Research Paper

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A Clinicopathological Study of Solitary Nodule of Thyroid

Medical Science

KEYWORDS : Solitary nodule, Fine needle aspiration cytology, Papillary Carcinoma

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ABSTRACT

Introduction:

Nodular goiter is a common endocrine problem in the world today. The primary aim of investigating a thyroid nodule is to look for the possibility of malignant transformation. The objective of the study was to understand the usefulness of FNAC as a diagnostic tool in the evaluation of Solitary nodule of thyroid.

Materials and methods:

Prospective analysis of 50 cases of solitary nodule of thyroid was done. FNAC of the nodule was compared with histopathological examination.

Results:

All cases that were benign on FNAC showed benign features on histopathology also, except in one case, which was a papillary carcinoma. FNAC was significantly associated with histopathology.

Conclusion:

FNAC is an invaluable tool for pre-operative assessment of thyroid lesions, but malignancy can still come as a surprise on postoperative histopathologiocal examination.

Introduction:

A thyroid nodule is a discrete lesion within the thyroid gland that is palpably and/or ultrasonographically distinct from the surrounding thyroid parenchyma. [1] Nodular goiter is the most common lesion of the thyroid gland.[2] SNT is relatively a common problem more so in the endemically iodine deficient areas like sub-Himalayan goiter belt. SNT is more common in women more so in the middle aged women. This is due to extreme degree of fluctuations in thyroid function associated with varying hormone requirements like in pregnancy. A solitary nodule has a higher risk of malignancy than a multinodular goitre. [3] The main aim of evaluating a thyroid nodule is to detect any malignant transformation.

Materials and Methods:

The present study was conducted for a period of 2 years at our center. Prospective analysis of sequentially selected 50 cases of Solitary nodule of Thyroid was carried out. The subjects who were diagnosed with solitary nodule based on clinical, sonological studies and FNAC, who later underwent surgical excision were included in the study.

For all patients a detailed history was taken, clinical examination of thyroid nodule was done. Investigations like thyroid function tests, ultrasonogram, FNAC were carried out in all cases. Indirect laryngoscopic examination to check the mobility of vocal cords was done before and after surgery.

All the patients were operated and the specimen was studied.

In the gross examination, degenerative changes like cyst, calcification and haemorrhage were looked for. The consistency of the remaining lobe was studied. The specimen was subjected for microscopic examination. Postoperative events were monitored.

The statistical software SPSS 15.0, Strata 8.0, Medcalc 9.0.1 and Systat 11.0 were used for the analysis of data. 3x5, 5x5 Fisher exact test has been used to find the significance of study parameters and 95% Confidence Interval has been computed to find the significant features. P value p< and = 0.01 were considered strongly positive.

Results:

Majority of the patients were in the age group of 31-40, (19 patients amounting to 38.0%). 44 of the 50 patients (88%) were females, with the female: male sex ratio of 7.3:1.The most common presentation was swelling in front of the neck which moved with deglutition (seen in all 50 patients 100%). Pain in the neck and dry cough were present in 4% each. Right lobe was involved more commonly (40 patients amounting to 80%) compared to left lobe (10 patients 20%).

According to ultrasound neck, 31 (62.0%) cases were diagnosed to have colloid nodule, 11 (22%)adenoma, 5 (10.0%) complex cyst and 3 (6.0%) as simple cyst. (Table1) 39 Patients (78%) underwent hemithyroidectomy, 4(8%) patients underwent lobectomy, 4(8%) patients underwent total thyroidectomy and 3(6%) underwent near total thyroidectomy.

