

A clinico-pathological evaluation of Thyroid nodules by FNAC in tribal population of Jharkhand and correlation it with Thyroid function tests - A tertiary care hospital based study

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Abstract:

Background: Solitary thyroid nodule (STN) is a common clinical entity. The majority of STNs are benign - the incidence of carcinoma is low. The ideal investigation for STN should differentiate between benign and malignant nodules so that the percentage of thyroid operations for cancer increases and unnecessary surgery for benign nodules is avoided

A thyroid nodule could present in different ways: ranging from a solitary, asymptomatic nodule to a large multinodular goiter. While approaching a patient with a thyroid nodule, it is important to discern certain clinical features/risk factors suggesting thyroid cancer. Serum thyroid stimulating hormone (TSH) estimation is helpful as an initial test. Fine-needle aspiration cytology (FNAC) is the best diagnostic test. Out of the total population of 3 crore in Jharkhand India, 27% constitute the tribal population and MGM Medical College and Hospital Jamshedpur bear's majority of patients coming from Kolhan area of Jharkhand there is no study related to prevalence of thyroid nodules among tribal population. The health seeking behavior of tribals particularly from rural areas is very low due to their believe in traditional customs, norms, sorcery, etc.

Objective: So the aim of this study was not only to study the prevalence of thyroid nodules in tribals but also to have a picture of low socioeconomic status as well as poor health awareness of these people. It will try to look for any correlation with the presence of thyroid nodules among tribals with their function tests

Methods

The patients with thyroid nodules attending the outpatient clinics of tertiary care centre catering to the needs of the rural and tribal population were subjected to clinical examination, FNAC and thyroid function tests. The results were analyzed. 100 cases of in tribals of age group (25-50 yrs) attending the Department of Medicine MGM Medical College & Hospital Jamshedpur were reviewed for clinical FNAC and, biochemical findings (Thyroid function tests) for a period of 2 years. Details of each case were recorded in a Performa.

Results:

100 cases for FNAC were selected based on family history nodule size, clinical manifestations & symptoms on FNAC 94 were diagnosed

Conclusion

A majority of the thyroid nodules present with a lump in front of the neck, seen or felt on self examination. These are more common in females. 90% of them are benign in nature, adenoma being the commonest amongst benign causes. Thyroid function tests are not good metabolic markers of thyroid nodules while FNAC could be a very reliable and powerful screening method in the pre-operative diagnosis of STN with high specificity and sensitivity, and can differentiate those thyroid nodules which require surgery or not

Keywords: Thyroid nodules, Fine needle aspiration cytology (FNAC), Tribes, TSH (Thyroid Stimulating Hormone)

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I. Introduction

A clinically or radiologically discernable lesion within the thyroid gland is called a thyroid nodule. The term goiter describes the swelling of the thyroid gland. A patient with a thyroid nodule may present with varied manifestations, ranging from a solitary nodule to a large multinodular goiter. In India, thyroid nodules are very common. About 12% of the population has a palpable thyroid nodule. On ultrasound-based assessment, however, the prevalence of thyroid nodules is higher—from about 18.9% in iodine sufficient area like Kerala, to

about 80% when a North Indian population with a high prevalence of malnutrition and iodine deficiency was studied. In contrast to thyroid nodules, thyroid cancer is rare in India and the frequency is estimated at 1 per 100,000 for men and 1.8 per 100,000 for women. In the evaluation of the thyroid nodule, the clinical challenge lies in identifying subjects at high risk of developing thyroid cancer.

India has a very rich biodiversity, unique physical and ethnic diversity, traditional culture, and much indigenous knowledge or tribal wisdom (Rao 1989, 1994). There are 400 tribal and other ethnic groups in India constitute about 7.5% of India's population. Besides them, forest dwellers and rural people also possess unique knowledge about plants (Jain, 1991). One of the surveys conducted by the WHO reports that more than 80% of the world's population still depends upon the traditional medicines for various diseases. In the developed countries 25 percent of the medical drugs are based on plants and their derivatives and the use of medicinal plants is well known among the indigenous people in rural areas of many developing countries (Fabricant and Farnsworth, 2001; Perumalet al. 2008).

