Original Research

Ultrasonographic evaluation of thyroid lesions in south Gujarat area

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Received June 24, 2016. Accepted August 12, 2016

Abstract

Background: Thyroid lesions are a global problem with incidence of thyroid in adults undergoing ultrasonography at 10–67%. For thyroid lesion assessment and its management various methods are used like clinical examination, pathological fine needle aspiration cytology, biopsy examination, and radiological examinations like plain X-ray, ultrasonography, and CT Scan. Ultrasound is useful for evaluation of thyroid because it is accessible, non-invasive, no radiation hazards and relatively inexpensive. Ultrasound also helps in defining whether a lesion is benign or malignant.

Objectives: To evaluate role of ultrasound in the diagnosis of thyroid lesions and comparing it with pathological diagnosis and to differentiate benign from malignant masses on the basis of sonographic appearance.

Materials and Methods: A prospective observational study was carried out by Department of Radiodiagnosis over period of one year. Patients visiting to various departments with thyroid enlargement were included in the study after informed written consent. Information collected from each participant included detailed history, data of general and specific examination, and laboratory parameters. Radiological examinations like plain X-ray, ultrasonography and if required CT scan was done. Radiological findings were correlated with pathological findings.

Results: Out of total 50 number of participants 72% were female. 72% of patients had single nodular lesion, while 18% patients had multiple nodular lesions and 10% had diffuse lesion. 34% of participants showed calcification on ultrasonography. 30% patients had hypoechoic and 18% had hyperechoic lesions, while 12% had anechoic lesions. Halo sign was seen in 28% of patients, while comate trail artifact seen in 12% of patients. Sensitivity of radiological diagnosis in this study was 83%, specificity was 73%.

Conclusion: Ultrasonography helps in initial evaluation and diagnosis of thyroid lesions. Fine needle aspiration cytology remains the gold standard for diagnosing whether a lesion is benign or malignant. It also helps in differentiation of benign lesions from malignant one.

KEY WORDS: Thyroid lesions, Ultrasonography

Introduction

Thyroid lesions are a global problem, affecting the people of 130 of 191 member countries of the World Health Organization. The incidence of thyroid in adults undergoing ultrasonography is at 10–67%. However, most thyroid nodules are benign, and only a small percentage (9.2–14.8%) of nodules are malignant[1-2].

Access this article online	
Website: http://www.ijmsph.com	Quick Response Code:
DOI: 10.5455/ijmsph.2017.24062016599	

Inspection and palpation are 2 traditional methods that have been widely used to determine the thyroid volume. Palpation method has been used in field survey of endemic goiter. Other pathological examinations such as fine needle aspiration cytology and histopathological examination gives the volume. However, the clinical assessment of thyroid size has been shown to be imprecise and has relatively high inter observer variation, especially when the goiter is small. Ultrasonography is far more sensitive than palpation, as it detects nodules of any size in up to 67% of the general population[3]. Thyroid ultrasonography is a reliable procedure

for the assessment of thyroid size. Ultrasonographic examination of the thyroid provides precise information on thyroid volume and structure, and it is now considered the most reliable method of determining thyroid volume[4-5]. However, to use ultrasonographic method for determination of thyroid volume, reliable reference data should exist. Unfortunately, an appropriate standard data is still lacking. With the advent of high resolution (high frequency) transducers, ultrasonography has become the procedure of choice for initial evaluation of thyroid. Ultrasound is useful for evaluation of thyroid because it is accessible, non-invasive, no radiation hazards and relatively inexpensive. Ultrasound also help in defining whether a lesion is benign or malignant.[6]

Other modalities of radiological evaluation of thyroid lesions are Colour Doppler studies, CT scan, Magnetic Resonance Imaging (MRI), and Radioisotope scanning,

The objective of the study was to evaluate role of ultrasound in the diagnosis of thyroid lesions and comparing it with pathological diagnosis and to differentiate benign from malignant masses on the basis of sonographic appearance.

Materials and Methods

It was a prospective observational study carried out at the Department of Radiodiagnosis and Imaging, Government Medical College and hospital, Surat. Institutional ethics committee permission was taken before starting the study.

All the patients with thyroid enlargement visiting surgery and other departments were included in the study. There were no any specified exclusion criteria. During study duration of 1 year total 50 number of patients with thyroid enlargement were recruited in the study. Informed written consent from all patients was taken before recruitment in the study.