FNAC findings significantly coincided with postoperative histopathological examination of the excised specimen with a 'p' value of <0.001. In 96% of the patients where FNAC showed benign nodule showed benign in histopathology also. Only in 1 (4%) patient, the histopathology came as papillary carcinoma where FNAC had showed benign features. (Table 2)

In our study accuracy of FNAC was 100% in diagnosing colloid goiter, adenomatoid hyperplasia, thyroiditis with a positive predictive value (PPV) of 100 and 98% accurate in diagnosing adenoma and papillary carcinoma of thyroid. This amounted to PPV of 95% for adenoma and 97.8% negative predictive value for papillary carcinoma of thyroid. (Table 3)

Discussion:

Thyroid nodule is a common entity, with up to 8% of the adult population having palpable nodules. With the use of ultrasound, up to 10 times more nodules are likely to be detected.[4] Autopsy studies indicate 50% prevalence of thyroid nodules larger than 1cm in patients without any clinical evidence of thyroid disease. [5] About 5% of thyroid nodules are malignant. [6]

Nodules are more common in women and in areas of iodine deficiency. Christensen et. Al conducted a survey of thyroid disease in 477 middle aged women selected at random in an urban area where goiter was not endemic. The overall occurrence of thyroid disease was estimated to be 16.2%. [7]

Exposure to ionising radiation in childhood and adolescence increases the risk of both nodules and thyroid carcinoma.[7] The frequency of cancer is higher in males compared to females.[8]

Evaluation of a thyroid nodule

The primary aim of evaluation of a thyroid nodule is to exclude

the possibility of malignancy which occurs in 5% of the nodules. The other reasons are compression symptoms, cosmesis and hyperfunctioning. Papillary thyroid carcinoma is more common in solitary nodule than in multinodular goitre and in males compared to females.[9]The evaluation should always begin with a detailed history. The patient often presents with a palpable nodule in the anterior neck that is either detected by the patient or the clinician or as an incidental nodule detected during imaging of neck for any other reason.The patient should be asked about the presence of symptoms, a change in nodule size, previous head and neck radiation exposure, and a family history of thyroid or endocrine diseases.

Physical examination findings that increase the concern for malignancy are,

- Nodules larges than 4 cms in size
- Firmness on palpation
- Cervical lymphadenopathy
- Fixation to adjacent structures
- Vocal cord paralysis[5]

Thyroid profile and serum calcitonin levels to rule out medullary carcinoma of thyroid are important lab investigations to be done in the evaluation of SNT.Ultrasonography is the imaging modality of choice for thyroid nodules. [5] Ultrasonography changed the clinical management of 44% of patients who were referred for solitary nodule.[10] The findings that altered the management included the discovery of multiple nodules, no actual nodule identified, and very small solitary nodules (<1 cm). Clinical palpation is less sensitive than thyroid ultrasonography in identifying multiple nodules. A palpable solitary nodule represents a multinodular goiter in about 50% of patients according to a study.[11]

Thyroid ultrasound features associated with malignancy in thyroid nodules are microcalcifications, hypoechogenicity, irregular margins or abscent halo sign, solid areas, intranodular vascularization. [12] Though thyroid ultrasonography is the recognized "Gold standard" for an accurate and reliable assessment of gland volume and thyroid nodules, it has technologic, biologic and examination technique limitations.[13]

Fine-needle aspiration biopsy is crucial in the investigation of a thyroid nodule.[4]

FNAC should be undertaken with ultrasound guidance and with a pathologist in attendance to assess sample adequacy. The FNAC sensitivity and specificity has a wide range when the literature was studied. (Table 4) [13,14]

Ultrasound guided FNAC had a significantly lower non-diagnostic rate compared to freehand FNAC.[14] For clarity of communication, the Bethesda system for reporting thyroid cytopathology was framed. This recommends that each report begin with one of the six general diagnostic characteristics **(Table 5)**. Each of the categories has an implied cancer risk that links it to an appropriate clinical management guideline. Adoption of this framework will facilitate easy communication among cytopathologists, endocrinologists, surgeons and radiologists. This allows reliable sharing of data from different laboratories. [15,16] Overall the specialized caregivers will speak the same language.

