

Research Article

Histopathological study of thyroid lesions and correlation with ultrasonography and thyroid profile in western zone of Rajasthan, India

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ABSTRACT

Background: To evaluate the different patterns of thyroid lesions in surgically resected specimens and biopsies received at department of pathology and correlate the various histo-morphological features with respect to clinical findings, USG and thyroid profile findings.

Methods: Total 100 cases of partial or complete thyroidectomy were studied. A detailed clinical examination with USG examination and assessment of thyroid function test were carried out preoperatively.

Results: The highest incidences (51%) of thyroid enlargements were found in age group of 21-40 years with females predominated (77%), ratio being 3.34:1. Out of total 100 cases, 28 were neoplastic and 72 were non-neoplastic. Thyroid function test was carried out of all 100 cases and out of them 81 were euthyroid. Most common clinical symptom in the patients of thyroid lesions was swelling in the neck which was present in all cases. Multinodular goiter was the most common radiological finding seen in 55% cases. Out of 55 cases of MNG one case turned out to be malignant after histopathological examination. USG diagnosed 10 cases were malignant, out of them 1 case turned out to be benign after histopathological examination.

Conclusions: Taking into consideration histopathology report as a gold standard, correlation of USG finding with histopathology finding showed 90% sensitivity, 98.8% specificity with 90% positive predictive value.

Keywords: Thyroid swelling, Multinodular goiter, Histopathology, Ultrasonography, Thyroid profile

INTRODUCTION

Thyroid lesions are fairly common worldwide and are commonly encountered in clinical practice.¹ Thyroid lesions may be developmental, inflammatory, hyperplastic and neoplastic. Diseases of the thyroid gland are common and comprise a spectrum of entities causing systemic disease (Grave's disease) or a localised abnormality in the thyroid gland such as nodular enlargement (goitre) or a tumour mass.

Thyroid carcinoma closely resembles its benign counterpart in physical characteristics, measurable

physiological parameters such as serum T3/T4 levels and ultrasonic characteristics. Therefore, the surgical excision of the nodule and its histological examination is the only way to differentiate between the more frequent benign and much less frequent malignant nodules. A solitary thyroid nodule is defined as a palpable single, clinically detected nodule in the thyroid. It causes more concern because of high probability of malignancy in it, which can range from 5-35% of all solitary thyroid nodules.²

Diffuse thyroid lesions are those that are associated with conditions affecting entire gland such as hyperplasia and thyroiditis. Nodular lesion comprises those disorders that

produce a clinical nodule and consists of non-neoplastic hyperplasia as well as benign and malignant tumours.³

Neoplasms of the thyroid are relatively uncommon disease. They constitute only 0.7% of all cancers in female and 0.2% in males. There are different diagnostic modalities used to evaluate and diagnose efficiently thyroid nodules. These include clinical examination, thyroid function test (TFT), Scintiscan, ultrasonography (USG), fine needle aspiration cytology (FNAC) and histopathological examination. However clinical assessment, TFT and USG have been poor parameters for assessing thyroid nodules. Final diagnosis requires morphological examination of lesions and for this FNAC or histological examination becomes mandatory. FNAC is an established technique for the investigation of thyroid lesions. Despite many advantages, FNAC has certain limitations which include specimen adequacy and cytological interpretation, as the sampling is variable and not always representative. Thus a specific diagnosis can only be arrived at after a histological examination.⁴

METHODS

We performed two years prospective study in 2014-2015 on 100 cases of thyroid. The specimens were included lobectomy, hemithyroidectomy, subtotal and near total thyroidectomy. A detailed clinical examination with USG examination and assessment of thyroid function test were carried out preoperatively. The specimen was received in 10% formalin. Gross features of the specimen received were recorded. Representative tissue was taken and after processing tissue was embedded in paraffin wax to make blocks. After making section in microtome routine staining was carried out with hematoxylin and eosin (H&E) stain.

Inclusion criteria

1. All lobectomy, hemithyroidectomy, subtotal and near total thyroidectomy specimens with macroscopically and microscopically detected thyroid lesions.
2. Thyroid biopsy specimen.

Exclusion criteria

- (1) Autolyzed specimen and (2) Inadequate biopsy

RESULTS

Table 1: Sex distribution of thyroid lesion.

| Sex | No. of cases | Percent of cases |
|--------|--------------|------------------|
| Male | 23 | 23.0 |
| Female | 77 | 77.0 |
| Total | 100 | 100.0 |

In present study, out of total 100 cases, 77 were females while remaining 23 cases were males. Female: Male was 3.34:1.

