

# Thyroid Nodule: A Clinical and Ultrasonographic Evaluation

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## ABSTRACT

**Introduction:** The thyroid gland is one of the principal endocrine gland of the body with its disease forming a major share of head and neck surgery. FNAC and USG are being used in association with clinical features for diagnosis with surgery being the mainstay of treatment. An attempt has been made in the present study to evaluate the usefulness of clinical features, FNAC and USG in managing thyroid nodule.

**Materials and Methods:** The present study was carried out to evaluate the usefulness of clinical features and ultrasonography in managing thyroid nodules in Assam Medical College and Hospital, Dibrugarh, for a period of one year. Total of 34 patients (>12years) were selected, who had attended Outpatient Department in Assam Medical College with thyroid nodule, examined, investigated, treated surgically and complications if any were managed accordingly.

**Results:** In our study, the sensitivity, specificity, positive predictive value and negative predictive value of FNAC for diagnosing malignancy was 77%, 100%, 100% and 92.59% respectively, whereas ultrasonography showed it to be 66.67%, 92%, 75% and 88.96% respectively. Hemithyroidectomy was the most performed surgery (44.12%). Histopathological finding was taken as the final diagnosis.

**Conclusion:** The USG and FNAC are useful tools in evaluating thyroid nodule along with HPE being taken as the final diagnosis. The malignancy rate was 26.47% which was much higher as the people here are less conscious and present for treatment only when they face problems. Hence, long standing thyroid swelling led to higher malignancy rate.

**Keywords:** Thyroid Nodule

## INTRODUCTION

The thyroid gland is one of the principal endocrine gland of the body. It is the largest gland and weighs about 25 grams and also the only one which is accessible for physical examination because of its superficial location.

The disease of thyroid form a major share of head and neck surgery. Clinical examination although very accurate in most cases, is inadequate in some areas especially in staging of thyroid malignancies and in detecting the multinodularity of the gland. The advancement in the management of thyroid pathology has been possible, thanks to the development in the field of imaging radiology.

Solitary nodule structurally and morphologically can be divided into three groups. The commonest is adenomatous goitre, which is confined to a solitary area. The second is an adenoma, which is well encapsulated, with a growth pattern different from neighbouring normal thyroid tissue and tends to compress them. The third are the malignant nodules. It can also be divided as Benign (Colloid, Hyperfunctioning nodule) and Malignant (Papillary, Follicular, Medullary and Anaplastic).<sup>1</sup> The question of malignancy in a nodular goitre is controversial. It has been claimed that malignant change is prone to occur frequently in a

solitary nodule than in a multinodular goitre.

As hypofunction and hyperfunction in thyroid nodules is frequently seen, so a thorough investigation is necessary to identify the cause. Most importantly the application of ultrasound in the pre operative evaluation has enhanced the armamentarium of the head and neck surgeon. Ultrasound of the neck is extremely sensitive in detecting thyroid and cervical lymph node pathology and is felt to be the most complete and cost effective imaging method for the evaluation of the thyroid gland. Diseases of the thyroid gland especially multinodular goiter due to deficiency of iodine is prevalent in India. India has the world's biggest goiter belt in the subhimalayan region. Ultrasonologists have laid down some ultrasonologic features that help in management of thyroid disorders helping to identify benign from malignant lesions.<sup>2</sup>

FNAC and USG are used in association with clinical features but there are drawbacks of each technique.

Surgery remains the mainstay of treatment for thyroid nodule. The vast majority of operations for the solitary nodules are therefore performed for benign nodule as well as malignant.

The thyroid nodule is frequently met in our practice in Assam Medical College and Hospital, Dibrugarh. So that, an attempt has been made in the present study, to evaluate the usefulness of clinical features, FNAC and USG in managing thyroid nodule.