Radioisotope scanning determines the functionality of a nodule. About 80-85% thyroid nodules are cold and about 10% of these are malignant. As the positive predictive value of the malignancy is only 10%, the use of radioisotopes in the initial workup of a thyroid nodule has been nearly abandoned. [5]

In suspicious FNAC findings frozen section examination may be adopted intraoperatively. Bahadir et. al studied 203 patients with thyroid nodules and compared pre operative FNAC with intraoperative Frozen section and analysed with postoperative histopathological examination. They found that Frozen section biopsy was most helpful for patients with suspicious biopsy findings.

Frozen section is not necessary when FNA biopsy gives a malignant or benign diagnosis. Both techniques fail to reveal occult carcinomas of thyroid.[17]

Thus there are no pre-operative diagnostic tools which can 100% detect a thyroid carcinoma in a nodule. Still today surgery followed by post-operative histopathological examination gives the final verdict about the nature of a thyroid nodule.

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.

Table. 1-Thyroid Ultrasound Diagnosis of Nodular Goitre

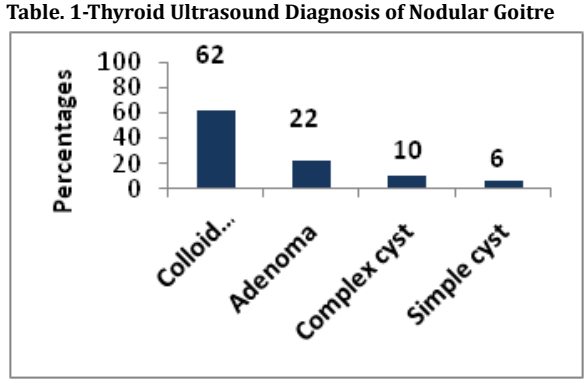

Table 2 - Comparison of outcomes of FNAC and histopathology

FNAC	Number of patients (n=50)	Histopathology				
		Colloid goitre	Adenoma	Adenomatoid hyperplasia	Papillary Carcinoma	Thyroiditis
Colloid goitre	16	16 (100%)	0	0	0	0
Adenoma	20	0	19(95%)	0	1(5%)	0
Adenomatoid hyperplasia	8	0	0	8(100%)	0	0
Papillary carcinoma	4	0	0	0	4(100%)	0
Thyroiditis	2	0	0	0	0	2(100%)
Total	50	16	19	8	5	2(4%)

Table 3- Correlation of FNAC and histopathology

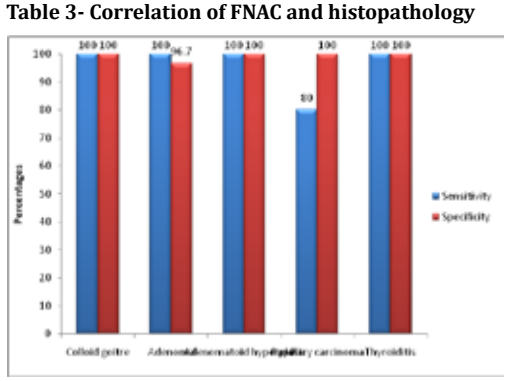

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Table 4 - Comparison of FNAC and Frozen section outcome in literature

	Sensitivity	Specificity	Accuracy
FNAC	55% -93%	56-100%	67.2-92.5%
Frozen Section	60-93%	97-100%	92-97%

Table 5- FNAC Categories for Thyroid Nodule: The Bethesda cytological classification system and its correlation with the risk of thyroid nodule malignancy[5]

Caterogory	Proposed Categories	Risk of Malignancy (%)
I	Nondiagnostic or unsatisfactory	1-4
II	Benign	0-3
III	Atypia of Undetermined Significance or Follicular Lesion of Undetermined significance	5-15
IV	Follicular Neoplasm or Suspicious for a follicular neoplasm	15-30
V	Suspicious for malignancy	60-75
VI	Malignant	97-99

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