

Comparison of radiological and histocytological examination of thyroid lesions in Udaipur area

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Abstract

Background: The evaluation of the thyroid lesion is much important for both medical and surgical point of view. Ultrasonography (USG) is far more sensitive than palpation, but diagnostic accuracy is always found to be less than fine needle aspiration cytology (FNAC) and histopathological examination. If cost-effectiveness and diagnostic value considered, the repeat FNA can be done when the nodule shows any suspicious feature on the initial USG. However, known ultrasound features associated with malignancy show an extremely variable probability of malignancy.

Objectives: To compare the radiological findings with histo-cytological findings and diagnosis of various thyroid lesions.

Material and Methods: The present prospective study was carried out over one and half years. The patients visiting various departments with thyroid enlargement and referred to radiology department were included in the study. Detailed clinical history like demographic data, history of the present thyroid swelling, change in weight, diplopia, mood, and drug history was taken. Patients' general examination and local examination of swelling was performed. Radiological examinations like X-ray examination, USG, and if needed CT scan were performed. USG-guided FNAC was performed in all participants while histo-pathological examination was done only in operated lesions. Correlation of radiological examination and cyto-histological examination was done.

Results: Female:male ratio was 8.3:1 with common age group of presentation was 21–40 years of age. Ultrasound findings show that nodule size varied from 8 mm to 3.5 cm. Total 64.29% participants had single nodule, 26.19% had multiple nodules, and 9.52% had diffuse lesion. Briefly, 90.48% lesions had regular shape and 78.57% had well-defined margin. Nearly 55% of lesions had hyperechoic, 24% had isoechoic, and 21% had hypoechoic picture. Microcalcification was seen in 28.57% of lesions. Radiologically 70% of lesions were colloid goiter, 9.52% were thyroiditis, 8.33% were thyroglossal cyst, 10.71% were benign neoplasm, and 2.38% were malignant. Comparison with cyto-histological examination shows that accuracy of diagnosing the thyroid lesions by radiological examination was 92.86%.

Conclusion: Although FNAC and biopsy examination give accurate diagnosis, radiological evaluation of thyroid lesion by ultrasound gives valuable findings that help in further management of the thyroid lesions. Ultrasound also helps in the procurement of sample from the lesion accurately for the FNAC and biopsy.

KEY WORDS: Thyroid lesions, ultrasound examination, FNAC, histological examination

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Introduction

The evaluation of the thyroid lesion is much important from both medical and surgical point of view. Thyroid lesions are classified in broad spectrum of pathology into five categories, i.e., colloid, hyperplastic, cystic, inflammatory, and neoplastic, with the last being the most feared. At the time of diagnosis majority of nodules are asymptomatic, and with only 5–10% of nodules being malignant, the decision to operate and remove

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is made on therapeutic or diagnostic grounds. The removal of thyroid nodules required only when they are large enough to be symptomatic, or if there is a concern for malignancy.^[1,2]

Ultrasonography (USG) is far more sensitive than palpation, as it detects nodules of any size in up to 67% of the general population.^[3] It can identify nodules too small to be palpated, the presence of multiple nodules, central, or lateral neck lymphadenopathy, and provides accurate measurements of nodule diameter for interval monitoring. Additionally, it allows characterization of nodules by sonographic features which suggest malignancy. Solid appearance (or hypoechogenicity), increased vascularity, microcalcifications, irregular margins, and the absence of a halo are features that have been consistently associated with malignancy. Ultrasound imaging studies and cytology from fine-needle aspiration are the main tools used by the clinician to decide whether surgical excision of a thyroid nodule is required or not.^[4] If cost effectiveness and diagnostic value considered, the repeat fine needle aspiration (FNA) can be performed when the nodule shows any suspicious feature on the initial USG.^[5] However, known USG features associated with malignancy show an extremely variable probability of malignancy. Irregular or speculated margin, microcalcifications, and marked hypoechogenicity show a high risk of malignancy, while hypoechogenicity and solid composition show a relatively low positive predictive value (PPV).^[6] On the basis of these results, each suspicious ultrasonographic feature may not be considered as an equal risk factor for malignancy. But the other study shows that fine needle aspiration cytology (FNAC) has an overall accuracy rate around 95% in the detection of thyroid malignancy and diagnosis by histological examination is the most accurate.^[7]

Hence, the objective of the present study was to compare radiological findings with histo-cytological findings and diagnosis.

Material and Methods

It was a prospective study which was carried out at Radio-diagnosis Department of Pacific Medical College and Hospital, Udaipur with duration of one and half years. Permission of Institutional Ethics Committee was taken before enrolment of the participants.

