

Ultrasonography-guided Fine Needle Aspirations of Thyroid Incidentaloma: Correlation with Pathologic Findings

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Purpose: There are many reports that diagnostic accuracy of fine needle aspiration (FNA) of thyroid is improved with ultrasound guidance, especially for impalpable nodules. Despite its general acceptance, routine use of ultrasound guided fine needle aspiration (USGFNA) has been the source of much controversy due to the lack of large-scale studies and lack of data on the natural course of well-differentiated thyroid cancer of small size.

Method: The aim of our study was to define the rate of malignancy in relatively large numbers of patients with incidentally detected impalpable thyroid nodules and to assess the extent of disease in patients with suspicious or malignant cytology on USGFNA of thyroid nodules by surgery. We retrospectively reviewed the medical records of the 267 patients who underwent USGFNA of incidental thyroid nodules from January 2000 through December 2001.

Results: Three hundred and seventeen nodules from 267 patients were aspirated. The average size of nodules was 0.9±0.3 cm, a range of 0.2 cm to 1.5 cm. All 317 lesions were impalpable. Cytological diagnosis included 101 inadequate specimen (32%), 139 benign (44%), 29 indeterminate (9%), 4 suspicious of follicular or Hurtle cell neoplasm (1%), 42 papillary carcinoma (13%), and 2 others. The size of the nodule was not related to the probability of getting an adequate specimen for cytological diagnosis. Forty of 48 patients with suspicious or malignant cytology underwent surgery. All 35 patients with a cytological diagnosis of papillary carcinoma were confirmed to have papillary carcinoma on histological results. One of 3 patients with a cytological diagnosis of follicular neoplasm had a follicular carcinoma.

In 36 patients with well-differentiated thyroid cancer, extrathyroidal extension was observed in 44% (16/36), regional lymph node metastasis was found in 50% (18/36), and multifocal tumors were found in 39% (14/36).

Conclusion: The rate of malignancy in incidentally detected impalpable thyroid nodules was 12% in retrospective analysis of our patients. Among those, 69% (25/36) of patients had either extrathyroidal extension or regional node involvement and 39% had multifocal tumors at surgery. This suggests that the small size itself could not guarantee a good prognosis in incidentally found thyroid cancers. USGFNA is a useful diagnostic method in those patients. (Korean J Endocrine Surg 2003;3:127-135)

Key Words: Thyroid, Ultrasound, Fine needle aspiration, Incidentaloma

INTRODUCTION

Thyroid nodules are commonly encountered in clinical practice. The prevalence of thyroid nodules in the general population is known to be 4~7% by palpation alone (Tan *et al.*, 1997; Brander *et al.*, 1991) and 30~50% by ultrasonography (Ezzat *et al.*, 1994; Clark *et al.*, 1995; Mazzaferri, 1993), but about 5~6.5% of them have been found to be malignant (Belfiore *et al.*, 1992; Wang *et al.*, 1997; Werk *et al.*, 1984).

Undoubtedly, fine needle aspiration (FNA) is the most reliable diagnostic test for evaluating palpable thyroid nodules (Baloch *et al.*, 1998). However, recently there have been many reports that diagnostic accuracy of FNA is improved with ultrasonographic guidance (Danese *et al.*, 1998; Hatada *et al.*, 1998; Lin *et al.*, 1997; Yokozawa *et al.*, 1996; Cochand-Priollet *et al.*, 1994; Rosen *et al.*, 1993; Khurana *et al.*, 1998; Sabel *et al.*, 1998), especially for impalpable nodules (Leenhardt *et al.*, 1999; Hagag *et al.*,

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1998; Carmeci *et al.*, 1998). Despite its general acceptance, ultrasonography guided fine needle aspiration (USGFNA) has been a source of much controversy; as large scale studies on the prevalence of malignancy in patient with incidentally detected impalpable thyroid nodules are lacking and the biological behavior and natural course of small cancers (including the micro-papillary thyroid carcinoma) are not well known.