## MATERIAL AND METHODS

The present study was carried out to study thyroid nodule and to evaluate the usefulness of clinical features and ultrasonography in managing thyroid nodules in the Department of General Surgery, Assam Medical College and Hospital, Dibrugarh, during the period from July 2014 to June 2015 for a period of one year. Total of 34 patients were selected, who had attended Outpatient Department in Assam Medical College with thyroid nodule and underwent treatment.

After taking ethical clearance and informed consent, all the patients were taken in the study who attended the Outpatient Department with the complaints of swelling in front of neck which moves on deglutition. All the cases were carefully examined and investigated to find out the pathologies. There were only 34 cases who had nodular thyroid disease and were included in the study. Criteria for selection of cases were based on inclusion and exclusion criteria:

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### Inclusion criteria

All patients >12 years age having thyroid nodule on clinical examination

### Exclusion criteria

All patients < 12 years of age

Names and address of the patients were recorded for the identity of the patient. Age and sex of the patient were also recorded to see the incidence of the disease in relation to age and sex. Complete history was taken for swelling in front of neck with duration and rate of growth and other associated complaints.

Local examination of the swelling was done to see its position, size, shape, consistency, tenderness, mobility, position of trachea and whether it moves with deglutition, and the signs of thyrotoxicosis. A thorough systemic, ear, nose and throat examinations were done. All patients were subjected to complete blood count, renal and blood sugar test. Electrocardiography was done in every case.

Evaluation of thyroid function done in all cases to find out whether the patient has thyrotoxicosis. Thyroid function was assessed by estimation of Thyroid stimulating hormone (anterior pituitary hormone), Free Thyroxine (T4) and free triiodothyronine (T3). These radioimmunoassay-based tests are sensitive and gives accurate measurement of biologically active thyroid hormone. Fine needle aspiration cytology (FNAC) was done in all cases to know the underlying thyroid disease.

Radiological investigations: like X ray of chest (PA view) were done for assessment of lung function and possibility of retrosternal goitre. X ray of soft tissue of neck (AP and Lateral view) was also done in cases of the large multinodular goitre and where there were possibility of tracheal involvement. Ultrasonography with or without colour Doppler was also done to assess the thyroid pathology.

However, it cannot distinguish between solid carcinoma from a solid dominant nodule.

Computerized tomography (CT scan), however was not used in any cases.

Laryngoscopic examination: was also done preoperatively, intraoperatively and postoperatively in all cases to examine the vocal cord. There was no impairment of vocal cord movement detected in any case. The sensitivity, specificity, positive predictive value and negative predictive value were calculated for both ultrasonography and FNAC with HPE being taken as the final report.

### STATISTICAL ANALYSIS

Microsoft office 2007 was used for the analysis. Descriptive statistics like mean and percentages were used for the analysis.

### RESULTS

The present study shows maximum of 13 (38.24%) patients in age group of 31 to 40 years, followed by 10 cases (29.42%) in the group of 41 to 50 years. The mean age in this study was

40.26 years. In our study the male to female ratio was 4:1 which is comparative to other study reports.

Only swelling in front of neck was present in 24 (70.59%) patients. There were 3 patients (8.82%), who presented with pain over thyroid swelling, 4 patients (11.77%) complained of respiratory difficulty, 2 patients (5.88%) had difficulty in swallowing and 1 patient (2.94%) had change in voice.

The swelling varied in consistency from cystic to solid. On clinical examination, 2 (5.88%) cases were cystic, 20 (58.82%) cases were solid and 12 (35.3%) cases were mixed. On Ultrasonography, 3 (8.82%) cases were cystic, 15 (44.12%) cases were solid and 16 (47.06%) cases were mixed. During operation, 3 (8.82%) cases were cystic, 14 (41.18%) cases were solid and 17 (50%) cases were mixed.

In the study, thyroid swellings involved the right lobe in 8 (23.53%) cases or right lobe with isthmus in 9 (26.47%) cases or bilateral in 9 (26.47%) cases. 2 cases (5.88%) presented with hypothyroidism and these cases were taken up for the study after treatment of the condition with thyroxine and other were in euthyroid state. 1 case (2.94%) presented with hyperthyroidism. Pulse Rate was measured during day time and during sleep time, having, only one patient with hyperthyroidism showing tachycardia.

