ROLE OF ULTRASONOGRAPHY IN THE EVALUATION OF THYROID NODULES WITH FNAC CORRELATION

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ABSTRACT

BACKGROUND

To ascertain different morphologic patterns of clinically palpable thyroid nodule by ultrasound. To correlate ultrasound findings with FNAC and to evaluate the efficacy of ultrasound in differentiating benign and malignant thyroid nodules.

MATERIALS AND METHODS

This is a prospective, diagnostic study. The study period is from October 2014 till July 2016. Patients of all age groups and both sexes.

RESULTS

Out of 100 patients evaluated by USG, 80 were diagnosed to be benign thyroid nodules, 20 were malignant thyroid nodules. After FNAC correlation, 82 cases were found to be benign thyroid nodules and 18 were malignant thyroid nodules.

CONCLUSION

Among benign thyroid nodules benign multinodular goiter were most common followed by benign colloid nodule. Among malignant nodules, papillary carcinoma was most common followed by follicular carcinoma. Thyroid nodules were common in the female of age group 31-40 years compared to male population. USG is safe radiation free cost effective fairly accurate investigation of choice in any patient presenting with clinically suspecting thyroid nodule. It also helped to differentiate between benign and malignant lesions. Associated with FNAC correlation it helps in early diagnosis and management.

KEYWORDS

USG-Ultrasonography.

HOW TO CITE THIS ARTICLE: Chakraborty S, Ishwar P. Role of ultrasonography in the evaluation of thyroid nodules with FNAC correlation. Journal of Research in Radiodiagnosis, Teleradiology and Imaging 2016; Vol. 2, Issue 2, July-December 2016; Page: 1-5.

BACKGROUND

The thyroid gland is unique among endocrine glands, in that it is the first endocrine gland to appear in the foetus. It is the largest of all endocrine glands (weighing about 25 g) and is the only one which is amenable to direct physical examination because of its superficial location.

Thyroid nodules are a very common clinical finding, with an estimated prevalence on the basis of palpation that ranges from 3% to 7%.[1] In a large population study (in Framingham, Massachusetts), clinically apparent thyroid nodules were present in 6.4% of women and 1.5% of men.[2] During the past 2 decades, the widespread use of ultrasonography (US) for evaluation of thyroid and neck disease has resulted in a dramatic increase in the prevalence of clinically unapparent thyroid nodules, estimated at 20% to 76% in the general population. Moreover, 20% to 48% of patients with a single palpable thyroid nodule are found to have additional nodules when investigated by US.[3,4] As a consequence, we are now facing an epidemic of thyroid nodules; the prevalence is similar to that reported in autopsy data, 50%, in patients with no history of thyroid disease.[5-7] Thyroid nodules are more common in elderly person, in women, in those with iodine deficiency, and in those with a history of radiation exposure. The clinical implications of these data are overwhelming.

The growth of nodules can lead to a multinodular goitre. The clinical importance of thyroid nodules, besides the infrequent cases of local compressive symptoms or thyroid hyperfunction, is primarily the need to exclude the presence of a thyroid malignant lesion, which accounts for about 5% of all thyroid nodules, independent of their size.[7,8]

Because of the high prevalence of nodular thyroid disease, it is neither economically feasible nor necessary to submit all or even most thyroid nodules for a complete work-up for the assessment of their structure and function.

Therefore, it is essential to develop and follow a reliable, cost-effective strategy for diagnosis and treatment of thyroid nodules. Most patients with thyroid nodules have few or no symptoms, and usually no clear relationship exists between nodule histologic features or size and the reported symptoms. Thyroid nodules can grow insidiously for many years and are often discovered incidentally on physical examination, self-palpation, or imaging studies performed for unrelated reasons.