Detailed history of participants like demographic data, history of present thyroid swelling, weight loss, diplopia, mood, past history like radiation or partial/total thyroidectomy, and drug history was taken. Patients' general examination and local examination of swelling was done. Routine investigations and Thyroid Function Test like Serum T3, T4 and TSH as well as Fine Needle Aspiration Cytology examination was done in each patient. Ultrasonography of thyroid was done in each patient to examine for – Echotexture of thyroid gland, Measurement of right lobe, left lobe and isthmus, Great vessels and Lymphadenopathy. If lesion present, it was examined for – Size, Shape, Number i.e. single/multiple, Margin well defined or ill defined, Solid/cystic, Echogenicity, Halo sign, Calcification and Comet-tail artefact. Ultrasound examination of abdomen was also done to check for the malignant spread in the suspects. Radiological findings were correlated with pathological findings.

Results:

A total 50 patients with thyroid lesions were recruited during the study duration of 1 year. Figure 1 shows age incidence of the patients. It shows majority of patients were between 20 and 49 years of age. The youngest patient was 18 years of age and oldest was 73 years. Gender wise distribution shows 72% were female and 28% were male with M:F ratio was 1:2.5.

The presenting complaint of all patients was swelling in front of the neck. According to 94% patients it was gradual in onset. And 6% patients had complaint of sudden in onset. Signs of thyrotoxicosis seen in only 6% of patients.

Table 1 shows the findings of thyroid swelling by radiological examinations like X-ray and ultrasonographic examination. It shows that 14% patients show calcification by X-ray. While by ultrasonography, calcification was seen in 34% of thyroid swelling. Figure 2 shows the follicular carcinoma with metastasis and shows calcification on ultrasound examination. Another sign seen on X-ray was tracheal shift, which was positive in 22% of the patients. Ultrasonographic findings studied were nodularity and echogenicity of the lesions, halo sign and comate trail artifact, margin and content of lesion, and calcification within the lesion. 72% of patients had single nodular lesion, while 18% patients had multiple nodular lesions and 10% had diffuse lesion. In sonography, 30% patients had hypoechoic and 18% had hyperechoic lesions, while 12% had anechoic lesions. Halo sign was seen in 28% of patients, while comate trail artifact seen in 12% of patients. Figure 3 shows comate trail artifact in cystic colloid goitre patient. 70% lesions had well defined margin. 54% of lesions were solid and 26% were cystic in consistency. Radiographically 88% of tumor seems to be benign in nature, while 12% looked like malignant.

Figures 4, 5 and 6 show the clinical, pathological, and radiological diagnosis of thyroid lesions, respectively. Clinical diagnosis shows 56% were have solitary thyroid nodule, 32% had diffuse thyroid nodule, 6% had multinodular goitre, and 6% had cystic lesion. Radiological finding shows that 26% lesions are goitre and 10% are diffuse enlargement of gland. And 30% lesions are benign and 8% are malignant. While pathological diagnosis shows 72% lesions are goiter, 10% are benign follicular adenoma, and 12% are malignant lesions. So, out of 50 lesions diagnosed 5 were diagnosed true positive, and 32 were diagnosed as true negative, while 12 were diagnosed as false positive and 1 was diagnosed as false negative. So, sensitivity of radiological diagnosis in this study was 83%, specificity was 73% positive predictive value (PPV) was 30%, negative predictive value (NPV) was 96.9%, and accuracy for diagnosis was 74%.

Discussion

In the present study, 50 patients who presented with thyroid swelling were studied over a period of 2 years at New Civil Hospital, Surat. All the patients included in the present study were clinically examined by physicians/surgeons and were subsequently referred to our Radiology Department for imaging studies.

Common age of presentation in present study is 30–39 years of age with mean age was 35 years. Other studies by

Table 1: Radiological findings

Calcification on X-ray		
Present	7	14%
Absent	43	86%
Total	50	100%
Tracheal shift on X-ray		
Present	11	22%
Absent	39	78%
Total	50	100%
Ultrasonographic findings		
Nodularity		
Single nodule	36	72%
Multiple nodule	9	18%
Diffuse	5	10%
Total	50	100%
Echogenicity		
Hyperechoic	9	18%
Hypoechoic	15	30%
Anechoic	12	24%
Isoechoic	9	18%
Mixed echogenic	5	10%
Total	50	100%
Halo sign		
Present	14	28%
Absent	36	72%
Total	50	100%
Calcification by Ultrasonography		
Present	17	34%
Absent	33	66%
Total	50	100%
Comet tail artifact		
Present	6	12%
Absent	44	88%
Total	60	100%
Margin of lesion		
Well-defined	35	70%
Ill-defined	15	30%
Total	50	100%
Component		
Solid	27	54%
Cystic	13	26%
Solid+cystic	10	20%
Total	50	100%
Benign/malignant		
Benign	44	88%
Malignant	6	12%
Total	50	100%

Nam-Goong S et al[7] and Eisuke Koike et al [8] had mean age of presentation was 51 and 52 years, respectively. Female were affected predominantly with M:F ratio of nearly 1:3. It is similar with other studies like by Nam-Goong S et al,[7] which