The aim of our study was to define the rate of malignancy in relatively large numbers of patient with incidentally detected impalpable thyroid nodules and to assess the extent of disease in patients with suspicious or malignant cytology on USGFNA by surgery.

METHODS

1) Patients

The medical records of patients who underwent USGFNA of impalpable thyroid nodules from January 2000 through December 2001 at Asan Medical Center Endocrinology Clinics were reviewed retrospectively. These patients were referred to our clinics for further evaluation of thyroid nodules detected by ultrasonography at primary clinics (43%, 114/267) or at our Health Promotion Center (47%, 125/267), or incidentally detected by neck ultrasonography for other reasons (10%, 28/267). Therefore, if the nodules showing as pure cyst at initial ultrasonography, these could have been excluded by physician who referred the patients. Experienced endocrinologists examined patients to confirm that they had no palpable nodule. Patients with nodules of equal to or larger than 0.5 cm in diameter were subjected to evaluate by USGFNA. Subjects with known thyroid diseases or those with palpable nodules were excluded.

2) Methods

Ultrasonography of the thyroid gland for guided aspiration was performed using a real-time ultrasonographic scanner (Advanced Technology Laboratories, inc., HDI 5000) with 7- to 15-MHz linear transducers by radiologists. Nodules were measured in three dimensions. The echo structure (solid, cystic or mixed), echogenicity (hyperechoic, isoechoic, hypoechoic or mixed), calcification (punctuate, coarse, egg-shell or absence), and characteristics of nodule margin (well-defined or ill-defined) were assessed.

Fine needle aspiration was performed with a 21-gauge needle on a 10-ml syringe. Ultrasonography guidance was used to confirm the placement of the needle in the nodule. One to three passes were made per nodule. For a partially cystic nodule, the sampling was directed to the solid portion of the nodule. Specimens were smeared on slides, fixed in 95% ethanol immediately,

and stained using a Papanicolaou method. Cytological diagnosis was made by an experienced pathologist as benign, indeterminate, suspicious for follicular or Hurtle cell neoplasm, suspicious of or consistent with papillary carcinoma, or inadequate. Patients with a cytological diagnosis of “benign” included a normal thyroid, nodular hyperplasia (cytological findings of abundant colloid and bland follicular cells), lymphocytic thyroiditis, or other benign conditions. Diagnosis of “indeterminate” was made in follicular cell proliferative lesions of which cellularity of the follicle cells and the amount of colloid were indeterminate for differential diagnosis between nodular hyperplasia and follicular neoplasm. Patients with a diagnosis of “suspicious for follicular or Hurtle cell neoplasm” have cytological findings of high cellularity and a pattern suggestive of follicular or Hurtle cell neoplasm. Patients with a diagnosis of “suspicious for or consistent with papillary carcinoma” have specimens showing patterns (clusters of atypical follicular cells with nuclear grooves and intranuclear pseudoinclusions) suspicious for or consistent with papillary carcinoma. An adequate specimen was defined as the presence of more than six clusters of follicular thyroid cell in each preparation (Baloch *et al.*, 1998).

All patients with suspicious or malignant cytology were referred for surgery. Forty of 48 patients (83%) underwent surgery (Fig. 1). Patients with multiple nodules on ultrasonography underwent a total thyroidectomy, and those with one or two nodules confined within one lobe underwent lobectomy with/without isthmusectomy. Lymph node dissection was performed in patients with suspicious nodal enlargement.

3) Statistical analysis

Statistical analyses were performed using the SPSS (SPSS, Inc., Chicago, IL) software package. The frequency distribution of