There is considerable controversy over whether clinically unapparent thyroid lesions should be assessed by fine needle aspiration biopsy (FNA).[9,10] The conflicting attitudes are due to uncertainty about the prevalence of malignancy in small

Financial or Other, Competing Interest: None.
Submission 01-09-2016, Peer Review 07-12-2016,
Acceptance 12-12-2016, Published 22-12-2017.
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thyroid lesions and the biological behaviour of thyroid microcarcinomas,[11–16] usually diagnosed retrospectively in resected goitres. Few prospective studies[17–19] have been addressed to the systematic evaluation of thyroid nodules incidentally discovered at sonography to correlate the dimensions and the US and colour Doppler (CFD) findings with the prevalence of cancer and its pathologic staging.

Aims of the Study

1. To study the Greyscale ultrasound features in patients presenting with thyroid nodules of different pathologies.
2. To study the role of Colour Doppler & Power Doppler in the evaluation of nodular thyroid disease.
3. To study the accuracy of Grey scale, Colour Doppler & Power Doppler ultrasound features in differentiating benign from malignant thyroid nodules.
4. To study & compare ultrasound features with that of fine needle aspiration cytology findings in differentiating benign from malignant thyroid nodules.

MATERIALS AND METHODS

This was a prospective, diagnostic study conducted in the Department of Radiodiagnosis. The study period was from October 2014 till July 2016 and included patients of all age groups and both sexes.

Inclusion Criteria

Patients referred by the clinicians as cases of swelling in the neck region and found to have nodular thyroid disease on examination.

Exclusion Criteria

1. Patients who had already undergone neck surgery or received radiotherapy.
2. Patients presenting with diffuse enlargement of thyroid.

Equipments used

1. Ultrasound with colour Doppler Voluson S6 PRO.
2. Ultrasound with colour Doppler Siemens ACUSON X 300.
3. Linear array transducer of 7-9 megahertz frequencies.
4. Image soft programme for recording images.

Consent

Prior to each FNAC investigation, consent was taken from the patient.

METHODS

Technique of High Resolution Sonography

Patient Position

Thyroid ultrasound is usually performed with the patient in supine position and with a pillow placed between the shoulders to allow hyperextension of the neck and to elevate the thyroid gland away from sternal notch area. This is helpful in visualising the inferior poles of both thyroid lobes, especially in a patient with a short neck.[20]

Procedure

A 7.5 MHz transducer is universal for sonographic thyroid imaging. More superficial lesions with involvement of the strap muscles can be optimally imaged with 10 MHz or higher frequency transducers.

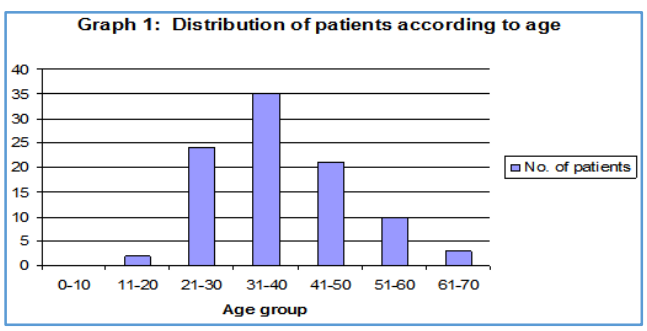
The thyroid gland must be examined thoroughly in both transverse and longitudinal planes. Imaging of the lower poles can be enhanced by asking the patient to swallow, which momentarily raises the thyroid gland in the neck. The entire gland, including the isthmus, must be examined. The examination must also be extended laterally to include the region of the carotid artery and jugular vein in order to identify enlarged jugular chain lymph nodes, superiorly to visualise submandibular lymphadenopathy, and inferiorly to define any pathologic supraclavicular lymph nodes. The thoracic inlet should be evaluated by angling the transducer inferiorly in the area of the sternal notch to look for a substernal goitre.[20]

Sonography of larger goitres may require lower frequency transducers, such as 5 MHz, which allow better penetration at the expense of resolution.[21]