The health seeking of rural people in India and tribal populations in particular is very unsatisfactory and they have their own beliefs and practices regarding health. Some tribal groups still believe that a disease is always caused by hostile spirits or by the breach of some taboo (Mishra & Majhi, 2004). They therefore seek remedies through magic & religious practices. On the other hand, some rural people have continued to follow rich, undocumented, traditional medicine systems, in addition to the recognized cultural systems of medicine such as ayurveda, unani, siddha and naturopathy, to maintain positive health and to prevent disease. However, the socioeconomic, cultural and political onslaughts, arising partly from the erratic exploitation of human and material resources, have endangered the naturally healthy environment (e.g. access to healthy and nutritious food, clean air and water, nutritious vegetation, healthy life styles, and advantageous value systems and community harmony). The basic nature of rural health problems is attributed also to lack of health literature and health consciousness, poor maternal and child health services and occupational hazards.

The literature available about the thyroid nodules among tribal population is scanty and non-existent when we look for this among tribal population of Jharkhand

II. Materials And Methods:

A thyroid nodule is a discrete lesion within the thyroid gland that is palpably or radiologically distinct from the surrounding thyroid parenchyma. Nodular diseases of the thyroid are very common, seen in about 8.5 % of the population. They are commoner amongst women. Thyroid cancer is relatively rarer- the incidence is 8.7 per 100000 people per year, though this seems to have been increasing over the years. Hence, whenever a patient presents with a thyroid swelling, the task of the clinician is to distinguish the benign nodule from the malignant one. This is a difficult task, and no test is perfect in this regard. However, a reasonable amount of success can be achieved by good clinical evaluation and appropriate investigations.

Since the thyroid gland has a rich vascular supply, it is a common site of metastatic tumours from primary tumours elsewhere, e.g., malignant melanoma and carcinoma of lung, breast, and oesophagus. Amongst thyroid neoplasms, lymphoma is the most common tumour occurring in women between the age of 55 - 75 years, who have chronic lymphocytic thyroiditis with positive serum antithyroglobulin antibodies.

Fine needle aspiration cytology (FNAC) It has become the investigation of choice because of its safety, cost effectiveness, and accuracy. But it needs expertise and experience. It is the most specific investigation to differentiate between benign and malignant nodules. The technique is very simple to perform, having no complications except a little discomfort. In FNA, cellular material is aspirated by a syringe and a fine needle under negative pressure. But the drawback is missing of the malignant area, especially follicular neoplasm. This can be overcome by multiple site aspirations, i.e., 3 - 6 aspirations. A satisfactory specimen contains at least five or six groups of 10 to 15 well-preserved cells. The cells are classified by their cytological appearance into benign, indeterminate, or suspicious and malignant. FNAC specimens of follicular neoplasms and Hurthle cells are usually interpreted as indeterminate or suspicious. This has resulted in low FNAC accuracy rates of about 40% for follicular carcinoma. The diagnosis of follicular carcinoma also requires the identification of capsular or vascular invasion which is not possible with FNAC technique. Therefore, the use of a large needle biopsy and intra-operative frozen section analysis in addition to standard FNAC has improved diagnostic accuracy in difficult FNAC cases for follicular carcinomas, but is associated with increased morbidity and increased complication rates in the form of haematoma, tracheal injury and laryngeal nerve injury, injury to other neck structures and cutaneous implantation of malignant cells. In cases of cystic thyroid nodules, the accuracy is increased if aspiration is done from the margin of the nodule rather than from the cystic fluid and debris in the centre. The overall sensitivity, specificity, and accuracy of FNAC technique is 83%, 92% and 95% respectively. In FNAC, both false positive and negative results occur. According to guidelines of Papanicolaou Society of Cytopathology for the examination of fine needle aspiration specimens from thyroid nodules, false negative diagnosis is defined as a diagnosis of nonneoplastic lesion, which does not normally require surgical intervention, rendered on a malignant lesion; and its rate is computed as the number of false negative diagnoses

