Research Paper

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Clinical, Sonological And Pathological Evaluation of Thyroid Nodule

General Surgery

KEYWORDS : Fine needle aspiration cytology(FNAC), Ultrasonography(USG).

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ABSTRACT

Background and objectives: Nodular thyroid is a common clinical entity. The optimum diagnostic strategy for the patient with nodular thyroid is still a matter of debate. The goal of diagnostic workup now is to select those patients for surgery who have a high likelihood of harboring malignancy in the thyroid nodules. The present study was undertaken to evaluate the efficacy of FNAC and USG in differentiating benign and malignant nodules.

Methods: A prospective study was carried out on 100 patients from 11-70 years age group of both sexes, presenting with thyroid nodules to Dept. of General Surgery during the period of September 2011 – September 2013. All patients were evaluated clinically and subjected to FNAC and USG of thyroid. The results of clinical diagnosis, FNAC and USG compared with histopathology reports.

Results: The majority of the cases presented were females between the age group of 31- 40 years. Swelling in the anterior neck was the presenting complaint in all 100 cases. The sensitivity and specificity of FNAC in diagnosing benign and malignant lesion was 81.3%,100% and 74%,100% and USG 80.4%, 77.77% and 73%, 85.3% respectively. Interpretation and Conclusion: The commonest presentation was from the females in the age group of 31-40 years, with swelling in the anterior neck. Solitary thyroid nodule cases had 18% rate of malignancy. It was found that FNAC is a safe, reliable and cost effective diagnostic modality with a high sensitivity of 80% and specificity of 100% and is the single best investigation for preoperative evaluation of thyroid nodules.However, a combination of FNAC and USG give optimum results and avoid unnecessary surgery.

OBJECTIVES

To correlate Clinical diagnosis with investigative parameters, ie Ultrasonography and fine needle aspiration cytology and histopathology in the evaluation of thyroid nodule.

MATERIALS & METHODS

A prospective study was carried out on 100 patients of nodular thyroid swelling between 11-70 yr age group, attending department of general surgery at Alluri Sita RamaRaju Acadamy of Medical Sciences, Eluru West Godavari District during the period of September 2011 to Spetember 2013. Patients with thyroid swellings which are not nodular and unfit patients for surgery are excluded.

All patients were examined clinically after taking a detailed history. Then, they were investigated with FNAC and USG of the thyroid. High resolution 7.3 MHz probe is used. The results of FNAC were interpreted as benign, malignant, suspicious and inadequate aspirate. Sonographically, the nodules were evaluated for size, location, echotexture, margins, presence of halo, calcification, vascularity, accessory nodules, associated cervical lymphadenopathy and consistency (solid, cystic or mixed) in order to differentiate between benign and malignant nodules. Then, all the patients were subjected to surgery and histopathological examination (HPE) of the specimen obtained. Finally, the histopathology reports were correlated with the findings of FNAC and USG in order to evaluate their sensitivity and specificity by statistical methods.

OBSERVATION AND RESULTS

Table 1. Age and sex distribution of patients.

a) The age of the patients ranges from 11-70 years. The commonest age group with

thyroid pathology is between 31-40 years and mean age group is 35.4 years

b) Majority of the patients were females i.e 69 (69 %) and male to female ratio is 1:2.2.

I. PRESENTING COMPLAINTS

Table 2. Presenting complaints

All the patients presented with swelling in the anterior neck region of the thyroid. In addition to swelling in the neck, fourteen patients presented with pain in the swelling, three with difficulty in breathing and eight with difficulty in swallowing. Twelve of the patients who presented with thyroid swelling had cervical lymphadenopathy on clinical examination. No patient had any change in voice or history suggestive of hypo/hyperthyroidism features.

II. DURATION OF COMPLAINTS

Table 3. Duration Of Complaints

The duration of complaints ranged from 1 week to 8 years. Majority of the patients presented between 6 months to 3 years.

III. Family history and past history

None of the patients had any significant history.

IV. CLINICAL DIAGNOSIS

The clinical diagnosis is solitary nodule of the thyroid

V. FINE NEEDLE ASPIRATION CYTOLOGY

Table 4.Distribution of lesions on FNAC

The benign category occupies the major group with 61 (61%) cases, followed by suspicious, 29 (29%) cases and malignant 10 (10%) cases. There is no inadequate or insufficient cytological smear.