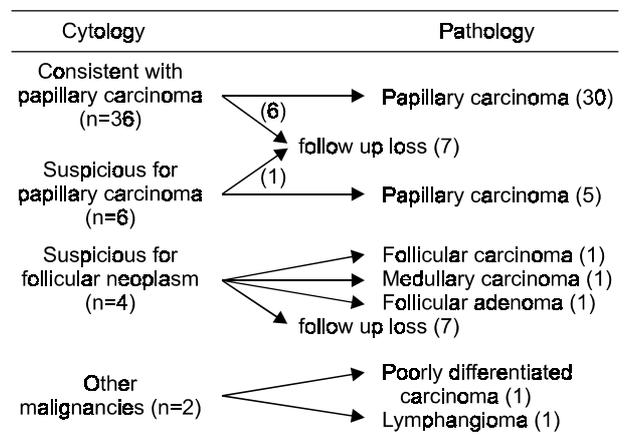


Fig. 1. Cytological diagnosis by USGFNA and histological results by surgery.

thyroid nodules in the different groups of age, gender, and nodule size were compared by χ^2 or Fisher's exact test. The relative risk of malignancy was evaluated by logistic regression analysis. Statistical significance was accepted when the corresponding *p*-value was less than 0.05.

RESULTS

1) Characteristics of study population

A total of 267 patients (209 women and 58 men) were evaluated at Asan Medical Center Endocrinology Clinics. The mean age was 51 years with a range of 26 to 75 years. USGFNA was performed on 317 nodules in 267 patients. There was no patient who had any radiation therapy on head or neck area.

2) Ultrasonographic findings

Mean size of all detected nodules (n=317) was 0.9±0.3 cm, with a range of 0.2 to 1.5 cm. Among 25 nodules of less than 0.5 cm in diameter aspirated, 13 nodules were initially measured as equal to or larger than 0.5 cm being finally measured as less than 0.5 cm at the time of USGFNA, 12 nodules were found incidentally and aspirated during a USGFNA of another nodule of more than 0.5 cm. Ultrasonography revealed a solitary nodule in 49% (130/267), and two or more nodules in 51% (137/267) of patients.

3) Cytological findings of fine needle aspiration

All 317 nodules were aspirated under ultrasonography guidance. The USGFNA results of 317 nodules were as follows; 139

(44%) were benign, 29 (9%) were indeterminate, 4 (1%) were suspicious for follicular or Hrtle cell neoplasm, 42 (13%) were suspicious for or consistent with papillary carcinoma, 1 was a malignant neoplasm of undetermined type, 1 was poorly differentiated carcinoma, and 101 (32%) were inadequate for cytological diagnosis (Table 1). The rate of adequate specimen was not significantly different according to sex, age, TSH value, number or size of nodules, or echo structure (classified by the percentage of cystic content)(data not shown). Among the inadequate specimens, 85% (86/101) were insufficient for diagnosis (less than six clusters of follicular cells) and 15% (15/101) were hindered by bloody aspirates.

Follow up of thyroid nodules by USGFNA or ultrasonography was done in some patients. Of 29 nodules with indeterminate cytology, 8 nodules were reaspirated (cytological results; 2 benign, 2 inadequate for cytological diagnosis, and 4 indeterminate) and 1 nodule was followed ultrasonography. Of 101 nodules inadequate for cytological diagnosis, 14 were reaspirated (cytological results; 7 benign, 5 inadequate for cytological diagnosis, and 2 indeterminate) and 7 were followed ultrasonography. Of 139 nodules with benign cytology, 13 were repeated USGFNA (cytological results; 7 benign, 4 inadequate for cytological diagnosis, and 2 indeterminate) and 13 were followed ultrasonography. Considering the results of repeated USGFNA, 29% (93/317) of nodules remained to be inadequate for cytological diagnosis.

The rates of malignancy on cytology were 8%, 15%, and 14% in groups of nodule size of <0.5 cm, 0.5~1.0 cm, and 1.0~1.5 cm, respectively (*p*=0.57)(Table 1). It did not significantly differ according to gender, nodule size (classified by the size of between less than 1.0 cm and equal or larger than 1.0 cm), age of patient, or multiplicity of nodules. The rate of malignant cytology was significantly higher in solid (26% (40/156) vs. 7% (4/60) in cystic or mixed, *P*<0.01), hypoechoic nodules (27% (30/111) vs. 14% (9/68) in isoechoic and 11% (2/18) in hyperechoic, *p*=0.04), nodules with punctuate calcification (39% (16/41) vs. 16% (28/175) in those without punctuate calcification, *p*<0.01), and those with ill-defined (31% (21/68) vs. 16% (23/148) in those with well-defined, *p*<0.01) margin (Table 2). Color Doppler of thyroid was examined only in 23% (50/216) of nodules. The rate of malignant cytology was significantly higher in increased intranodular vascularization (43% (9/21) vs. 17% (5/29) in decreased intranodular vascularization, *p*=0.04).

