

Research Article

Open Access

# A Prospective Study of Clinical, Sonological and Pathological Evaluation of Thyroid Nodule

Venkatachalapathy TS<sup>1\*</sup>, Sreeramulu PN<sup>2</sup> and Ramesh Krishna Maddineni<sup>3</sup>

<sup>1</sup>Assistant Professor of Surgery, Sri Devaraj Urs Medical College & RI Jalappa Hospital and Research Centre, Tamaka, Kolar, Karnataka, India

<sup>2</sup>Professor of Surgery, Sri Devaraj Urs Medical College & RI Jalappa Hospital and Research Centre, Tamaka, Kolar, Karnataka, India

<sup>3</sup>Post Graduate Student, Sri Devaraj Urs Medical College & RI Jalappa Hospital and Research Centre, Tamaka, Kolar, Karnataka, India

## Abstract

The diseases of thyroid form a major share of head and neck surgery. Clinical examination although very accurate in most cases, is inadequate in most areas especially in staging of thyroid malignancies and in detecting the multi nodularity of the gland. The present study was undertaken to evaluate the usefulness of clinical examination, FNAC and USG thyroid in the management of thyroid nodule and compare the efficacy of each of the investigation. Thyroid nodules are common in females of age group 31-40 yrs, all our patients presented with swelling in front of neck.

A total of 200 cases of solitary nodule thyroid evaluated from October 2007 to December 2011 At R L Jalappa hospital and research centre, kolar. In our study the sensitivity and specificity of FNAC was 74% and 100% respectively. FNAC helps in planning the correct management and avoids second surgery. The sensitivity and specificity of USG was 73% and 85.3 respectively, hence with use of USG along with FNAC will improve the diagnostic accuracy to higher level. Nodular goiter more in females (m:f 1:2.2). Duration of swelling prior to the presentation was from 6 months to 3 yrs. Incidence of malignancy in SNT is 18%. On FNAC majority were benign with nodular goiter being more common. All the lesions suspicious on FNAC (31.3%) proved to be malignant indicating need for surgery. Extent of surgery depends on the nature of lesion and the risk group classification, of that hemithyroidectomy is the commonest. Except transient hypocalcemia no major complications were noticed.

**Keywords:** Solitary nodule thyroid; FNAC; USG; Hemithyroidectomy

## Introduction

The diagnosis of thyroid lesions using aspiration cytology was first reported by Martin and Ellis in 1930 [1]. The routine use of fine needle aspiration cytology (FNAC) in the assessment of thyroid nodules has reduced the number of patients subjected to thyroidectomy for benign diseases of the thyroid [2-4]. As a result, the incidence of malignancy at thyroidectomy has increased from 5-10% to 30-50% in the recent years [6]. This relatively simple procedure has assumed a dominant role in determining the management of patients with thyroid nodules [7,8]. However, the success of FNA is contingent upon several important contributing influences including aspirator experience [9-11], skillful cytological interpretation and a rational analysis based upon a synthesis of cytological and clinical information in the context of an individual patient [10,11]. The aim of this prospective study was to evaluate the clinical, thyroid FNAC and correlate it with histology. The advancements in management of thyroid pathology have been possible, thanks to the developments in the field of imaging. Most importantly USG in the pre operative evaluation has enhanced the armamentarium of the head and neck surgeon.

## Materials and Methods

A prospective study carried out on 200 patients of solitary thyroid swelling between the age group of 11-70 yr, attending department of surgery, RLJ hospital and research centre, kolar during the period of October 2007 to December 2011. Patients with pubertal thyroid swelling, multinodular and not willing patients not included in the study.

All patients were examined clinically after taking detailed history. Then they were investigated with FNAC and USG of the thyroid. High resolution 7.3 MHz probe is used [12]. The results of FNAC were interpreted as benign, malignant, suspicious, and inadequate aspirate using a 23-gauge needle attached to a Franken's handle was used, either

without or with aspiration by a 20 ml disposable syringe [13]. Two to three passes were made in each case. In the case of cystic nodules, the cysts' contents were aspirated, centrifuged, and slides made from the sediment for cytological analysis [14,15]. Sonologically the nodules were evaluated for size, location, echotexture, margins, presence halo, calcification, vascularity, accessory nodules and associated cervical nodes and consistency of (solid, cystic or mixed) [12] in order to differentiate from benign & malignant nodules. Then all the patients subjected to surgery, the HPE of the specimen were correlated with finding of FNAC and USG [14,16].