Table 2: Age wise distribution of thyroid lesion.

| Age (in years) | No of cases | Percent of cases |
|----------------|-------------|------------------|
| 0-20 | 12 | 12.0% |
| 21-40 | 51 | 51.0% |
| 41-60 | 31 | 31.0% |
| >60 | 6 | 6.0% |

Most common age group in present study was 21-40 years (51%) (Table 2).

Table 3: Clinical symptoms in cases with thyroid lesions.

| Clinical symptoms | No. of cases | Percent of cases |
|--------------------|--------------|------------------|
| Neck swelling | 100 | 100% |
| Lymphadenopathy | 3 | 3% |
| Dysphagia | 1 | 1% |
| Dyspnoea | 1 | 1% |
| Hoarsness of voice | 1 | 1% |

Table 3 shows in present study most common symptom was neck swelling which was present in all cases (100%).

Table 4: Site of thyroid gland involvement in 100 cases.

| Site | No. of Cases | Percent of cases |
|------------------------------|--------------|------------------|
| Right side swelling | 49 | 49% |
| Left side swelling | 35 | 35% |
| Bilateral / diffuse swelling | 16 | 16% |

According to Table 4 right side (49%) of thyroid gland was more commonly involved.

Table 5: Neoplastic and non neoplastic distribution of thyroid lesion.

| Thyroid lesion | No. of cases | Percent of cases | |
|----------------|--------------------------------|------------------|-------|
| Non neoplastic | Multinodular goitre | 6 | 6.0% |
| | Adenomatous goitre | 52 | 52.0% |
| | Colloid goitre | 7 | 7.0% |
| | Autoimmune thyroiditis | 1 | 1.0% |
| | Hashimoto's thyroiditis | 6 | 6.0% |
| Neoplastic | Follicular adenoma | 15 | 15.0% |
| | Hyalinising Trabecular Adenoma | 3 | 3.0% |
| | Papillary Carcinoma | 8 | 8.0% |
| | Poorly diff. carcinoma | 1 | 1.0% |
| | Anaplastic carcinoma | 1 | 1.0% |

Out of total 100 cases, 28 were neoplastic and 72 were non-neoplastic (Table 5).

USG thyroid was done in all 100 cases. Table shows that out of 100 cases, the maximum number of thyroid cases

that were investigated on USG was diagnosed as MNG accounting for 55% of cases (Table 7).

Thyroid function test was done in all 100 cases; out of them 81 cases were euthyroid (Table 8).

Table 6: Distribution of histological diagnosis of cases according to sex.

| Histological diagnosis | Sex | | | | Total | |
|--------------------------------|-----|-------|----|-------|-------|------|
| | No | % | No | % | No | % |
| Multinodular goitre | 1 | 4.3% | 5 | 6.5% | 6 | 6% |
| Adenomatous goitre | 11 | 47.8% | 41 | 53.2% | 52 | 52% |
| Colloid goitre | 2 | 8.7% | 5 | 6.5% | 7 | 7% |
| Autoimmune thyroiditis | 0 | 0.0% | 1 | 1.3% | 1 | 1% |
| Hashimoto's thyroiditis | 0 | 0.0% | 6 | 7.8% | 6 | 6% |
| Follicular adenoma | 4 | 17.4% | 11 | 14.3% | 15 | 15% |
| Hyalinising Trabecular Adenoma | 1 | 4.3% | 2 | 2.6% | 3 | 3% |
| Papillary carcinoma | 2 | 8.7% | 6 | 7.8% | 8 | 8% |
| Poorly diff. carcinoma | 1 | 4.3% | 0 | 0.0% | 1 | 1% |
| Anaplastic carcinoma | 1 | 4.3% | 0 | 0.0% | 1 | 1% |
| Total | 23 | 23% | 77 | 77% | 100 | 100% |

Table 7: Ultrasonography diagnosis of thyroid lesion.

| Ultrasonographic diagnosis | No. of cases | Percent of cases |
|-------------------------------|--------------|------------------|
| Benign Thyroid lesion | 5 | 5.0% |
| Colloid goitre | 5 | 5.0% |
| Multinodular goitre | 55 | 55.0% |
| MNG with colloid degeneration | 10 | 10.0% |
| Solitary thyroid nodule | 19 | 19.0% |
| Thyroiditis | 6 | 6.0% |

Table 8: Thyroid function test in 100 cases.

| Thyroid function test | No. of cases | Percent of cases |
|-----------------------|--------------|------------------|
| Euthyroid | 81 | 81.0% |
| Hyperthyroid | 11 | 11.0% |
| Hypothyroid | 8 | 8.0% |

Over all correlation of USG v/s histopathology diagnosis was seen in 98 out of 100 cases. The correlation of USG diagnosis with Histopathology is given below (Table 9).