Sensitivity, specificity, predictive value, and relative risk for malignancy according to the ultrasonographic findings were summarized in Table 3. Logistic regression analyses demonstrated that independent risk factors for malignant cytology on USGFNA were; presence of solid nodule (OR 6.5, *p*<0.01), a hypoechoic

Table 1. Cytological results of USGFNA according to groups of nodule size

	Groups of nodule size		
	<0.5 cm (n=25)	0.5~ 1.0 cm (n=153)	1.0~ 1.5 cm (n=139)
Adequate (%)*	16 (64)	103 (67)	97 (70)
Benign	11 (44%)	62 (40%)	66 (48%)
Indeterminate	3 (12%)	17 (11%)	9 (7%)
Papillary carcinoma	2 (8%)	22 (15%)	18 (13%)
Suspicious for follicular neoplasm		2 (1%)	2 (1%)
Others (malignant)			2 (1%)
Inadequate (%)	9 (36)	50 (33)	42 (30)

* (%) = percent of column.

Table 2. Characteristics of patients and ultrasonographic findings of thyroid nodules according to the results of cytology (including 216 nodules with adequate cytology)

	Benign (%)*	Malignant (%)	Total	p-value
Patients (n)	143	44	187	
Age (years±SD)	51±8	48±10	50±9	0.06
Sex				
Female	119 (83)	31 (71)	150	0.06
Male	24 (17)	13 (29)	37	
Number of nodule				
Single	68 (48)	22 (50)	90	0.78
Two or more	75 (52)	22 (50)	97	
Thyroid nodules (n)	172	44	216	
Size of nodule				
Mean (cm)	0.91±0.31	0.93±0.26	0.92±0.30	0.65
Echo structure				
Solid	116 (67)	40 (90)	156	
< 50% cystic	39 (23)	2 (5)	32	< 0.01
> 50% cystic	17 (10)	2 (5)	10	
Echogenicity				
Hyperechoic	16 (9)	2 (5)	18	
Isoechoic	59 (35)	9 (20)	68	0.04
Hypoechoic	81 (47)	30 (68)	111	
Mixed	16 (9)	3 (7)	19	
Calcification				
Punctuate	25 (15)	16 (37)	41	
Coarse	3 (2)	1 (2)	4	
Egg-shell	11 (6)	1 (2)	12	< 0.01
Absence	133 (77)	26 (59)	159	
Margin				
Well-defined	125 (73)	23 (52)	148	< 0.01
Ill-defined	47 (27)	21 (48)	68	

*(%) = percent of column.

appearance (OR 3.6, $p < 0.01$), and punctuate calcification (OR 4.1, $p < 0.01$). An insignificant increase in the relative risk was associated with the ill-defined margin of nodule (OR 2.4) and with the increased intranodular vascularization on color Doppler (OR 3.6). Variable associated with the highest sensitivity was the presence of solid nodule (90.9%), and that associated with the highest specificity was calcification of nodule (85.5%). Specificity and positive predictive value for malignant cytology was increased especially when the presences of punctuate calcification was combined with other independent risk factors for malignant cytology (solid, hypoechoic)(Table 3).

4) Pathologic findings after surgery

Forty of 48 patients with suspicious or malignant cytological

diagnosis underwent surgery. In 35 patients whose cytological diagnosis was papillary thyroid carcinoma, all the patients turned out to have the same histological diagnosis. Three of 4 patients whose cytological diagnosis was "suspicious for follicular neoplasm" underwent operations. One had follicular carcinoma, another had medullary carcinoma, and the other had follicular adenoma on histological results. One patient with a cytological diagnosis of malignant neoplasm of undetermined type turned out to have lymphangioma and 1 patient with a cytological diagnosis of poorly differentiated carcinoma had the same histological diagnosis (Fig. 1).