In ultrasonography, 26 cases (76.47%) were found to be benign and 8 cases (23.53%) malignant. The final diagnosis was done through histopathological examination. Thus, Ultrasonography showed sensitivity of 66.67% and specificity of 92%. The positive predictive value and negative predictive value was 75% and 88.96% respectively.

In FNAC, 27 cases (79.41%) came out to be benign whereas, 7 cases (20.59%) were malignant (table-1). Final diagnosis was confirmed with histopathological examination. Thus, the sensitivity, specificity, positive predictive value and negative predictive value of FNAC for diagnosing malignancy was 77%, 100%, 100% and 92.59% respectively. In our study all the cases underwent surgery and specimens were sent for histopathological examination, which was done in Department of Pathology, Assam Medical College and Hospital. In this study, 25 cases (73.53%) came out to be benign and 9 cases (26.47%) to be malignant on histopathological examination.

The table-1 shows the comparison between FNAC findings, USG findings and histopathological findings.

### DISCUSSION

Thirty four cases were taken for study in the Department of Surgery, Assam Medical College and Hospital, Dibrugarh.

**Age and gender:** The present study shows maximum number 13 (38.24%) of patients were in age group of 31 to 40 years, with the mean age being 40.26 years.

Andre J. Van Herle and Amy J. Lutz stated that in a children under the age of 14, a thyroid nodule is likely to be malignant in 50% of cases, and after the age of 65, a growing nodule has a good

Category	FNAC Diagnosis		USG Diagnosis		Histopathology	
	Number	Percentage	Number	Percentage	Number	Percentage
Benign	27	79.41	26	76.47	25	73.53
Malignant	7	20.59	8	23.53	9	26.47
Total	34	100	34	100	34	100

**Table-1:** Comparison of FNAC, USG and histopathology

chance of being malignant. Thyroid nodules are more common in women than in men by a ratio of about 4 to 1, and increase in frequency with age and with decreasing iodine intake.<sup>2</sup> Our study showed the ratio to be of 4:1.

**Geographical distribution, source of drinking water and diet:** Our study was done in the eastern part of the country, a goiter endemic area where majority of the people take ground water.

Arup Sengupta, et al (2012) concluded that Incidentally revealed thyroid swelling was quite high in eastern India for which we need a consensus line of intervention.<sup>3</sup>

According to Kapil and Singh (Asian Network for Scientific Information 2003): Status of Iodine Content of Salt and Urinary Iodine Excretion Levels in India: 18 districts have been declared to be endemic to iodine deficiency disorder in Assam.<sup>4</sup>

**Presenting complaints:** Only swelling in front of neck was present in 24 (70.59%) patients, accompanied by pain in 3 patients (8.82%), respiratory difficulty in 4 patients (11.77%), dysphagia in 2 patients (5.88%) and change in voice in 1 patient (2.94%).

The pain over the swelling could be due to sudden haemorrhage or degeneration inside the nodules. The difficulty in swallowing and in breathing was most probably due to the thyroid swelling pressing over the trachea and oesophagus and is collectively referred to as pressure symptoms

In 1982 S.K. Bhansali had examined 600 cases and reported pain in 78 (13%), dysphagia in 70 (11.67%) of cases.<sup>5</sup>

**Duration consistency and location of swelling:** Our study showed 8 cases (23.53%) whose thyroid swelling were of less than 6 months, 14 cases (41.18%) between 6 months to 2 yrs and 12 cases (35.29%) of more than 2 years.

On clinical examination, maximum cases, 20 (58.82%) were solid while on Ultrasonography, 15 (44.12%) cases came out to be solid. During operation, 3 (8.82%) cases were cystic, 14 (41.18%) cases were solid and 17 (50%) cases were mixed.