1. MNG- 54 out of 55 cases (98.1%)
2. STN-19 out of 19 cases (100%)
3. Colloid goitre-5 out of 5 cases (100%)
4. Thyroiditis-6 out of 6 cases (100%)
5. Benign thyroid lesion - 5 out of 5 case (100%)
6. Thyroid malignancy-9 out of 10 cases (90%).

Table 9: Correlation of USG diagnosis with histological diagnosis.

| USG diagnosis | No. of cases | Histological diagnosis | |
|---|--------------|------------------------|-----------|
| | | Benign | Malignant |
| Multinodular goiter | 55 | 54 | 1 |
| Solitary thyroid nodule | 19 | 19 | 0 |
| Colloid goiter | 5 | 5 | 0 |
| Thyroiditis | 6 | 6 | 0 |
| Benign thyroid lesion | 5 | 5 | 0 |
| Multinodular goiter with colloid degeneration | 10 | 1 | 9 |

Table 10: Diagnostic parameters on the basis of ultrasonography and histopathology study in 100 cases.

| USG | Histopathology | | Total USG |
|----------------------|----------------|-----------|-----------|
| | Benign | Malignant | |
| | Benign | 89 TN | 1 FN |
| Malignant | 1 FP | 9 TP | 10 |
| Total histopathology | 90 | 10 | 100 |

Table 10 shows that malignancy was indicated on USG and Histopathology in 10 of the 100 cases wherein USG v/s Histopathology correlation was available. The correctly correlated malignant cases were 9 in number

(TP-True positive). The wrongly diagnosed benign cases on USG which turned out malignant on histopathology (FN-False negative) were 1 case.

The cases diagnosed as benign on USG were 90 out of the correlated 100 cases. The cases correctly correlated as benign (TN-True Negative) on histopathology were 89 in number while wrongly interpreted cases as malignant lesions on USG neck but found to be benign (FP-False positive) on such correlation was 1 case. Diagnostic parameters obtained after using USG to detect thyroid malignancy; sensitivity- 90%; specificity- 98.8%; positive predictive value (PPV) - 90%

DISCUSSION

This study was done in the department of Pathology, Sardar Patel Medical College Bikaner. For this study, 100 cases were studied by detailed history, clinical examination, thyroid hormone assay, ultrasonogram, and histopathological examinations. In our study mean age of the patients of thyroid nodule was 37.49 years and the highest frequency (51%) was within 21-40 years of age.

Whereas in the study of Singh P et al. 2000, of 108 cases age range was 12-80 years, mean age was 47 years.⁵ Islam et al. 2009, showed the majority of the patients were within 21-40 yrs of age.⁶ Rangaswamy M, et al, studied 585 cases and age range was 11-70 years, mean age was 40.57 years.⁷ The youngest patient in our study was a boy of 14 years and the oldest patients was a man of 85 years both with adenomatous goitre. In this series, out of 100 patients, female (77) outnumbered the males with male:female ratio of 1:3.4. This female preponderance is reflected in all other studies also. Singh P et al.2000, female:male was 4.7:1.⁵ Sangall G, et al 2006, female:male was 4.21:1, Mandal S, et al female:male was 5:1. Kilopatric, et al found a female to male ratio of 4:1 in nonendemic area.⁸⁻¹⁰ It is due to fact that thyroid disorder is female prone owing to the presence of estrogen receptors in the thyroid tissue.¹¹ All solitary nodules are not a single clinical entity. So it is very difficult to comment upon the nature of solitary nodule purely on the basis of clinical ground. But hoarseness of voice, hard irregular nodule, palpable cervical lymph node, extreme of age, male sex are always suspicious for malignancy in solitary thyroid nodule.¹² Regarding presenting complaints we have found that all of the patients presented with neck swelling of variable durations. Some patient also presented with other symptoms like cervical lymphadenopathy 3 (3%) cases, dysphagia 1 (1%), dyspnoea 1 (1%), hoarseness of voice 1 (1%) case & bone metastasis was found in none. In the study of Prakash A, et al thyroid swelling was in 95.55% cases, Sachdeva HS, et al thyroid swelling was in 90%, dysphagia in 33.33%, dyspnoea in 26.66% cases, Godinho-Matos L, et al thyroid swelling was in 100%, dysphagia in 4%, dyspnoea in 3%, pain in 8% and hoarseness of voice in 3% cases.¹³⁻¹⁵