## Results

The age of the patients range from 11-70 yrs, the commonest age group with thyroid pathology is 31-40 yrs and mean age of 35.4 yrs. Majority of patients were females (69%) (M:F - 1:2.2). All the patients were presented with swelling in the neck and 28 patients had pain in the swelling. Duration of complaints ranged from 1 week to 8 yrs, majority of the patients presented between 6 months to 3 yrs. None of the patients had any significant family history. Clinical diagnosis of solitary nodule of thyroid was commonest with benign category occupies the major group with 122 (61%) followed by 58 (29%) cases and malignant

**\*Corresponding author:** Venkatachalapathy TS, Assistant Professor of Surgery, Sri Devaraj Urs Medical College & RI Jalappa Hospital And Research Centre, Tamaka, Kolar, Karnataka, India, 563101, Tel: +918197507094; E-mail: [drvenkey@hotmail.com](mailto:drvenkey@hotmail.com)

Received April 14, 2012; Accepted April 21, 2012; Published April 23, 2012

**Citation:** Venkatachalapathy TS, Sreeramulu PN, Ramesh Krishna M (2012) A Prospective Study of Clinical, Sonological and Pathological Evaluation of Thyroid Nodule. Thyroid Disorders Ther 1:109. doi:10.4172/2167-7948.1000109

**Copyright:** © 2012 Venkatachalapathy TS, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

20 (10%) cases. The most common lesion in HPE is benign follicular adenoma 66 (33%) and the least being benign cyst 4 (2%).

On USG cases with benign category is major group 140 (70%) [17] cases, followed by malignant 50 (25%) of cases and suspicious 10 (5%) cases. Out of the 200 patients diagnosed to have STN, HPE revealed 82% benign and 18 % malignant.

In 122 cytologically diagnosed benign cases [18,19,20], all proved to be benign, only malignant lesion found was papillary carcinoma 20 (10%) cases. All the 58 cases of follicular neoplasm were subjected to surgery and correlated with HPE, 20 cases were benign and 9 cases were malignant [21]. The USG diagnosis of benign lesion was confirmed in 132 (93.5%) [22] out of 140 cases and was disputed in 4 (6.05%) cases by histopathology which turned to be malignant. In 10 USG suspects, HPE revealed 6 benign and 4 malignant lesions. Among 50 USG diagnosis of malignant lesions, 26 were confirmed by HPE and 24 were disputed to be benign. The USG diagnosis of benign lesions was confirmed in 104 (74.25%) cases out of 140 and was suspicious in 36 cases by FNAC. out of 10 suspect cases 4 turned to be malignant. Out of 50 malignant cases 18 were proved by FNAC and 20 were suspicious. Among total 200 cases of STN, USG revealed multiple nodules 34 (17%) cases; it is more sensitive diagnostic modality to detect nodularity.

The commonest surgery performed was hemithyroidectomy [12,23] 126 (63%) cases. Functional neck dissection was done in 26 patients of papillary carcinoma thyroid where lymph nodes palpable (Table 1-6).

## Discussion

In the present study age of the patient ranged from 11-70 yrs with median age of 5 yrs. Age distribution of the present study is comparable to the number of males is the present study was 62 (31%) and the females were 138 (69%) with M:F ratio of 1:2.2, sex comparison was similar to Afroze et al. [24] commonest clinical presentation is the presence of swelling in front of neck and presented between 6 months

FNAC	USG			
		+	-	TOTAL
	+	104	36	140
	-	18	42	60
TOTAL		122	78	200

**Table 1:** Comparison of USG and FNAC30: BENIGN  
Sensitivity – 85.20%, Specificity –60%.Positive predictive value – 74.28% .Negative predictive value – 70%.

USG	FNAC			
		+	-	TOTAL
	+	18	32	50
	-	02	148	150
TOTAL		20	180	200

**Table 2:** MALIGNANT:Sensitivity – 90%,Specificity –82%,Positive predictive value – 36%,Negative predictive value – 98.60%.

USG	HPE			
		+	-	TOTAL
	+	132	08	140
	-	32	28	60
TOTAL		164	36	200

**Table 3:** COMPARISON OF USG WITH HPE33; BENIGN.  
Sensitivity – 84%,specificity –77.7%,positive predictive value – 94.28%, negative predictive value – 46%.

USG	HPE			
		+	-	TOTAL
	+	26	24	50
	-	10	140	150
TOTAL		36	164	200

**Table 4:** MALIGNANT;sensitivity – 73%,specificity –85.30%,positive predictive value – 52%,Negative predictive value – 93.3%.