RESULTS

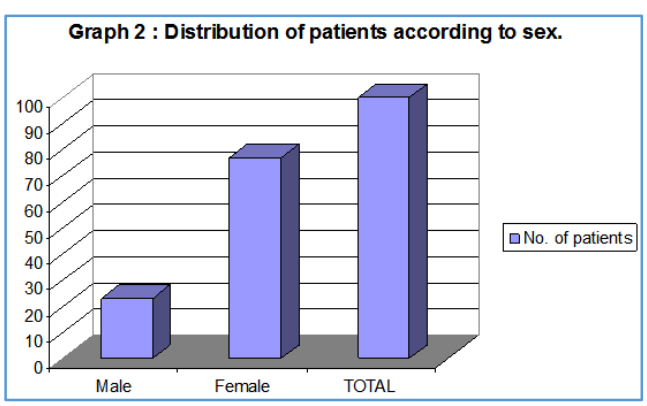
In this study, maximum number of cases fell in the age group of 31-40 years (n=35) followed by 21-30 years age group (n= 24). The youngest patient was 14 years old and oldest was 70 years old. This is depicted in graph 1.

Graph 1



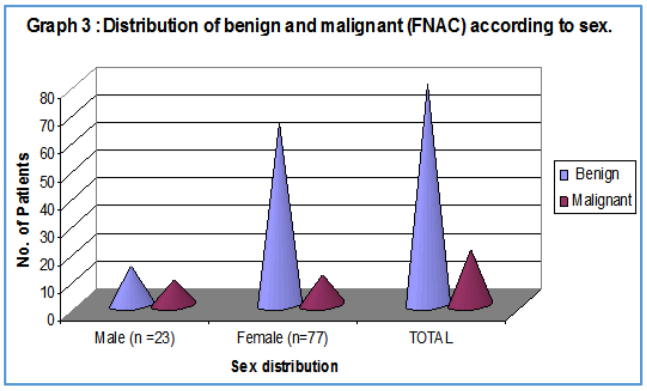
Out of the 100 cases in this study, 23 (23.0%) were male and 77 (77.0%) were female. Females (77.0%) were more commonly affected than males (23.0%). This is depicted in graph 2.

Graph 2



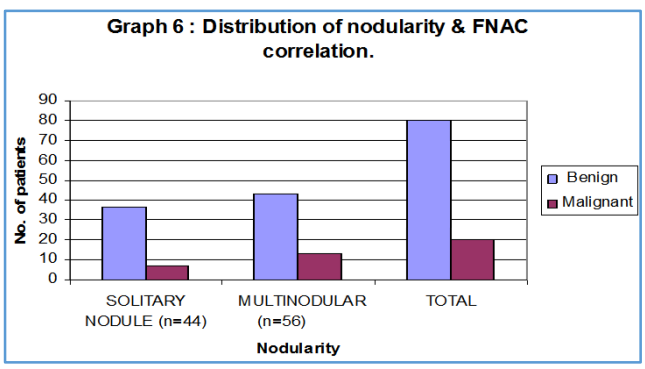
Out of 100 cases in the study, 80 were benign and 20 were malignant on FNAC. 9 (39.1%) out of 23 male patients had malignancy. 11(14.3%) out of 77 female patients had malignancy. Males had higher malignancy proportion than females. This is depicted in graph 3.

