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CYTOHISTOPATHOLOGICAL EVALUATION OF THYROID SWELLINGS

Pathology

Arun Dev Singh

Subhash Bhardwaj* * Corresponding Author

ABSTRACT

Thyroid swellings are one of the commonly encountered endocrine problems in general population but majority of them are nonneoplastic which don't need surgery. 40 cases of thyroid swelling admitted in hospital were included in this study. Patients reported to the hospital with complaints of swelling, pain, pressure effects etc having duration varying from 3 weeks to 12 years. Detailed clinical and thorough physical examination was done in all patients. All routine and special investigations were performed. The initial screening included TSH levels, ultrasonography, FNAC and radionucleotide scan. The aim of the present study is to correlate the cytology findings with final histopathology. All of these patients were subjected to both cytological and histopathological examination. In this study commonest age group involved is third and fourth decade with male to female ratio being 1:3.

RESULTS

In our study of 40 thyroid lesions, the diagnosis according to cytological features were classified into Malignant, Benign, Indeterminate (suspicious for follicular or Hurthle cell neoplasm) and Insufficient for diagnosis.

CONCLUSION

FNAC is an essential component in the preoperative management of thyroid lesions. Nodular goitre may have single or multiple nodules. These are more common in females. Mostly goitres are asymptomatic but few may be symptomatic. Serum TSH is main screening test for thyroid function. FNAC is the initial diagnostic test and histopathology is performed for definitive diagnosis. Fine needle aspiration cytology is a cost effective, rapid, simple procedure with high degree of accuracy and it has become the mainstay in the evaluation of thyroid lesions among clinicians and endocrinologists. Histological correlation indicated FNAC to be a good diagnostic tool.

KEYWORDS

thyroid, thyroid diseases

INTRODUCTION

Thyroid gland is located below and anterior to laryanx. It consists of 2 bulky lateral lobes connected with thin isthmus. Thyroid is divided by thin fibrous septae into lobules composed of about 20-40 evenly dispersed follicles, lined by cuboidal to low columnar epithelium and filled with PAS positive thyroglobulin. Enlargement of thyroid gland (goitre) is commonly encountered problem. Goitre may be diffuse or nodular, toxic or non toxic. Nodular goitre may have multiple or single nodule. Palpable thyroid nodule among adults is very common finding. Non endemic goitre may be caused by excessive iodine intake, exposure to ionizing radiation and is more common in women and elderly. Worldwide, iodine deficiency is the most common cause of endemic goitre. Most of the thyroid swellings are nonneoplastic which mostly do not require surgical intervention. Less than 5 % of thyroid nodules are malignant. Thyroid surgeries are associated with thyroid hormone dependence and post operative risk of hypoparathyroidism. An accurate preoperative diagnosis can avoid unnecessary surgery in benign conditions. The initial preoperative screening procedures include TSH levels, ultrasonography, fine needle aspiration cytology (FNAC) and radio nucleotide scan. Among these, the FNAC is considered the most helpful diagnostic modality.

MATERIALS AND METHODS

A prospective analysis of 40 cases of thyroid swelling, which underwent fine needle aspiration followed by surgery was conducted for a duration of one year from 1-5-2009 to 30-4-2010 in Government Medical College Jammu. Detailed clinical work up of all patients was done including local and general physical examination, detailed history of principal complaint like site, duration, rate of growth, pain, any previous radiation, family history etc. All other routine and special tests were performed. FNAC was performed in all cases. For superficially located lesions, direct FNAC was performed by palpation method and for deep seated lesions, Ultrasound guided or CT guided FNAC was performed. The aspirate was expressed on the slides to make 4-5 smears. The smears were than stained by May Grunwald Giemsa and Papanicolaou stain for microscopic examination. Histopathological examination of specimen was done after surgery. Specimen was processed and 4-6 micron thick paraffin sections were cut. Cut sections were stained with haematoxylin and eosin (H&E) stain. Fine needle aspiration cytology results were compared with the histopathology in all cases.