Nodular goiter with large swelling may be associated with difficulty in respiration or rarely in deglutition which is due to pressure on trachea or oesophagus.¹⁶ In present study we found 49 nodules in right lobe, 35 nodules in left lobe, 16 nodules in both lobes. Similar findings were noted by many authors.^{17,18}

All cases of our study underwent thyroid hormone profile and found to be, Euthyroid 81%, Hyperthyroid 11% and 8% Hypothyroid. In the study by Godinho-Matos L, et al there were 144 cases out of them 88 cases were euthyroid, 9 cases were hyperthyroid and 3 cases were hypothyroid.¹⁵ Final diagnosis in our study was on the basis of histopathological reports record. Out of 100 cases, 72 cases (72%) were proven as non-neoplastic & 28 cases (28 %) as neoplastic & in neoplastic lesions we found 18 cases were benign (follicular adenoma, hyalinising trabecular adenoma) and 10 cases were malignant. Out of 10 malignant cases, 8 were papillary carcinoma, 1 was poorly differentiated carcinoma and 1 case was anaplastic carcinoma.

Ultrasonography is used to establish physical characteristics of nodule like the size, echo-structure (solid or cystic), shape and number of nodule(s), and extra nodular thyroid tissue. In our study of ultrasonography we found 90(90%) nodules were benign, 10 (10%) were malignant. Diagnostic parameters obtained from USG were following, sensitivity- 90%, specificity- 98.8% and positive predictive value (PPV) - 90%. Whereas in the study of Jones AJ, et al sensitivity was 75% and specificity was 61%, Watters DA, et al sensitivity was 74% and specificity was 83%, Cai XJ, et al sensitivity was 80.5% and specificity was 97.8% and Bhushan M warpe was found 70% sensitivity and 91.3% specificity.¹⁹⁻²² In our study, most of the benign & malignant nodules were predominantly solid and shows cystic degeneration. In present study 55 cases were diagnosed as multinodular goiter by ultrasonography. After histopathology one case turned out to be follicular variant of papillary thyroid carcinoma. Cathy Crenshaw Doheny also mentioned in a web journal that a solid thyroid nodule is more likely to be malignant than a cystic nodule.²³

CONCLUSION

Solitary thyroid nodules are more common in females but more worrisome in males due to the increased incidence of malignancy. FNAC is a very useful procedure for pre-operative assessment of solitary nodule of thyroid, but malignancy can still come as a surprise in postoperative histopathological examination.

Combined opinion on the nature of a thyroid nodule should be done based on history, clinical examination, ultrasound features and FNAC. Ultrasound guided FNAC and Bethesda system of reporting have added better clarity but still the solitary nodule of thyroid continues to be an enigma and 100 percent definitive diagnosis is

possible only with excision and postoperative histopathological examination of the nodule.

The USG diagnosis correlated exactly with the operative findings indicating it to be the gold standard investigations. When the size of nodule was less than 2 cm, clinical palpation failed to detect it, indicating nodules less than 3 cm are frequently missed by clinical palpations. The type of nodules was mostly cystic, clinical palpations was correct in almost all cases. Nodules were present commonly in the upper pole followed by middle and lower pole. There was no much significant difference between the site of the nodule and difficult in detecting the nodule by clinical palpations. USG gave a suspicion for malignancy in 10 cases in out of which 9 cases (90%) were confirmed to be carcinomatous by histopathological examinations.