The patients visiting to surgery and other departments with thyroid enlargement and referred to radiology department were included in the study. There were no any specified exclusion criteria. An informed written consent was taken before enrolment in the study. Detailed clinical history like demographic data, history of present thyroid swelling, change in weight, diplopia, mood, and drug history was taken. Patients' general examination and local examination of swelling were performed. Radiological examination of swelling was performed by X-ray examination, USG, and if needed CT scan. USG was performed to check the size, echogenicity, composition (cystic, solid, mixed), the presence or absence of calcifications, borders (irregular vs smooth), and the presence and quality of internal color Doppler flow. After ultrasonographic evaluation of the thyroid gland

USG-guided FNAC was performed by the same radiologists who evaluated the thyroid gland. Thyroid nodule palpated and carefully decided the location for aspiration. FNAC was done under aseptic conditions by using 10 cc or 20 cc disposable syringes with 23 gage needle. Other routine investigations and special investigations related to thyroid lesion like thyroid function test was done in each patient. Among all participants only 40 participants undergo operative procedure. Histopathological examination of the tumor could be done only in operated patients. Correlation of radiological examination and cyto-histological examination was done in all patients.

Statistical analysis was carried out with the help of OpenEpi, version 2 for sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy.

Results

Out of total 92 patients screened, 84 gave the consent and could be included in the study. Among them 75 were female and 9 were male. Hence, the female:male ratio was 8.3:1 and the age incidence is shown in Table 1. According to that 21–40 years female are more commonly presented with thyroid lesions.

Most of the patients (95.24%) were presented with the complaint of swelling in front of neck which was gradual in onset. The swelling was nodular in majority of cases and in some cases it was diffuse. Other common complaints were pain and difficulty and pain during swallowing.

Radiological examination like X-ray and USG was done in almost all recruited patients. In X-ray findings, calcifications and tracheal shifts were seen in 16 and 20 patients, respectively. Ultrasonographic findings like size, echogenicity, composition (cystic, solid, mixed), presence or absence of calcifications, and borders (irregular vs smooth) were studied (Table 2). According to the finding most of the patients were with nodule of size varying from 8 mm to 3.5 cm. Out of 84 participants, 54 (64.29%) participants had single nodule, while 22 (26.19%) had multiple nodules, and 8 (9.52%) had diffuse lesion. Nearly 35% of lesions were located in the middle part of the thyroid gland, while nearly 24% were located in the upper lobe. Briefly, 76 (90.48%) lesions had regular shape and (66) 78.57% had well-defined margin. On evaluation of echogenicity of lesions it was found that nearly 55%

Table 1: Age incidence of patients with thyroid lesions

Age group (years)	No. of patients	Percentage
10–19	4	4.76
20–29	20	23.81
30–39	25	29.76
40–49	15	17.86
50–59	10	11.9
60–69	7	8.33
70–79	3	3.57
Total	84	

Table 2: Ultrasonographic findings of thyroid lesions

Radiological characteristics	No. of patients	Percentage
Diffuse or nodular		
Single nodule	54	64.29
Multiple nodule	22	26.19
Diffuse	8	9.52
Location		
Upper	20	23.81
Middle	29	34.52
Lower	15	17.86
Isthmus	2	2.38
Margin		
Well define	66	78.57
Not well define	18	21.43
Shape		
Regular	76	90.48
Irregular	8	9.52
Echogenicity		
Hyo-echoic	18	21.43
Iso-echoic	20	23.81
Hyper-echoic	46	54.76
Composition		
Solid	45	53.57
Cystic	21	25.00
Solid + cystic	18	21.43
Calcification		
No calcification	53	63.10
Micro-calcification	24	28.57
Other calcification	7	8.33
Vascularization		
Normal	79	94.05
Increased centrally	4	4.76
Increased peripherally	1	1.19

of lesions had hyperechoic, 24% had isoechoic, and 21% had hypoechoic picture. However, there were also lesions with mix echogenicity, but they were put in one of three groups as per the major component. The solid or mix composition (75%) were more common than cystic composition. Microcalcification is independent parameter commonly seen in malignancy, which was seen in 28.57% of lesions. Doppler study was performed in all patients. It shows that four patients had increased vascularity centrally and one had increased vascularity peripherally.