HPE	FNAC			
		+	-	TOTAL
	+	122	0	122
	-	42	36	78
TOTAL		164	36	200

**Table 5:** COMPARISON OF FNAC WITH HPE32: BENIGN;  
Sensitivity – 81.3%,Specificity –100%,Positive predictive value – 100%,Negative predictive value – 46%.

FNAC	HPE			
		+	-	TOTAL
	+	20	0	20
	-	16	164	180
TOTAL		36	164	200

**Table 6:** MALIGNANT;sensitivity – 74%,specificity –100%,positive predictive value – 100%,Negative predictive value – 91%.

to 3 yrs. Overall sensitivity in our series was 81.3%, 74%,while the specificity was 100% for both benign and malignant lesions. FNAC has certain limitations due to suspicious diagnosis. In the present series 58 (29%) of cases were found to be suspicious, of which 18 were malignant on final HPE [25], thus an overall malignant rate of 31.03% [26] for the suspicious group was found. Because of this high incidence of malignancy in suspicious lesions, surgical removal of these nodules should be strongly considered in these cases. In other studies the incidence of malignancy in STN ranges from 10-30%, in our study it's 18%.

The thyroid nodules on USG, 50 cases to be malignant, 26 cases were confirmed on HPE and remaining 24 cases were benign. In 10 cases where USG gave false negative of benign disease, but on HPE revealed papillary carcinoma. The overall sensitivity was 80.4%, 73%, while the specificity was 77.7%, 85.3% for both benign and malignant lesions on USG.

Watters et al. [27] interpreted USG has added advantage of examining whole gland but limited by the fact that no features were pathognomic for malignancy, so that it is regarded as complimentary to FNAC in the management STN [28,29] It has been a consistent observation that risk of thyroid cancer is more common with solitary nodules. Watters et al. [27] have shown that the prevalence of multinodularity in clinically STN is 20%-40%. In our series it's 17%. It has been observed that thyroid nodule to be detected by palpation; it must be 1 cm while on USG as small as 3mm can be detected [30].

## Conclusion

The present study was undertaken to evaluate the usefulness of clinical examination, FNAC, USG of thyroid in the management of thyroid nodule and compare the efficacy of each investigation. Thyroid nodules were common in females of 31 to 40 yr age group, with commonest complaint as swelling in front of the neck. In our study sensitivity and specificity of FNAC was 74%, 100% and it helped in planning correct management. USG had 73% and 85.3%, sensitivity &

specificity; hence USG along with FNAC will improve the diagnostic accuracy. Hemithyroidectomy is the minimal surgery in our study, which helped in getting HP diagnosis and in comparing the efficacy of above tests. An ideal test should have 100% Sensitivity and specificity. The closest method to ideal test is thus, FNAC which has high sensitivity and specificity. However combination of FNAC and USG will yield optimum results and avoids mismanagement.