HISTOPATHOLOGICAL DIAGNOSIS.

Table 5. Results of histopathological diagnosis

The most common lesion is benign follicular adenoma 33 (33%) and the least

common is benign cystic lesion.

VI. ULTRASONOGRAPHY

Taking into consideration of the various ultrasonographical features, cases were classified in to benign, suspicious and malignant. Table 6. Distribution of lesions on USG.

The benign category occupies the major group with 70 (70%) cases, followed by malignant 25 (25%) cases and suspicious,5 (5%) cases.

IX. COMPARISON OF CLINICAL DIAGNOSIS WITH HISTOPATHOLOGY

Table 7. Comparison of clinical diagnosis with histopathology

Out of 100 patients diagnosed to have solitary nodule of thyroid, histopathology revealed 82% benign and 18% malignant.

X. CORRELATION OF FNAC LESIONS WITH HISTOPATHOLOGY

Table 8. Correlation of FNAC lesions with Histopathology

In 61 cytologically diagnosed benign cases, all proved to be benign,only malignant lesion found was papillary carcinoma in 10 (10%) cases. All the 29 cases of follicular neoplasia were subjected to surgery and correlated with histopathology. Twenty cases were found to be benign and nine cases to be malignant.

XI. CORRELATION OF USG WITH HISTOPATHOLOGICAL DIAGNOSIS

Table 9. Correlation of USG with Histopathological diagnosis

The USG diagnosis of benign lesion was confirmed in 66 (93.05%) out of 70 cases and was disputed in 4 (6.09%) cases by histopathology which turned out to be malignant. In 5 USG suspects, histopathology revealed benign in 3 cases and malignant lesion in 2 cases. Among 25 USG diagnoses of malignant lesions, 13 were confirmed by histopathology, and 12 were disputed to be benign.

XII. COMPARISION OF USG WITH FNAC

Table10.Comparision of USG with FNAC

The USG diagnosis of benign lesion was confirmed in 52 (74.25%) out of 70 cases and was suspicious in 18 cases by FNAC. Out of 5 suspect cases 2 turned out to be malignant.Out of 25 malignant cases 9 were proved by FNAC and 10 turned out to be suspicious.

Among total 100 cases of Solitary thyroid nodule, USG revealed multiple nodules in 17 cases. Thus USG is more sensitive diagnostic modality to detect nodularity.

Table 11- Assessment of nodularity by various methods

TABLE- 12 TYPES OF SURGERIES PERFORMED:

The commonest performed surgery was Hemithyroidectomy, which accounts for 63 (63%) cases. Functional neck dissection was done in 13 cases of papillary carcinoma of thyroid wher lymph nodes were palpable.

COMPARISION OF USG WITH FNAC

a) BENIGN**: TABLE 13**

SENSITIVITY- 85.2%

SPECIFICITY- 60%

POSITIVE PREDICTIVE VALUE-74.28% NEGATIVE PREDICTIVE VALUE-70%

b) MALIGNANT**: TABLE 14**

SENSITIVITY- 90%

SPECIFICITY- 82% POSITIVE PREDICTIVE VALUE-36%

NEGATIVE PREDICTIVE VALUE-98.6%

COMPARISION OF USG WITH HISTOPATHOLOGY

a) BENIGN**: TABLE 15**

SENSITIVITY- 80.4%

SPECIFICITY- 77.7% POSITIVE PREDICTIVE VALUE-94.28% NEGATIVE PREDICTIVE VALUE-46%

b) TABLE 16

SENSITIVITY- 73%

SPECIFICITY- 85.3% POSITIVE PREDICTIVE VALUE-52%

NEGATIVE PREDICTIVE VALUE-93.3%

COMPARISION OF FNAC WITH HISTOPATHOLOGY

a) TABLE 17

SENSITIVITY- 81.3%

SPECIFICITY- 100% POSITIVE PREDICTIVE VALUE-100% NEGATIVE PREDICTIVE VALUE-46%

b)MALIGNANT**: TABLE 18**

SENSITIVITY- 74%

SPECIFICITY- 100% POSITIVE PREDICTIVE VALUE-100% NEGATIVE PREDICTIVE VALUE-91%

DISCUSSION

In the present study age of the patient ranged from 11-70 years with a median age of 35 years. Age distribution of the present study is comparable to Jose RJ et al.