The radiological diagnosis shows that nearly 70% of lesions were colloid goiter, either solitary or multinodular. While 9.52% lesions were thyroiditis and 8.33% lesions were thyroglossal cyst. Among all lesions, 9 (10.71%) lesions were found to be benign neoplasm while 2 (2.38%) were malignant (Table 3). Histologically it was found that benign lesions were follicular adenoma and malignant lesions were papillary

Table 3: Radiological diagnosis of the thyroid lesions

Thyroid lesions	No. of patients	Percentage
Solitary colloid goiter	20	23.81
Multi-nodular goiter	38	45.24
Thyroiditis	08	9.52
Benign thyroid nodule	09	10.71
Malignancy	02	2.38
Thyroglossal cyst	7	8.33
Total	84	100

Table 4: Cyto-histological diagnosis of thyroid lesions

Thyroid lesions	No. of cases	Percentage
Colloid goiter	43	33.33
Adenomatous goiter	14	10
Thyrotoxicosis	4	6.67
Thyroglossal cyst	5	3.33
Thyroiditis	9	10
Benign tumors (follicular adenoma)	7	13.33
Malignant tumors (carcinoma)	2	6.67
Total	84	100

carcinoma. FNAC was done in all patients, while histological examination was done in 40 patients. The results shown after diagnosis by FNAC and histological examination are presented in Table 4. The comparison of diagnosis by radiological examination and cyto-histological examination shows that, accuracy of diagnosing the thyroid lesions by radiological examination was 92.86%. In this study, goiter was diagnosed with 96.3% of accuracy, thyroiditis was diagnosed with 100% of accuracy, follicular adenoma was diagnosed with 77.78% of accuracy, and malignant tumor was diagnosed with 100% of accuracy (Table 5).

Discussion

High-resolution ultrasound is the first line imaging modality for evaluation of the thyroid gland due to excellent visualization of the thyroid parenchyma. It is highly sensitive in detection of small nodules, calcification, margin and cysts. It is commonly utilize in guiding FNA biopsies. Large-scale studies have reported prevalence rates in adults of 4–8% by palpation, up to 67% by ultrasound, and 50% at autopsy.^[8,9] Ultrasound is commonly used as noninvasive technique for diagnosis of various thyroid nodules. The gender-wise incidence shows nearly 80% lesions were seen in females. Similar findings were seen in the study by Bamanikar (2014), which showed gender distribution with ratio of female:male as 8.6:1 and Walker^[10] showed that female involvement was 89%. And the common age group was young, i.e., 21–40 years of age. Mean age of presentation of patients with thyroid lesion

Table 5: Comparison of radiological and histological diagnosis of thyroid lesions

Thyroid lesions	Radiological diagnosis	Histological diagnosis	Radiological diagnosis		Accuracy
			Correct	Incorrect	
Goiter	54	57	52	2	96.3
Thyrotoxicosis	4	4	4	–	100
Thyroglossal cyst	7	5	5	2	71.43
Thyroiditis	8	9	8	–	100
Benign tumors (follicular adenoma)	9	7	7	2	77.78
Malignant tumors (carcinoma)	2	2	2	–	100
Total	84	84	78	6	92.86

seen in other studies like Rodriguez et al^[11] and Rani^[12] was 41 years and 38 years, respectively.

Thyroid nodules are very common and are observed in nearly 50% of adult population by USG.^[13] The most common cause of benign thyroid nodules is nodular hyperplasia although less than 7% of thyroid nodules are malignant.^[14] In the present study, nearly 65% patients had single nodular lesions and nearly 26% had multinodular lesions. These findings correlate with the study by Chang Pu (2013). Other ultrasound findings like shape of the lesions, well or ill-define margin, echogenicity of the lesions and composition of lesions gives idea about the type of lesion. Ill-define margin, hypoechogenicity and irregular shape are specific findings for malignant lesions. In the present study nearly 9% lesions had irregular shape, 21% had ill-define margin, and 21% had hypoechoic picture. Also micro-calcification, which is independent parameter of malignancy^[15] was seen in nearly 28% of lesions.

The radiological diagnosis of thyroid lesions shows that 69% of lesions were goiter, nearly 9% were thyroiditis, 11% were benign thyroid lesion like follicular adenoma, and only 2% were malignant. However, on comparison with cyto-histological diagnosis it was found that two lesions were falsely diagnosed as goiter. Out of which one was follicular adenoma and other was thyroglossal cyst. While two falsely diagnosed follicular adenoma were goiter lesions. However, both malignant lesions were diagnosed correctly by radiological examination. Both malignant lesions were diagnosed histologically as papillary carcinoma. The FNAC and biopsy examination of thyroid lesions are the best for the accurately diagnosing the thyroid lesions. However, ultrasound guiding is necessary for accurate sampling in both examinations. Ultrasound-guided FNAC is the one of the best for distinguishing the benign and malignant thyroid lesions.^[16] Also there is a clear need to select nodules for ultrasound-guided FNAC to maximize benefits and minimize cost. In the present study, the accuracy of diagnosis in thyroid lesions by radiological examination was 92.85%.

Conclusion

Although, FNAC and biopsy examination give accurate diagnosis, radiological evaluation of thyroid lesion by

ultrasound gives valuable findings that helps in further management of the thyroid lesions. Ultrasound also helps in the procurement of sample from the lesion accurately for the FNAC and biopsy examination.

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