In patients with differentiated thyroid cancer (papillary and follicular thyroid carcinoma), extrathyroidal extension was observed in 44% (16/36), regional lymph node metastasis in 50%

Table 3. Sensitivity, specificity, predictive values, and odds ration for the presence of malignancy in thyroid nodules according to ultrasonographic features (including 216 nodules with adequate cytology)

Ultrasonographic findings	No.	Sensitivity	Specificity	Predictive value for malignancy	OR
Solid nodule	156	90.9%	32.6%	25.6%	6.5 ^a
Hypoechoic nodule	111	68.2%	52.9%	27.0%	3.6 ^a
Punctuate calcification	41	36.4%	85.5%	39.0%	4.1 ^a
Solid and hypoechoic nodule	81	63.6%	69.2%	34.6%	6.3 ^b
Solid nodule with punctuate calcification	30	36.4%	91.9%	53.3%	8.8 ^b
Hypoechoic nodule with punctuate calcification	15	20.5%	96.5%	60.0%	6.6a
Solid and hypoechoic nodule with punctuate calcification	12	20.5%	98.3%	75.0%	13.1b

^a $p < 0.01$, ^b $p < 0.001$.

Table 4. Pathologic findings in patients with well-differentiated thyroid cancer

Stage	Number of patients	Bilaterality*	Multifocality [†]
pT ₁ N ₀ M _x	7	0	2
pT ₂ N ₀ M _x	4	1	2
pT ₄ N ₀ M _x	7	3	3
pT ₁ N ₁ M _x	6	2	2
pT ₂ N ₁ M _x	3	1	1
pT ₄ N ₁ M _x	9	4	4

*Bilaterality = Number of patients with bilateral thyroid cancer;
[†] Multifocality = Number of patients with multifocal thyroid cancer.

(18/36), and multifocal tumors in 39% (14/36)(Table 4). These findings of locally advanced tumor and/or multifocality were not significantly different between nodules of less than 1cm (infracentimetric) and those of larger size (supracentimetric)(Fig. 2). Among the two patients with cancers of less than 0.5 cm in diameter, one had extrathyroidal invasion and the other had regional lymph node involvements.

Lobectomy and/or isthmusectomy were done in 19 of 36 patients, and total thyroidectomy was done in 17 of 36 patients with differentiated carcinoma. All except one patient (stage T₁N₀M₀) who underwent total thyroidectomy received radioactive iodine ablation. No patient was found to have distant metastasis on whole body scan followed by radioactive iodine ablation.

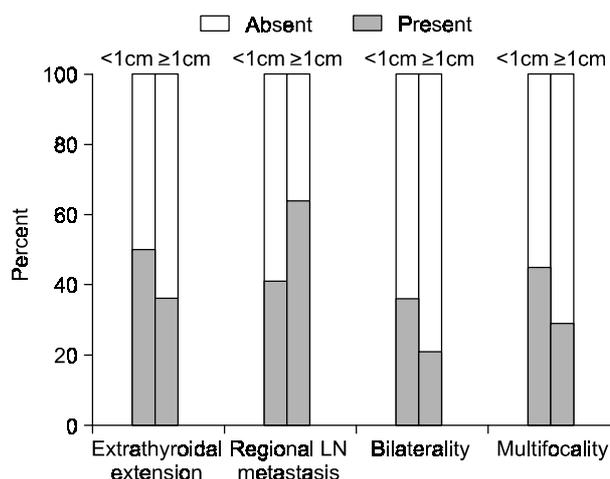


Fig. 2. Pathologic findings in patients with differentiated thyroid carcinoma (papillary or follicular carcinoma) according to nodule size (infracentimetric (n=22) vs. supracentimetric (n=14). In the patients with differentiated thyroid cancer, extrathyroidal extension (infracentimetric 50% vs. supracentimetric 36%, $p=0.50$), regional lymph node metastasis (41% vs. 64%, $p=0.31$), bilaterality (36% vs. 21%, $p=0.47$), and multifocality (46% vs. 29%, $p=0.49$) were not significantly different according to the nodule size.