Table.19: Age range and median age of different studies.

The number of males in the present study was 31(31%) and the females were 69 (69%) with a male to female ratio of 1:2.2. Sex distribution was similar when compared to Afroze et al

Table.:20 Sex distribution and male to female ratio in different studies.

The commonest clinical presentation is the presence of swelling in front of the neck and majority presented between 6 months to 3 years.

Table: 21.Comparison of FNAC results

The overall sensitivity in our series was 81.3%, 74%, while the specificity was

100%, 100% for both benign and malignant lesions. FNAC has certain limitations because of suspicious diagnosis.

In present series, 29(29%) cases were found to be suspicious, out of which 9 were found to be malignant on final histopathology examination. Thus, an overall malignant rate of about 31.03% for the suspicious group was found. Because of this high incidence of malignancy in suspicious lesions, surgical removal of these nodules should be strongly considered in these cases. The overall incidence of malignancy in solitary thyroid nodules varies

from 10%-30% according to various studies. In our study, the overall incidence of malignancy in solitary nodule was 18%.

The thyroid nodules on USG were subdivided in to 3 groups-benign, suspicious and malignant on the basis of various sonographic features. Features suggestive of malignancy on USG are-hypoechoic pattern, incomplete peripheral halo, irregular margins, internal micro calcification, increased vascularity, presence of cervical lymphadenopathy and peripheral degeneration in mixed nodules. Features suggestive of benign diseases on USG are- halo sign (transonic uniform rim surrounding the mass), variable echogenecity, multinodularity, large cystic lesion, diffusely nodular in homogenous gland and peripheral calcification.

In our study, out of 25 cases diagnosed to be malignant on USG, 13 cases were confirmed on histopathology and remaining 12 cases were differed to be benign. In 5 cases in whom USG gave false negative diagnosis of benign disease, histopathology revealed papillary carcinoma.

The overall sensitivity in our series was 80.4%, 73%, while the specificity was 77.7%, 85.3% for both benign and malignant lesions on USG.

Table: 22.Comparison of USG results

Watter et al. interpreted an USG report as suggestive of malignancy if the nodule was solid or of a mixed solid-cystic variety and a hypoechoic and nonhaloed lesion. They emphasized that the USG has added advantage of allowing the whole gland to be examined rather than the dominant nodule but was limited by the fact that no features were pathognomic for malignancy, so that it should be regarded as complementary rather than an alternative investigation to FNAC in the management of solitary thyroid nodule. It has been a consistent observation according to published literature, that the risk of thyroid cancer is less with multiple nodules than with the solitary nodules. High resolution real-time USG is far better than clinical examination in detecting thyroid nodularity. Walker et al. have shown that the prevalence of multinodularity in clinically solitary thyroid nodules is between 20% and 40%, and it has been observed that for a thyroid nodule to be detected by palpation, it must be atleast 1 cm in diameter, while USG detects nodules as small as 3mm in diameter.

CONCLUSION

The present study was undertaken to evaluate the usefulness of clinical examination, FNAC and USG of thyroid in the management of thyroid nodule and compare the efficacy of each of the investigation.

1. Thyroid nodules are common in females of age group 31 to 40 years.

2. Commonest presenting complaint is swelling in the anterior neck

3. In our study, the sensitivity and specificity of FNAC was 74% and 100% respectively. All malignant lesions on FNAC, were confirmed by histopathology indicating its excellence. Therefore FNAC helps in planning the correct management and avoids second surgery.

4. In our study, the sensitivity and specificity of USG was 73%and 85.3% respectively.Therefore use of ultrasound along with FNAC will improve the diagnostic accuracy to higher level and help in better management

5. All solitary thyroid nodules needs surgery and minimal surgery is Hemi-thyroidectomy. This was undertaken in all cases, which help in establishing the histopathological diagnosis and in comparing the efficacy of above investigations.

6. The ideal test should have a sensitivity and specificity of 100%. The closest method to ideal test is, thus, FNAC which has high sensitivity and specificity. However, a combination of both FNAC and Ultrasound will give optimal results and avoid mismanagement.