## References

- Martin HE, Ellis EB (1930) Biopsy by needle puncture and aspiration. *Ann Surg* 92: 169-181.
- Asp AA, Georgitis W, Waldron EJ, Sims JE, Kidd GS 2nd (1987) Fine needle aspiration of the thyroid. Use in an average health care facility. *Am J Med* 83: 489-493.
- Bottles K, Miller TR, Cohen MB, Ljung BM (1986) Fine needle aspiration biopsy. Has its time come? *Am J Med* 81: 525-531.
- Burch HB (1995) Evaluation and management of the solid thyroid nodule. *Endocrinol Metab Clin North Am* 24: 663-710.
- Gershengorn MC, McClung MR, Chu EW, Hanson TA, Weintraub BD, et al. (1977) Fine-needle aspiration cytology in the preoperative diagnosis of thyroid nodules. *Ann Intern Med* 87: 265-269.
- Ridgway EC (1992) Clinical review 30: Clinician's evaluation of a solitary thyroid nodule. *J Clin Endocrinol Metab* 74: 231-235.
- Burch HB, Burman KD, Reed HL, Buckner L, Raber T, et al. (1996) Fine needle aspiration of thyroid nodules. Determinants of insufficiency rate and malignancy yield at thyroidectomy. *Acta Cytol* 40: 1176-1183.
- Kaur K, Sonkhya N, Bapna AS, Mital P (2002) A comparative study of fine needle aspiration cytology, ultrasonography and radionuclide scan in the management of solitary thyroid nodule : A prospective analysis of fifty cases. *Indian J Otolaryngol Head Neck Surg* 54: 96-101.
- Giuffrida D, Gharib H (1995) Controversies in the management of cold, hot, and occult thyroid nodules. *Am J Med* 99: 642-650.
- de Vos tot Nederveen Cappel RJ, Bouvy ND, Bonjer HJ, van Muiswinkel JM, Chadha S (2001) Fine needle aspiration cytology of thyroid nodules: how accurate is it and what are the causes of discrepant cases? *Cytopathology* 12: 399-405.
- La Rosa GL, Belfiore A, Giuffrida D, Sicurella C, Ippolito O, et al. (1991) Evaluation of the fine needle aspiration biopsy in the preoperative selection of cold thyroid nodules. *Cancer* 67: 2137-2141.
- Gritzmann N, Koischwitz D, Rettenbacher T (2000) Sonography of the thyroid and parathyroid glands. *Radiol Clin North Am* 38: 1131-1145.
- Gharib H, Goellner JR, Johnson DA (1993) Fine-needle aspiration cytology of the thyroid. A 12-year experience with 11,000 biopsies. *Clin Lab Med* 13: 699-709.
- Sidawy MK, Del Vecchio DM, Knoll SM (1997) Fine-needle aspiration of thyroid nodules: correlation between cytology and histology and evaluation of discrepant cases. *Cancer* 81: 253-259.
- Mandreker SR, Nadkarni NS, Pinto RG, Menezes S (1995) Role of fine needle aspiration cytology as the initial modality in the investigation of thyroid lesions. *Acta Cytol* 39: 898-904.
- Carmeci C, Jeffrey RB, McDougall IR, Nowels KW, Weigel RJ (1998) Ultrasound-guided fine-needle aspiration biopsy of thyroid masses. *Thyroid* 8: 283-289.
- Marqusee E, Benson CB, Frates MC, Doubilet PM, Larsen PR, et al. (2000) Usefulness of ultrasonography in the management of nodular thyroid disease. *Ann Intern Med* 133: 696-700.
- Das DK, Khanna CM, Tripathi RP, Pant CS, Mandal AK, et al. (1999) Solitary nodular goiter. Review of cytomorphologic features in 441 cases. *Acta Cytol* 43: 563-574.
- Schnürer LB, Widström A (1978) Fine-needle biopsy of the thyroid gland: a cytohistological comparison in cases of goiter. *Ann Otol Rhinol Laryngol* 87: 224-227.
- El Hag IA, Kollur SM, Chiedozi LC (2003) The role of FNA in the initial management of thyroid lesions: 7-year experience in a district general hospital. *Cytopathology* 14: 126-130.
- Harach HR, Zusman SR, Saravia-Day E (1992) A histocytological study with some emphasis on pitfalls of fine needle aspiration cytology. *Diagn Cytopathol* 8:409-19.
- Robinson IA, Cozens NJ (1999) Does a joint ultrasound guided cytology clinic optimize the cytological evaluation of head and neck masses? *Clin Radiol* 54: 312-316.
- Kunori T, Shinya H, Satomi T, Abe M, Kawaguchi S, et al. (2000) Management of nodular goiters and their operative indications. *Surg Today* 30: 722-726.
- Afroze N, Kayani N, Hasan SH (2002) Role of fine needle aspiration cytology in the diagnosis of palpable thyroid lesions. *Indian J Pathol Microbiol* 45: 241-246.
- Mathur SR, Kapila K, Verma K (2005) Role of fine needle aspiration cytology in the diagnosis of goiter. *Indian J Pathol Microbiol* 48: 166-169.
- Godinho-Matos L, Kocjan G, Kurtz A (1992) Contribution of fine needle aspiration cytology to diagnosis and management of thyroid disease. *J Clin Pathol* 45: 391-395.
- Watters DA, Ahuja AT, Evans RM, Chick W, King WW, et al. (1992) Role of ultrasound in the management of thyroid nodules. *Am J Surg* 164: 654-657.
- Jones AJ, Aitman TJ, Edmonds CJ, Burke M, Hudson E, et al. (1990) Comparison of fine needle aspiration cytology, radioisotopic and ultrasound scanning in the management of thyroid nodules. *Postgrad Med J* 66: 914-917.
- Sekhri T (2001) Role of different diagnostic modalities in the evaluation of solitary thyroid nodule; experience in a tertiary referral centre of north India. *IJNM* 16: 105-108.
- Walker J, Findlay D, Amar SS, Small PG, Wastie ML, et al. (1985) A prospective study of thyroid ultrasound scan in the clinically solitary thyroid nodule. *Br J Radiol* 58: 617-619.