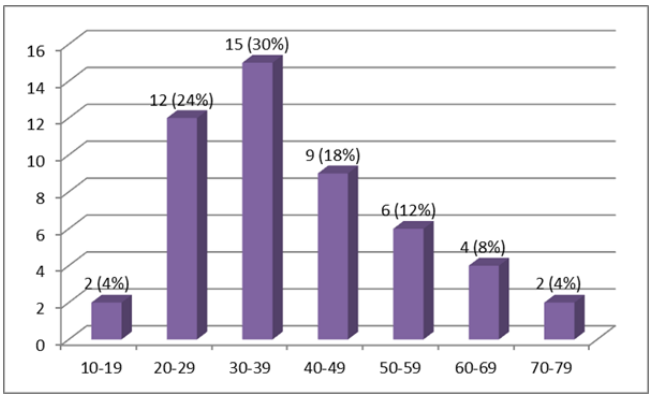

Figure 1: Age wise distribution of patients with thyroid swelling

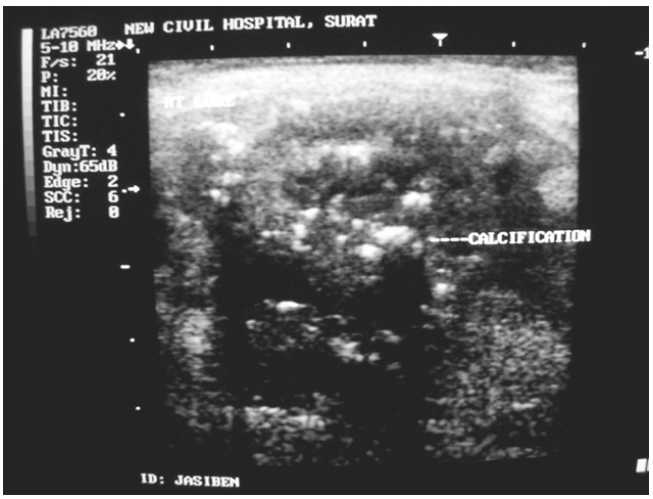

Figure 2: Follicular carcinoma with metastasis shows calcification

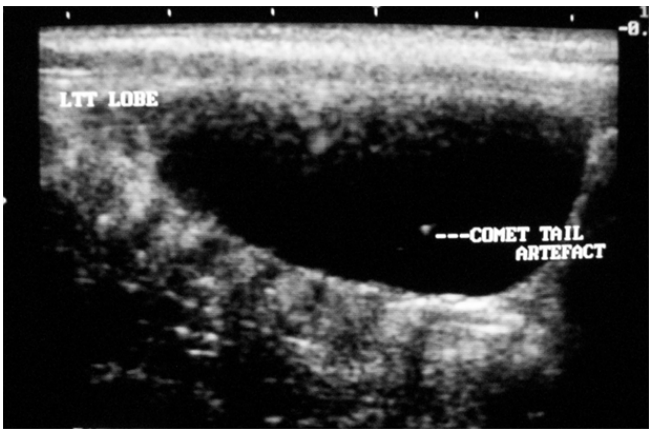

Figure 3: Ultrasonography of goiter with cystic changes shows comate trail artifact

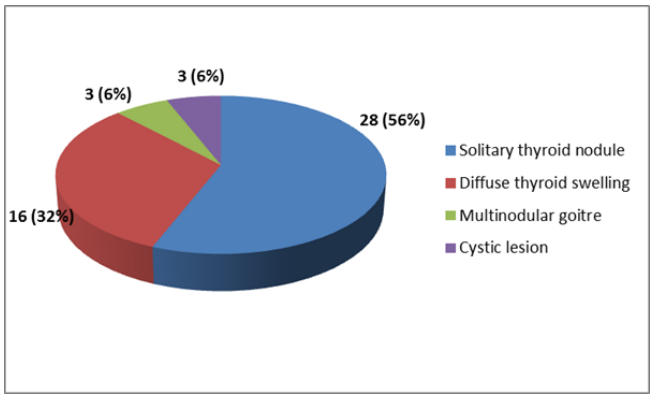

Figure 4: Patients distribution according to clinical diagnosis

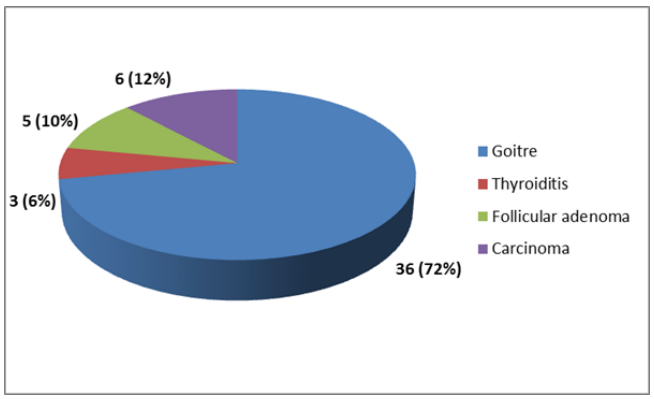

Figure 5: Pathological diagnosis of thyroid lesions.