SUMMARY

Total 100 cases of nodular thyroid were evaluated in Alluri Sita Rama Raju Academy of Medical Sciences, Eluru, West.Godavari .District. from September 2011 to September 2013, with respect to age, sex and duration of symptoms, and investigated with routine hemogram, thyroid profile, fine needle aspiration cytology and USG thyroid. The results of FNAC and USG were compared with histology.

- Nodular goiter is more common in females (M: F ratio 1:2.2)
- Majority of the patients are in the age group of 31-40 years.
- Swelling in the anterior neck was the commonest mode of presentation.
- In majority of the patients, duration of swelling prior to presentation was between 6 months and 3 years.
- The incidence of malignancy in solitary nodule of thyroid was 18%
- On FNAC majority of the lesions were benign, with nodular goiter being the largest group
- All the lesions diagnosed malignant on FNAC, were proved by histopathology.
- Among suspicious lesions on FNAC, 31.03% proved to be malignant, indicating the need for surgery.
- FNAC is the diagnostic modality of choice for the initial workup of thyroid nodule with sensitivity of 74.3% and specificity of 100%.
- USG with a sensitivity of 73% and specificity of 85.3%, helps in diagnosing doubtful cases.
- USG proved to be a more sensitive modality to evaluate the nodularity of the thyroid than clinical evaluation.
- Extent of the surgery depends on the nature of the lesion and the risk group classification -Hemithyroidectomy is the most commonly performed surgery for the thyroid.
- Except transient post operative hypocalcaemia, there were no complications of the surgery when meticulously done.

TABLE -1

Age (yr)	Male (n=30)	Female (n=70)	Total (n=100)
11-20	1	9	10
21-30	6	24	30
31-40	9	27	36
41-50	9	5	14
51-60	4	4	8
61-70	1	1	2

TABLE -2

Sl. No.	Presenting complaint	No. of patients
1	Swelling in front of neck	100
2	Pain in the swelling	14
3	Difficulty in breathing	03
4	Difficulty in swallowing	08
5	Change of voice	
6	Hypo / hyperthyroidism features	

TABLE 3

Sl. No.	Duration of complaints	No. of
1	Less than 6 months	13
2	6 months – 3 years	77
3	> 3 years	10

TABLE 4

Sl.No.	Classification	FNAC lesions	
		Category	No
1	Benign (n=61)	Nodular goiter	15
		Colloid nodule	26
		Benign cystic lesion	17
		Hyperplastic thyroid nodule	03
2	Suspicious (n=29)	Follicular neoplasia	29
3	Malignant (n=10)	Papillary carcinoma	10
4	Inadequate (nil)	Nil	Nil

TABLE 5

Sl. No.	Histopathological diagnosis	n=100
1	Colloid nodule	26
2	Nodular goiter	07
3	Benign cystic lesion	02
4	Hyperplastic thyroid nodule	02
5	Benign follicular adenoma	33
6	MNG	12
7	Papillary carcinoma	18

TABLE 6

Category	Lesion	No. of cases
Benign (n=70)	Cystic	12
	Hyperechoic nodule	42
	MNG	16
Suspicious	Suspicious MNG	03
	Suspicious mixed echogenic	02
Malignant (n=25)	Mixed	25

TABLE 7

Clinical	Histopathological	No. of
Solitary nodule of thyroid	Hyperplastic thyroid nodule	2
	Colloid nodule	26
	Nodular goiter	7
	Benign cystic lesion	2
	Benign follicular adenoma	33
	Multinodular goiter	12
	Papillary carcinoma	18

TABLE 8

Category	FNAC lesions	Histopathological Diagnosis	
Benign (n=61)	Nodular goite (n=15)	Nodular goiter	O4
		Benign follicular Adenoma	03
		MNG	08
		Papillary Carcinoma	00
	Benign cystic lesion (n=17)	Colloid nodule	04
		Nodular goiter	03
		Benign cystic Lesion	01
		Benign follicular Adenoma	05
		MNG	04
	Colloid nodule (n=26)	Colloid nodule	19
		Benign follicular Adenoma	07
		MNG	00
	Hyperplastic thyroid nodule (n=03)	Benign follicular Adenoma	03
Malignant (n=10)	Papillary carcinoma (n=10)	Papillary Carcinoma	10
Suspicious (n=29)	Follicular neoplasia (n=29)	Benign follicular Adenoma	15
		Colloid nodule	03
		Hyperplastic thyroid nodule	02
		Papillary Carcinoma	09