divided by the total number of FNACs in the series multiplied by 100. While a false positive result is defined as a diagnosis of neoplasm, which needs surgical excision, rendered on a non-neoplastic lesion; and its rate is computed as the number of false positive diagnoses divided by the total number of FNACs in the series multiplied by 100. Accuracy of FNAC is closely related to the histologic type of thyroid carcinoma which is being evaluated. Diagnosis is correct for papillary thyroid carcinoma in about 90 - 100% of FNAC specimens when correlated with the histology of the final surgical specimen. Undifferentiated (anaplastic) carcinoma, MTC and primary thyroid lymphoma also have characteristic cytologic features which help in arriving at a correct diagnosis in about 90% of FNAC specimens

Thyroid function tests: These are not useful in the assessment of patients with thyroid nodules because most patients with thyroid cancer are euthyroid. Benign disorders like autonomously functioning adenoma or Hashimoto's thyroiditis are more often associated with hypothyroidism except for Hashitoxicosis. There is a strong association between Hashimoto's thyroiditis and primary thyroid lymphoma.

III. Results

86 % of Nodules came out to be Benign Adenomas

4 % of Nodules were of suspected cytology

4 % of the patients with dysphagia and breathing problem was suspicious of malignancy

6 % cases having large thyroid gland no symptoms were insignificant

Probably iodine deficiency could be cause of it and drinking water water being poor.

IV. Discussion

Thyroid nodules present a challenge in their diagnosis, evaluation, and management. Often these abnormal growths/lumps are large in size and develop at the edge of the thyroid gland, so that they are felt or seen as a lump in front of the neck. The prevalence of these nodules in a given population depends on a number of factors like age, sex, diet, iodine deficiency, and even therapeutic and environmental radiation exposure. Prevalence increases with age, with spontaneous nodules occurring at a rate of 0 - 0.8% per year, beginning early in life and extending into the eighth decade. True solitary thyroid nodules (STN) occur in 4 - 7% of the adult population. They are present in 5% of persons at an average of 60 years. They are more common in females (6.4%) as compared to males (1.5%) and this predisposition exists throughout all age groups. Many palpable thyroid nodules, thought to be solitary, are actually part of a multinodular thyroid gland. In general, a nodule must reach a size of 1 cm in diameter to be detectable by palpation. Thyroid nodules could be adenomas or neoplasms. Most thyroid nodules are benign hyperplastic lesions, but 5 - 20% of these nodules are true neoplasms in nature. Solitary thyroid nodule first seen can be due to asymmetrical enlargement of one lobe as in chronic lymphocytic thyroiditis (i.e., Hashimoto's thyroiditis), simple goitre, or unilateral agenesis, or rarely due to developmental errors such as ectopic tissue. Childhood thyroid nodules need special attention due to higher incidence of malignancy, i.e., 15 - 25% as compared to adults. Further, thyroid cancer runs a more aggressive course in children and is associated with early metastasis locally to regional lymph nodes and distant sites including lungs and bones. The ultimate aim in the evaluation of solitary thyroid nodule (STN) is to differentiate benign hyperplasia from true neoplasms. Thus, to evaluate STN in terms of comprehensive and appropriate management, the medical team must include a primary care physician, an endocrinologist, a pathologist, a radiologist, and a head and neck surgeon. Currently, many investigations including diagnostic imaging studies, serologic and cytogenetic tests as well as histopathological techniques are available to evaluate STN. Out of all these investigations, fine needle aspiration cytology (FNAC) has become the diagnostic tool of choice for the initial evaluation of STN.

STN can be classified into benign and malignant nodule.

Benign : Generally, most (90%) thyroid nodules are benign and can be classified as adenomas, colloid nodules, cysts, infectious nodules, lymphocytic or granulomatous nodules, hyperplastic nodules, thyroiditis, and congenital abnormalities.