DISCUSSION

Our results showed that the rate of cytological malignancy rate was 13.9% (44/317) and histological proven rate was 12.0% (38/317) in incidentally detected impalpable thyroid nodules. After pathologic examination, extrathyroidal extension was observed in 44% and regional lymph node metastasis was observed in 50%.

Thyroid ultrasonography makes it possible to detect small nodules unrecognized at clinical examination. By ultrasonography of the thyroid, about 30~50% of the population has thyroid nodules and 5-6.5% of these is known to be malignant (Tan *et al.*, 1997; Belfiore *et al.*, 1992; Wang *et al.*, 1997; Werk *et al.*, 1984). There are many debates on the clinical significance of thyroid microcarcinomas. Whether clinically impalpable thyroid nodules should be routinely assessed by USGFNA is still subject to debate. Previous studies have shown that cytological examination by ultrasound guidance has better diagnostic accuracy and lower false-negative rates than by palpation (Danese *et al.*, 1998; Hatada *et al.*, 1998; Lin *et al.*, 1997; Yokozawa *et al.*, 1996; Cochand-Priollet *et al.*, 1994; Rosen *et al.*, 1993; Khurana *et al.*, 1998; Sabel *et al.*, 1998). However, recommendations for USGFNA have been limited to patients with incidentally detected impalpable thyroid nodules on radiology studies, those with nodules difficult to palpate, and those with previous nondiagnostic results on cytology. However, a recent study suggested that ultrasonography would alter the clinical management of nodular thyroid disease in 63% of patients (Marqusee *et al.*, 2000).

In our study, the successful cytological examination was possible in 68% of patients. The adequacy rate of USGFNA in the literature ranges from 68% to over 90%, however, the influence of nodule size has not been investigated in earlier studies (Yokozawa *et al.* 1995; Rosen *et al.* 1993). Recently, Leenhardt *et al.* (1999) reported that the adequacy rate was 85% in centimetric or supracentimetric nodules and 69% in infracentimetric nodules. But we found that the adequacy rate was not associated with the nodule size ($p=0.10$). This might be due to the narrow range of size distribution of nodules in our study population.

Kuma *et al.* (1999) reported that the risk of thyroid cancer is lower in patients with multiple nodules than in those with solitary nodule. But, our results showed that the rate of malignancy in thyroid nodules is independent of the multiplicity of nodules, being consistent with the results of other studies (Marqusee *et al.*, 2000; Tollin *et al.*, 2000).

Many of studies have shown that incidentally detected thyroid papillary carcinomas take an indolent course, but some reports have shown that small thyroid carcinomas can lead to death due to local or distant metastases (Noguchi *et al.*, 1996). Yokozawa *et al.* (1996) reported 15.9% of all carcinomas smaller than 1.0 cm had extrathyroidal invasion. Recently, Papini *et al.* (2002) found 33.3% (4/12) of thyroid carcinomas smaller than 1.0 cm had extrathyroidal invasion (pT4 at TNM staging) and 25.0% (3/12) of microcarcinoma had lymph node invasion (pN1 at TNM stag-

ing). We found that 11 of 22 patients (50%) with a tumor size of smaller than 1.0 cm had extrathyroidal invasion and 15 of 22 patients (68%) with microcarcinoma had locally advanced disease (extrathyroidal extension of cancer and/or regional lymph node metastasis). These probabilities of extrathyroidal extension and locally advanced disease were not significantly different between the patients with infra- and those with supra-centimetric nodules. These findings suggest that low risk is not guaranteed by smaller size of the nodules.