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TABLE 9

Category	USG Lesions	Histopathological Diagnosis	
		category	no
Benign (n=70)	Cystic (n=12)	Colloid nodule	09
	Hyperechoic nodule (n=42)	Benign follicular adenoma	25
		Colloid nodule	14
		MNG	02
	MNG (n=16)	Papillary carcinoma	03
		MNG	05
		Hyperplatic thyroid nodule	02
		Benign cystic lesion	02
		Benign follicular adenoma	04
Suspicious (n=5)	Suspicious MNG (n=3)	Nodular goiter	02
		MNG	01
	Suspicious mixed echogenic (n=2)	Papillary carcinoma	02
Malignant (n=25)	Mixed echogenic nodule (n=25)	Nodular goiter	03
		Papillary carcinoma	13
		MNG	04
		Colloid nodule	02
		Benign follicular adenoma	03

TABLE 10

Category	USG Lesions	FNAC	
		Category	no
Benign (n=70)	Cystic (n=12)	Colloid nodule	06
		Benign cystic lesion	06
	Hyperechoic nodule (n=42)	Benign cystic lesion	07
		Colloid nodule	20
		Nodular goiter	03
		Hyperplastic thyroid nodule	02
		Follicular neoplasia	10
	MNG(n=16)	Nodular goiter	04
		Benign cystic lesion	04
		Follicular neoplasm	08
Suspicious (n=5)	Suspicious MNG (n=3)	Nodular goiter	03
	Suspicious mixed echogenic (n=2)	Papillary carcinoma	02
Malignant (n=25)	Mixed echogenic nodule (n=25)	Nodular goiter	06
		Papillary carcinoma	09
		Follicular neoplasm	10

TABLE 11

Modality	Nodularity	
	Solitary	Multiple
Clinical examination	100	-
USG	83	17

TABLE 12

Sl. No.	Type of surgery	n=100
1	Hemithyroidectomy	63
2	Subtotal thyroidectomy	08
3	Total thyroidectomy	16
4	Functional neck dissection	13

TABLE 13

	FNAC			
		+	-	total
USG	+	52	18	70
	_	09	21	30
Total		61	39	100

TABLE 14

	FNAC			
		+	-	total
USG	+	09	16	25
	-	01	74	75
Total		10	90	100

TABLE 15

	HISTOPATHOLOGY			
		+	-	total
USG	+	66	04	70
	-	16	14	30
Total		82	18	100

TABLE 16

	HISTOPATHOLOGY			
		+	-	total
USG	+	13	12	25
	-	O5	70	75
Total		18	82	100

TABLE 17

	HISTOPATHOLOGY			
		+	-	total
FNAC	+	61	0	61
	-	21	18	39
Total		82	18	100

TABLE 18

	HISTOPATHOLOGY		
	+	-	total
+	10	0	10
FNAC -	O8	82	90
Total	18	82	100

TABLE 19

Authors	Range of age	Median age
Tabaqchali et al(2000)	8.5-85	48
Sekhri et al(2001)	9-70	33.9+11
Jose R J et al(2002)	17-65	35.5
Afroze N et al(2002)	16-78	40.2
Mitra R B et al(2002)	16-70	39.6
Present study	11-70	35

TABLE 20

Series	Total cases	Male	Female	M:F ratio
Sekhri T et al(2001)	300	44	256	1:6
Tabaqchali et al(2000)	239	26	213	1:8.2
Popivanov et al(2000)	175	10	165	1:16.5
Jose RM et al	98	16	82	1:5.1
Afroze et al(2002)	170	48	122	1:2.54
Present study	100	31	69	1:2.2

TABLE 21

Study	Sensitivity (%)	Specificity (%)
Altavilla et al	71.43	100
Goellner et al	98	99
Cai et al	83.5	98
Morgan et al	55.0	73.7
Kim et al	85.7	100
Carol et al	86	81

TABLE 22

Series	Sensitivity	Specificity
Watters et al.	74%	83%
Jones et al.	75%	61%
Ajith et al	20%	97.6%

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