid Association, Royal College of Physicians (2007) Guidelines for the management of thyroid cancer. In: Perros P (ed) Report of the Thyroid Cancer Guidelines Update Group, 2nd edn. Royal College of Physicians, London
8. Morris LF, Ragavendra N, Yeh MW (2008) Evidence-based assessment of the role of ultrasonography in the management of benign thyroid nodules. *World J Surg* 32:1253–1263
9. Marqusee E, Benson CB, Frates MC et al (2000) Usefulness of ultrasonography in the management of nodular thyroid disease. *Ann Intern Med* 133:696–700
10. Davies L, Welch HG (2006) Increasing incidence of thyroid cancer in the United States, 1973–2002. *JAMA* 295:2164–2167
11. Chow SM, Law SC, Chan JK, Au SK, Yau S, Lau WH (2003) Papillary microcarcinoma of the thyroid-prognostic significance of lymph node metastasis and multifocality. *Cancer* 98:31–40
12. Mazzaferri EL, Kloos RT (2001) Current approaches to primary therapy for papillary and follicular thyroid cancer. *J Clin Endocrinol Metab* 86:1447–1463
13. Mazzaferri EL (2006) Managing small thyroid cancers. *JAMA* 295