True adenomas are encapsulated and histologically classified as papillary, follicular, and Hurthle cell types. The follicular adenomas can be subdivided according to the size of follicles into colloid, foetal and embryonic varieties. Follicular adenomas are the most common and are most likely to mimic the function of normal thyroid tissue, and usually present as a single nodule. Clinically, the patient presents with slow growth of the nodule over many years, and with time the nodule grows larger and its function increases until it is sufficient to suppress TSH secretion, but all the adenomas do not become autonomous. Ultimately, the remaining part of the gland undergoes atrophy and loss of function, and the scintiscan shows radio-iodine accumulation only in the region of the nodule (a hot nodule). At this time TSH is suppressed (chemical thyrotoxicosis) but the patient may or may not be overtly thyrotoxic. Ultimately, the patient develops frank thyrotoxicosis (toxic adenoma) which may be precipitated by iodine exposure such as from radiographic contrast dyes. Hyperfunctioning adenomas are a frequent cause of T3 toxicosis and are amenable to ablation by surgery or I 131 treatment.

Malignant Thyroid nodules can be classified as:-

I. Differentiated:

1. Papillary adenocarcinoma: a) Pure papillary; b) Mixed papillary and follicular carcinoma (variant including tall cell, follicular, oxyphil, solid). Papillary carcinoma is the most common of thyroid malignancies, accounting for 80 - 90% of all thyroid cancers.

2. Follicular adenocarcinomas (variants including malignant adenoma, Hurthle cell carcinoma, oxyphil carcinoma, clear cell carcinoma, insular carcinoma).

II. Medullary carcinoma (not a tumour of follicular cells)

III. Undifferentiated: 1. Small cell (to be differentiated from lymphoma). 2. Giant cell . 3. Carcinosarcoma.

IV. Miscellaneous: 1. Lymphoma, sarcoma. 2. Squamous cell epidermoid carcinoma. 3. Fibrosarcoma.

4. Mucoepithelial carcinoma. 5. Metastatic tumour.

V. Conclusions

A majority of the thyroid nodules present with a lump in front of the neck, seen or felt on self examination. These are more common in females. 90% of them are benign in nature, adenoma being the commonest amongst benign causes. Thyroid function tests are not good metabolic markers of thyroid nodules while FNAC could be a very reliable and powerful screening method in the pre-operative diagnosis of STN with high specificity and sensitivity, and can differentiate those thyroid nodules which require surgery or not.

TAKE HOME MESSAGES :

- A thyroid nodule is a discrete lesion within the thyroid gland that is palpably or radiologically distinct from the surrounding thyroid parenchyma
- Whenever a patient presents with a thyroid swelling, the task of the clinician is to distinguish the benign nodule from the malignant
- Features suggestive of a malignant thyroid swelling are family history of thyroid cancer, rapid nodule growth, a very firm/ hard nodule, clinical signs of fixity to surrounding structures, vocal cord paralysis/ hoarseness of voice, regional lymph node enlargement or the presence of another lesion (for e.g., a lung nodule on chest x-ray) that suggests a distant metastases
- In addition to thyroid nodule, male gender, extremes of age (<20 or >70 years), history of neck irradiation, nodule >4cm in size or the presence of any pressure symptoms should evoke further investigations
- Investigations include TSH, Ts, T4, ultrasonography, Radionuclide Scanning and FNAC
- TSH is not much of a help but FNAC is definitely useful in diagnosing thyroid nodules.
- Surgery is required if malignant or suspicious cytology is reported. Rapid growth and increasing pressure effects (breathing difficulty, dysphagia), and cosmetic reasons due to the size of the goiter are indications for surgery
- Patients with a suspicious FNAC report are subjected to radio nuclide scanning and surgery is performed on those nodules that are cold or warm, and simply following up those with hot nodules without surgery as the risk of malignancy in these nodules is very low
- In malignant/ suspicious cases, total thyroidectomy is the treatment of choice
- In patients with a benign cytology total or hemi- or subtotal thyroidectomy is done
- Total thyroidectomy is advocated for bilateral benign multinodular goiters

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