Shereen Ezzat (1994) did a study concluding that palpable nodules were identified in 21 (21%) of 100 subjects, with nine solitary nodules (9%) and 12 multiple nodules (12%). In comparison, only 33 subjects were found to be free of any nodules by ultrasonography. Of the 67 subjects with abnormal ultrasound findings, 22 had solitary nodules (22%) and 45 had multiple nodules (45%). The prevalence of nodules was greater in women (72%) than in men (41%) ( $P < .02$ ). A concordance rate of 49% was noted between ultrasound and findings by palpation.<sup>6</sup>

In our study, thyroid swellings involved the right lobe most of the time. G. Messaris, et al concluded that the right lobe was more frequently involved (57.6 per cent) than the left.<sup>7</sup>

**Pulse rate:** In our study, only one patient with hyperthyroidism showed tachycardia. According to Ingabar and Woeber (1974), tachycardia was almost always present in thyrotoxicosis even at rest.<sup>8</sup>

**Laryngoscopic examination:** In our study, only 1 patient with large thyroid swelling showed diminished vocal cord movement. Wade (1960) stated that, to know the status of recurrent laryngeal nerve, the need of laryngoscopic examination arose. The reported incidence of recurrent. Laryngeal nerve palsy

varies widely from 0-14%.<sup>9</sup>

**Ultrasonography:** In our study, Ultrasonography showed sensitivity of 66.67% and specificity of 92%. The positive predictive value and negative predictive value was 75% and 88.96% respectively.

Won-Jin Moon, MD et al did a study and concluded that Statistically significant ( $P < .05$ ) findings of malignancy were a taller-than-wide shape, a spiculated margin, marked hypoechogenicity, microcalcification, and macrocalcification. The US findings for benign nodules were isoechogenicity and a spongiform appearance. The presence of at least one malignant US finding had a sensitivity of 83.3%, a specificity of 74.0%, and a diagnostic accuracy of 78.0%.<sup>10</sup> Tan WJ. Et al did a study on 112 patients and concluded that the sensitivity of ultrasound, was 41.4%. (2010).<sup>11</sup>

**Fine needle aspiration cytology:** In our study, the sensitivity, specificity, positive predictive value and negative predictive value of FNAC for diagnosing malignancy was 77%, 100%, 100% and 92.59% respectively,

Musani MA (2011) et al found the sensitivity of FNAC to be 61.53% and specificity 98.9%.<sup>12</sup>

Asli Muratli, et al did a study and concluded that the sensitivity of FNAC was 87.1% and specificity was 64.6%.<sup>13</sup> Morgan JL et al. (2003) did a study and concluded that the overall sensitivity of FNAC detecting thyroid neoplasia was 55.0%, specificity 73.7% and accuracy 67.2%.<sup>14</sup>

**Histopathological finding:** It was done in the Department of Pathology, Assam Medical College and Hospital. In our study, 25 cases (73.53%) came out to be benign and 9 cases (26.47%) to be malignant on histopathological examination.

Emily J Mackenzie and Robin H Mortimer (2004) stated that about 5% of thyroid nodules are malignant.<sup>15</sup> Laurel J. Bessey, et al (2013) concluded in their study that the typical 5% risk of thyroid nodule malignancy on FNA varies depending on patient age and gender. Cooper DS et al reported that the overall risk of malignancy in a thyroid nodule is 5–10%.<sup>16</sup>

**Treatment:** The most common surgical procedure performed was right hemithyroidectomy 15 (44.2%) cases, followed by lobectomy (either right or left) and near total thyroidectomy with 8 cases each (23.53%).

In 2013, Bauer PS et al had performed a total of 683, thyroidectomy for multinodular goiter and of these patients, 420 (61%) underwent unilateral resection and 263 patients (39%) underwent total thyroidectomy for bilateral Multinodular goiter.<sup>17</sup>

**Complications:** Haemorrhage, Infection of wound, Hypoparathyroidism and Scar disorders and Laryngeal nerve injury each were present in one case (2.94%). Wade (1967) reported 7.5% cases of wound infection in his series.<sup>9</sup>

## CONCLUSION

In our study, the sensitivity, specificity, positive predictive value and negative predictive value of FNAC for diagnosing malignancy was 77%, 100%, 100% and 92.59% respectively, whereas ultrasonography showed sensitivity of 66.67% and specificity of 92%. The positive predictive value and negative predictive value was 75% and 88.96% respectively.