We found that there are a few published data of prevalence of nodular thyroid disease in Korean general population. Recently Chung *et al.* (2001) reported the prevalence of nodular thyroid disease in Korean. They enrolled 1401 subjects who were scheduled to undergo either a breast examination (n=1209) or a follow-up examination for breast cancer (n=105). Enrolled subjects underwent ultrasonographic mass screening for thyroid cancer. In this study, the prevalence of nodular thyroid disease was 25.2% (353/1401). USGFNA of thyroid nodules was done only in patients with high-risk ultrasonographic findings (if one of the following findings was present; punctuate microcalcification, a marked hypoechoic pattern without posterior shadowing, irregular margins, or a taller than wider shape) and surgical confirmation of nodules with malignant cytology disclosed 37 patients with thyroid cancer (thyroid cancer rate; minimum 10.5% (37/353)). Yim *et al.* (2002) reported the prevalence of thyroid nodules detected by ultrasonography in women attending health check-ups was 37.7% (490/1300). There is possibility that cancer rate in our study population might have been slightly overestimated due to selection of nodules by ultrasonographic features. Enrolled patients were referred to our clinics for further evaluation of thyroid nodules detected by ultrasonography, nodules showing as pure cyst at initial ultrasonography could have been excluded by physician who referred the patients. Therefore, we could not figure out the entire referred patients. If there were selections of patients by physician who referred, it could have caused the high rate of thyroid cancer in our study. However, such cancer rate seems not to be far from true figures considering the results of Chung *et al.* done in same ethnic group. These figures and the data of our study suggest that thyroid cancer prevalence in Korean adult population is around 3~4%.

According to the data from Korea National Statistical Office, Annual Report on the cause of death statistic (2001), the incidence of thyroid cancer was 6.4/100,000 (male 2.4/100,000 and female 10.5/100,000) and mortality of thyroid cancer was 0.5/100,000 (male 0.3/100,000 and female 0.7/100,000) in Korean. These are comparable to the thyroid cancer statistics in USA population (Cancer Statistic Review 1973~1999, National

Cancer Institute, incidence of thyroid cancer in US population (1995~1999) was 6.6/100,000 (male 3.5/100,000 and female 9.5/100,000) and mortality of thyroid cancer was 0.5/100,000 (male 0.4/100,000 and female 0.5/100,000). These discrepancies between the low cancer-related death rate and the suggested high prevalence of thyroid cancer might be due to the benign and/or indolent nature of most small thyroid cancers.

There are some reports that the differences in iodine intake may be a factor explaining the geographic variation in incidence of thyroid cancer, high iodine intake being associated with a slightly increased risk of developing thyroid cancer, especially for papillary carcinoma. Park *et al.* (1995) reported that the mean value of urinary iodine excretion was 3.8 ± 2.7 mg/L (range 0.1~15.0 mg/L) and estimated daily iodine intake was 4~6 mg/day in general Korean population (n=184). Therefore, dietary iodine intake of general Korean population is very high when compared to that of Western population, and seems to be similar to Japanese. High iodine intake in Korean might have influenced the prevalence of malignancy. However, the relationship between iodine-intake and prevalence of thyroid cancer has been inconsistent results.

Nonetheless, autopsy data can provide the most accurate method for determining the true prevalence of thyroid nodules and malignancies. The prevalence of thyroid nodules in autopsy studies ranges from 8.2% to 65% and the prevalence of occult thyroid cancer ranges from 0.45% to 13% (Wang *et al.* 1997). A study in Japan 408 autopsies reported a cancer prevalence rate of 11.3% (Yamamoto *et al.* 1990). Neuhold *et al.* (2001) reported that the latent carcinoma of the thyroid in Austria was detected in 8.6% of autopsy cases. Therefore, the true prevalence of thyroid cancer among impalpable nodule seems much higher than that of clinically detectable thyroid cancer in palpable nodules. Therefore, it is possible that the sensitivity of USGFNA will be converting occult thyroid cancer into a clinical problem by ante-mortem detection.