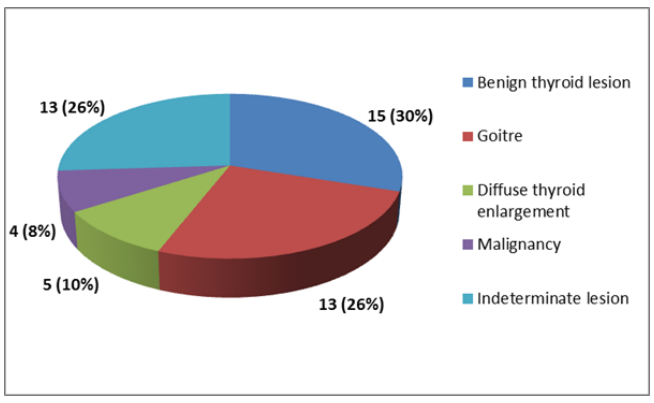

Figure 6: Radiological diagnosis of thyroid lesions

had similar ratio. While study by J Walkor et al[9] shows female affection up to 89%.

All the patients presented with complaint of swelling in front of the neck. 94% were gradual onset and 6% patients with signs of thyrotoxicosis. Among them 28 (56%) patients presented with solitary thyroid nodule by clinical examination. However, out of which 4 patients found to have multiple nodules on ultrasound. While study by William Scheible and George Leopold[10] found 73 (74%) out of 98 patients had solitary nodule on clinical examination. However, among them 37 (38%) were originally multinodular by ultrasonography. Similarly, study by Marqusee E et al shows faulty diagnosis of multinodular lesion with solitary nodule in 22% of cases. Thus, USG is helpful in finding other nodules in cases of clinically suspected solitary thyroid nodule, though the detection rate was lower in our study as compared to others. The commonest pathological diagnosis in the present study was goiter (72%) and the next being malignancy (12%). This correlates with the study of Kamaljit Kaur et al[11] which also had 68% cases of goiter and 18% cases of malignancy.

Ultrasonographic examination of thyroid gland gives much insight into the lesion type. The echogenicity of the thyroid lesions are compared to the normal surrounding parenchyma of the gland and said to be hypo, hyper or isoechoic to the gland. According to that most of the benign lesions are hyper or anechoic while malignant lesions are hypoechoic or have mixed echogenicity. The L Solbiati et al[12] study also shows the similar findings. In present study and a study by K Kaur et al[11], it was found that none of the cystic nodules harbored malignancy. It can be said that cystic lesion is in favor of benign pathology and most of the malignancies have solid nodules. Similarly, Thyroid lesions with well-defined margins suggest benign pathology. Halo sign is a peripheral sonolucent rim surrounding a nodule which was seen in 28% of benign lesions in this study and not seen in malignant studies. While in study by RA Propper et al[13] it was seen in 7% of malignant lesions and 28% of benign lesions. In present study, thyroid calcification was present in 17 (34%) patients, out of which 5 patients had malignancy and 6 patients had multinodular goitre. Also, according to result it was found that, in a multinodular thyroid disease, presence of calcification favours benign lesion but if a solitary nodule shows the presence of calcification, there is high chances of malignancy. Similar type of findings was seen with the studies by Khoo ML et al[14] and Kakkos SK et al[15]. In present study, 12% patients displayed comet tail artefact and all of them proved to be benign histologically. In a study by A Ahuja et al[16], 100 patients with comet-tail artefact proved to be benign by FNAC. Comet tail artefact strongly suggests benign lesion. Sensitivity of ultrasound for malignancy in present study is 83% which correlates well with the study by Eisuke Koike et al[8] (81.8%). And in study by Kamaljit Kaur et al[11] it is 71%. This proves that ultrasound has a significant role in the diagnosis of malignancy.

Conclusion

In conclusion, ultrasonography helps in initial evaluation and diagnosis of thyroid lesions. Fine needle aspiration cytology remains the gold standard for diagnosing whether a lesion is benign or malignant. It also helps in differentiation of benign lesions from malignant one.

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How to cite this article: Desai E, Patidar N, Sastri M, Bhatt A, Patel D, Chitara M, Diwanji N. Ultrasonographic evaluation of thyroid lesions in south Gujarat area. Int J Med Sci Public Health 2017;6:281-285

Source of Support: Nil, **Conflict of Interest:** None declared.