Graph 3

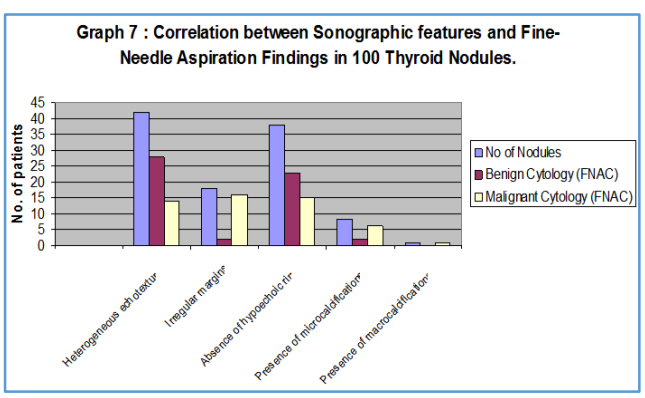


Out of the total 100 patients evaluated, 44 (44.0%) patients had solitary thyroid nodule as compared to 56 (56.0%) patients who had multinodular goitre. Of the 44 solitary thyroid nodule cases, 37 were benign and 7 were malignant. Of the 56 multinodular goitres, 43 (76.8%) were benign and 13 (23.2%) were malignant. Graph clearly shows that multinodular goitre cases are more than solitary nodule cases. The proportion of malignant cases were more in multinodular goitre i.e. 13 (23.2%) out of 56 cases as compared to 7 (15.9%) out of 44 solitary thyroid nodule cases. This is depicted in graph 4.

Graph 4

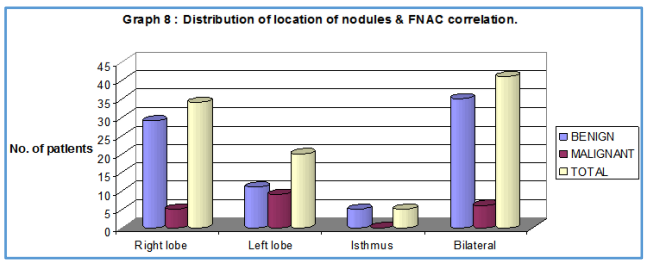


Graph 5



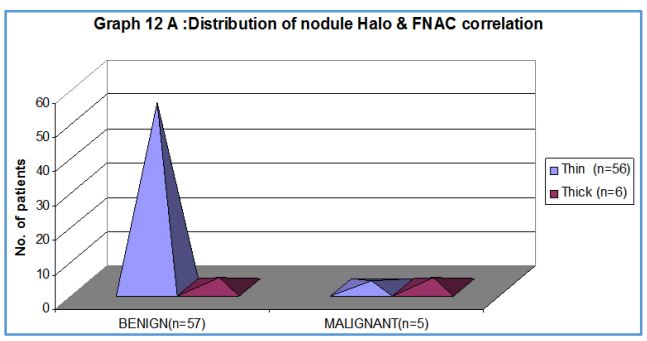
In most of the cases (41 out of 100), the nodules were bilateral in location, followed by 34 in the right lobe. However, the maximum number of malignancies were found in the left lobe i.e. 9 (45%) of the 20 cases. This is depicted in graph 6.

Graph 6



Halo was observed in a total of 62 (62%) nodules. Of the 80 benign nodules, 57 (71%) showed halo and 23 (29%) showed no halo in nodules. Of the 20 malignant nodules, 5 (25%) showed halo. When present, thin halo was observed in significant proportion of benign nodules (95%). Out of the 5 malignant nodules with halo, 3 (60%) cases showed thick halo and 2 (40%) showed thin halo. This is depicted in graph 7.

Graph 7



DISCUSSION

In this study, a clear female preponderance was observed with the male to female ratio of 1:3.35, the incidence is almost similar to the data by Solbiati et al,[17] (ratio of 1:3.5), Sabel et al[18] (ratio 1:3.2). In this study, the youngest patient had solitary thyroid nodule while the oldest one had multinodular goitre. However, no significant conclusion can be drawn concerning the correlation between the age and benign or malignant pathology. Marqusee et al[19] reported that half of the patients referred for a solitary nodule on physical examination (a group previously not thought to benefit from ultrasonography) were found to have multiple nodules. They suggested that routine ultrasonography should be seriously considered for all patients with suspected thyroid nodules. They concluded that ultrasonography altered the clinical management of patients referred to the thyroid nodule clinic after abnormal results on thyroid physical examination. The sonographic diagnosis of malignancy was made in 20 patients whereas clinically it was suspected in only 3 patients i.e., 15%, indicating clearly the non-reliability of clinical diagnosis and the need for the diagnostic studies. Tollin et al,[22] Hagag et al[23] and Frates et al found that overall malignancy rate in thyroid nodules among patients with multinodular goitre is comparable to that associated with solitary thyroid nodule cases. Messaris et al[24] reported that the right lobe was more frequently involved (57.6%) than the left. Solbiati et al[17] observed the solid hypoechoic pattern in 63% of malignant nodules.