Histopathology was taken as the final diagnosis.

The malignancy rate was 26.47% which was much higher. It is mainly because the people here are less conscious and present for treatment only when they face problems in their daily day to day activities due to the swelling. Hence, long standing thyroid swelling led to higher malignancy rate.

## REFERENCES

1. Sabiston, Textbook of surgery, 19<sup>th</sup> edition, p 903
2. Hegedus L. Clinical practice. The thyroid nodule. *N Engl J Med.* 2004;351:1764–1771.
3. Arup Sengupta, et al, Clinico-pathological correlates of incidentally revealed thyroid swelling in Bihar, India. *J Pharm Bioallied Sci.* 2012;4:51–55.
4. Umesh Kapil and Preeti Singh. Status of Iodine Content of Salt and Urinary Iodine Excretion Levels in India. *Pakistan Journal of Nutrition.* 2003;2:361-373.
5. Bhansali SK. solitary nodule in the thyroid gland; experience with 600 cases. *Ind J Surg.* 1982;44:547-561.
6. Shereen Ezzat, Dennis A. Sarti, Delver R. Cain, Glenn D. Braunstein. Thyroid Incidentalomas Prevalence by Palpation and Ultrasonography. *Arch Intern Med.* 1994;154:1838-1840.
7. G. Messaris, K. Kyriakou, P. Vasilopoulos and C. Tountas, The single thyroid nodule and carcinoma. *Br J Surgery.* 1974;61:943-4.
8. Ingbar SH and Woeber K.A. The thyroid gland textbook of endocrinology. Edi RH Williams 4<sup>th</sup> ed p198
9. Crile G and Dempsey W S, Indication for removal of non-toxic nodular goiter, *J Am Med Assoc.* 1949; 30;139:1247-51.
10. Won-Jin Moon et al. Benign and Malignant Thyroid Nodules: US Differentiation — Multicenter Retrospective Study. *Head and Neck Imaging.* 2008;247:12-14.
11. Tan WJ, Sanghvi K, Liao KH, Low CH. An audit study of the sensitivity and specificity of ultrasound, fine needle aspiration cytology and frozen section in the evaluation of thyroid malignancies in a tertiary institution. *Ann Acad Med Singapore.* 2010;39:359-62.
12. Musani MA, Khan FA, Malik S, Khambaty Y., Fine needle aspiration cytology: sensitivity and specificity in thyroid lesions. *J Ayub Med Coll Abbottabad.* 2011;23:34-6.
13. Asli Muratli, Nilsen Erdogan, Sezgin Sevim, Isik Unal, and Serap Akyuz, Diagnostic efficacy and importance of fine-needle aspiration cytology of thyroid nodules, *J Cytol.* 2014;31:73–78.
14. Morgan JL, Serpell JW, Cheng MS., Fine-needle aspiration cytology of thyroid nodules: how useful is it? *ANZ J Surg.* 2003;73:480-3.
15. Emily J Mackenzie and Robin H Mortimer, Thyroid nodules and thyroid cancer, *MJA Practice Essentials — Endocrinology.* *Med J Aust.* 2004;180:242-247.
16. Laurel J. Bessey, Ngan Betty K. Lai, Nicholas E. Coorough, Herbert Chen, Rebecca S. Sippel. The incidence of thyroid cancer by FNA varies by age and gender. *J Surg Res.* 2013; 184:761–765.
17. Bauer PS et al. In 2013 Sep; Unilateral thyroidectomy for the treatment of benign multinodular goiter. *J Surg Res.* 2013;184:514–518.

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