A major limitation of this study is the lack of long-term observation after surgery and an inability to assess cost-effectiveness. In view of the above stated health statistics, it seems somewhat questionable whether this small sized thyroid cancer really constitutes a real health problem or not. With sophisticated diagnostic tools, about 3~4% of the general population might turn to have thyroid cancer and if all these patients have to undergo surgery, it might cause great problem in many aspect. Without knowledge of the natural history of thyroid cancer, no conclusion on the necessity of routine search for, or treatment of, incidentally detected thyroid lesions can be made. Long-term prospective case-control studies are needed to answer these questions, since practically

it is difficult to leave patients with cancer untreated until we know the natural history of thyroid cancer, once it has been found by ultrasound.

In conclusion, although there remains a debate about the value of routine use of thyroid ultrasonography for detection of thyroid nodules, if the nodule has been detected by ultrasonography, further evaluation such as guided aspiration might be warranted because significant portions of patients with micro-papillary thyroid carcinoma had locally advanced diseases at the time of surgery. Thus, 69% (25/36) of patients had either extrathyroidal extension or regional lymph node involvement. This suggests that the small size itself could not guarantee low risk in incidentally found thyroid cancers. Although the ultimate therapeutic consequences of these findings remain to be resolved, USGFNA is an effective diagnostic modality in the evaluation of incidentally found thyroid nodules especially for those that are difficult to palpate.

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갑상선 우연종에서 초음파 유도하의 세포검사: 병리 소견과의 비교

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목적: 갑상선 결절의 세포검사시 초음파 유도는 진단적 정확도를 높혀주며 특히 촉진되지 않는 결절의 경우는 실제 검사를 할 수 있는 유일한 방법이다. 그러나 촉진되지 않는 작은 결절에서 실제 일상적으로 초음파 유도하에 세포검사를 할 필요가 있는지는 분명하지 않으며 이는 작은 크기의 갑상선암의 자연경과가 아직 분명하지 않는 것에도 원인이 있다.

방법: 본 연구의 목적은 촉진되지 않는 갑상선 우연종에서 갑상선암의 빈도를 알아보고 이를 수술하여 병리학적인 병변의 범위를 알아보는 데 있다. 이를 위하여 2000년 1월부터 2001년 12월까지 서울아산병원에서 초음파유도하에 세포검사를 받은 갑상선 우연종 환자 267명의 기록을 확인하였다.

결과: 267명에서 317개의 촉진되지 않는 결절을 대상으로 초음파 유도하에 세포검사를 시행하였다. 결절의 평균 크기는 0.9 cm이었고 0.2 cm에서 1.5 cm 사이의 크기였으며 모든 317개의 결절이 촉진되지 않았다. 세포검사 결과로는 139명(44%)에서 양성, 29명(9%)에서 중간형, 4명(1%)에서 여포성

종양, 41명(13%)에서 유두선암, 2명에서 기타의 악성종양의 소견이었고 101명(32%)은 검체가 적절하지 못하였다. 결절의 크기는 세포검사서 적절한 검체를 얻는 것과 관계없었다. 악성으로 진단되거나 의심스러운 48명 중 40명에서 수술이 시행되었으며 세포검사상 유두선암으로 진단되었던 35명은 전원 유두선암으로 확진되었고 세포검사상 여포성 종양으로 진단되었던 3명중 1명에 여포선암을 가지고 있었다. 분화된 갑상선암 36명중 갑상선 피막외로 침윤을 보인 경우는 16명(44%), 국소 림프절 전이를 동반한 경우는 18명(50%) 다발성 병소를 지는 경우는 14명(39%)이었다.

결론: 저자들의 후향적 연구결과 촉진되지 않는 갑상선 우연종에서 악성의 빈도는 12%였다. 이중 69% (25/36)는 수술결

과 갑상선 피막외 침윤, 국소 림프절 전이 또는 다발성 병소 등의 소견을 보였다. 이러한 결과는 우너발 병소의 크기가 작아도 우연히 발견된 갑상선암이 항상 좋은 예후를 보인다고 말하기 어렵게 한다. (**Korean J Endocrine Surg 2003;3: 127-135**)

중심단어: 갑상선, 초음파, 세침흡인 세포검사, 우연종

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