Summary

- A total of 100 patients having palpable thyroid nodule and suspected of having thyroid nodule were studied.
- The maximum patients were in their fourth decade of life.
- Female preponderance was observed in this study with male to female ratio being 1:3.35.
- The final diagnosis was established in all the cases by FNAC.
- Total numbers of benign nodules were 80 and the malignant nodules 20.
- Malignancy was suspected clinically in only 3% of the patients where there were palpable enlarged lymph nodes. It has been proven by FNAC that the malignant cases were 20%, indicating clearly the non-reliability of clinical diagnosis and the need for the diagnostic studies.
- Right lobe of thyroid is affected more than left lobe.
- Out of the benign thyroid swellings, colloid goitre was the most common cause (69%).
- Out of the 20 malignant thyroid lesions, papillary carcinoma was the most common variety accounting for 55% of the cases.
- Halo was present in a significant number of benign nodules. Thin, complete and regular halo was characteristically noted in higher percentage of benign nodules, whereas thick and irregular halo was observed in malignant nodules.

CONCLUSION

- Ultrasound is very sensitive in detecting subtle variations in thyroid architecture. Glandular size, symmetry and the presence of nodules can be well evaluated with ultrasound.
- It is the imaging modality of choice for evaluating thyroid nodules.
- In both sexes, the average age of presentation of the malignant thyroid nodule was significantly higher.
- The features predicting benign nature are: well-defined margins, cystic nature, hyperechogenicity, shape that is wider than taller, peripheral egg shell calcifications and presence of well-defined thin peripheral halo.
- The features in support of malignancy are: poorly or ill-defined margins, marked hypoechogenicity and more longer than width in shape.

Figure 1. USG Longitudinal view reveals Colloid Cyst with Comet Tail Artifact in the Right Lobe of Thyroid Gland

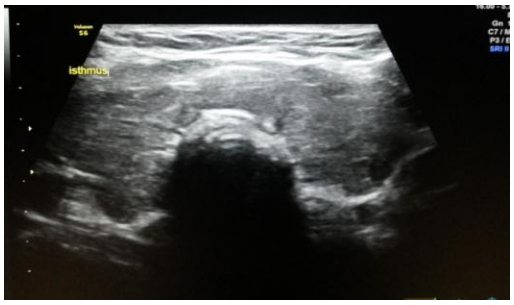


Figure 2. USG Transverse view reveals Diffuse Enlargement of the Thyroid Gland (diffuse thyroiditis)

Figure 3. USG Longitudinal view reveals a Benign Follicular Adenoma in Left Lobe of Thyroid Gland

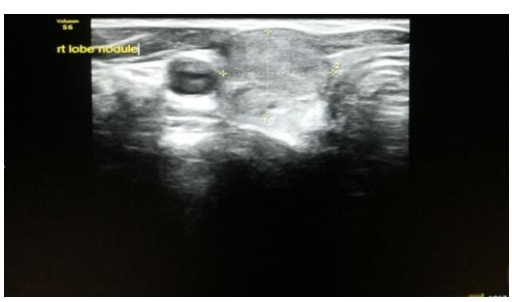


Figure 4. USG Transverse View of Right Lobe of Thyroid Gland reveals an ill-defined Hyperechoic Lesion. FNAC proved Anaplastic Carcinoma

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