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REFERENCES

1. Tsegaye B, Ergete W. Histopathologic pattern of thyroid disease. East Afr Med J. 2003;80:525-28.
2. Ananthakrishnan N, Rao KM, Narasimhan R, Veliath, Smilet SR, Jagadish S. The Single Thyroid Nodule: A South Indian Profile of 503 Patients with Special Reference to Incidence of Malignancy. Indian J Surg. 1993;55(10):487-92.
3. Baloch Z, Livolsi V. Pathology of thyroid and parathyroid disease. In: Sternberg's diagnostic surgical pathology. 4th ed. Edinburgh: Lippincott Williams & Wilkins. 2004:557-95.
4. Bhargava S, Bansal R, Elhence P, Pandey S, Makkar N. Cyto-histological correlation of thyroid lesions with Estrogen and Progesterone receptor status on neoplastic lesions. Journal of clinical and diagnostic research. 2012;6(5):811-15.
5. Singh P, Chopra R, Calton N, Kapoor R. Diagnostic Accuracy of Fine Needle Aspiration Cytology of Thyroid lesions. Journal of Cytology. 2000;17(3):135-9.
6. Islam R, Ekramuddaula AFM, Alam MS, Kabir MS, Hossain D, Alauddin M. Frequency & pattern of malignancy in solitary thyroid nodule. Bangladesh J of Otorhinolaryngology. 2009;15(1):1-5.
7. Rangaswamy M, Narendra KL, Patel S, Guruprasad C, Manjunath GV. Insight to neoplastic thyroid lesions by fine needle aspiration cytology. J Cytol. 2013;30(1):23-6.
8. Sangalli G, Sergio G, Zampatti C, Bellotti M, Lomuscio G. Fine needle aspiration cytology of the thyroid: A comparison of 5469 cytological and final histological diagnosis. Cytopathology. 2006;17(5):245-50.
9. Mandal S, Barman D, Mukherjee A, Mukherjee D, Saha J, Sinha R. Fine needle aspiration cytology of thyroid nodules-evaluation of its role in diagnosis and management. J Indian Med Assoc. 2011;109(4):258-61.
10. Ashraf SA, Matin ASM. A Review of thyroid diseases in Bangladesh. Journal of BCPS. 1996;2(1):6-10.
11. Krukowski ZH. The thyroid gland and thyroglossal tract. In: Williams NS, Bulstrode CJK, O'Connell PR, eds. Baily & Love's short practice of surgery. 24th ed. London. Hodder education. 2004:776-804.
12. Rains AJH, Charles VM. In: Russel RCG, Williams NS, Bulstrode CJK, Bulstrode C, O'Connell PR, eds. Bailey and Love's short practice of surgery, 23rd ed. London, ELBS. 2000:707-33.
13. Psarras A, Papadopoulos SN, Livadas D, Pharmakiotis AD, Koutras DA. The single thyroid nodule. Br J Surg. 1972;59(7):545-8.
14. Prakash A, Moulik BK, Sharma LK, Kapur M, Poddar PK. Carcinoma of thyroid gland. A clinical study. Ind J Surg. 1974;43:409-16.
15. Godinho-Matos L, Kocjan G, Kurtz A. Contribution of fine needle aspiration cytology to diagnosis and management of thyroid disease. J Clin Pathol. 1992;45:391-5.
16. Stark DD, Clark OH, Gooding GAW, Moss AA. High-resolution ultrasonography and computed tomography of thyroid lesions in patients with hyperparathyroidism. Surgery. 1983;94:863.
17. Messaris G, Kyriakov K, Vasilopoulos P, Tountas C. The single thyroid nodule and carcinoma. Br J Surg. 1974;61:943.
18. Gupta M, Gupta S, Gupta VB. Correlation of Fine Needle Aspiration Cytology with Histopathology in the Diagnosis of Solitary Thyroid Nodule. Journal of Thyroid Research. 2010:379051.
19. Jones AJ, Aitman TJ, Edmonds CJ, Burke M, Hudson E, Tellez M. Comparison of fine needle aspiration cytology, radioisotopic and ultrasound scanning in the management of thyroid nodules. Postgrad Med J. 1990;66(781):914-7.
20. Watters DA, Ahuja AT, Evans RM, Chick W, King WW, Metreweli C. Role of USG in the management of thyroid nodule. Am J Surg. 1998;164(6):654-7.
21. Cai XJ, Valiyaparambath N, Nixon P, Waghorn A, Giles T, Helliwell T. Ultrasound-guided fine needle aspiration cytology in the diagnosis and management of thyroid nodules. Cytopathology. 2006;17(5):251-6.
22. Warpe BM. Cyto-diagnosis of thyroid lesions. 2013. Available at http://www.ijser.org/thesis/publication/TH_PUQZX6.pdf. Accessed 10 February 2016.
23. Dohney CC. Clear answers for common questions of thyroid nodule, 2012. Available from <http://www.wiseGEEKThyroidnodule.com>. Accessed 10 August. 2012.

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