Results

A total of 40 cases of thyroid lesions were admitted in the hospital over one year study period. FNAC was done in these patients which was followed by surgery. The age of the subjects ranged from 20 to 60 years. 21 (52.5%) cases were involved between 31-40 years of age which is the commonest age group involved in this study. Thyroid swellings were common in females. 31 (77%) cases were females and 9 (23%) were males. The male: female ratio was 1:3 in this study.

In this study all the cases presented with asymptomatic thyroid swellings and the duration was from 3 weeks to 10 years. No case had history of thyrotoxicosis, pressure effects and family history of thyroid swelling.

In our study, majority of the thyroid swellings had soft to firm consistency, 38 (95%) cases had firm to soft and 2 (5%) case had cyst like swelling. 29 (73%) cases had single nodule, while 11 (27%) had multinodular thyroids. None of the cases had fixation of thyroid to underlying structures, nor had any pressure effects. Only 2 (5%) cases had cervical lymph node enlargement.

All the patients were completely investigated, only 2 (5%) cases had thyroid function tests suggestive of hyperthyroidism. Out of the 40 cases 32 (80%) cases had colloid goitre on FNAC, while 6 (14%) cases had follicular neoplasia, 1 (3%) case each was diagnosed as having Hurthle cell neoplasia and thyroid cyst.

In our study, 34 (84%) cases had post-operative histopathological features of colloid goitre. This included one case with thyroid cyst. 5 (13%) cases had follicular adenoma and only 1 (3%) case had benign Hurthle cell neoplasm.

Out of 40 cases, 29 (73%) cases underwent lobectomy, while 7 (17%) cases had subtotal thyroidectomy. 3 cases (7%) underwent near total thyroidectomy and only 1 (3%) case was subjected to isthmusectomy.

CO-RELATION BETWEEN FNAC, AND HPE
TABLE - 1

FNAC result	Cases No. (%)	HPE No. (%)
Negative (for malignancy)	32 (80)	30(100)
Suspicious	7 (17)	—
Non – diagnostic	1 (3)	---
Positive (for malignancy)	---	---

Results of FNAC of thyroid swellings
TABLE - 2

Feature	Value (%)
Accuracy	80
Specificity	80
Sensitivity	97
False negative	3

As shown in **table 1** and **2**, FNAC was negative (for malignancy) in 32 (80%) cases and reported 7 cases (17%) as suspicious for malignancy. FNAC was non-diagnostic in 1 (3%) case which was labelled as thyroid cyst. Overall specificity of FNAC was 80% and sensitivity 97%. FNAC has false-negative rate of 3% and accuracy of 80%. FNAC was 96% specific in cases of colloid goitre and was non-diagnostic in 4% cases. FNAC could not predict the malignant or benign nature of follicular neoplasia as well as Hurthle cell neoplasia. All the 7 cases of follicular and Hurthle cell neoplasia were confirmed to be benign by definitive histopathology. None of the cases required revision surgery.

Only 5 cases (13%) out of 40 cases had post-operative complications. Vocal cord palsy was found in 5 (13%) cases, with right vocal cord palsy seen in majority of these cases. Respiratory obstruction, reactionary bleeding and hypoparathyrodism, each occurred in 1 (3%) of cases. 1 of the cases had palsy of both the cords, respiratory obstruction and hypoparathyrodism. 1 of the cases had suffered from combination of right vocal palsy and reactionary bleeding.

Discussion

Thyroid nodules are commonly found in clinical practice and their detection raises the concern of cancer. Infact, fewer than 5% of detected nodules are malignant. A proper management reliably identifies the benign nodules, thus avoiding unnecessary surgery. The application of FNAC, highly sensitive thyrotropin (TSH) assays, ultrasonography, radio nucleotide scan have modified thyroid nodule management. Among them FNAC is considered as the best initial diagnostic test. FNAC helps to identify the various thyroid lesions with simplicity, safety and high degree of accuracy, thus helping in avoiding unnecessary surgery in benign conditions.

Nodular thyroid disease involve females more frequently than men in all age groups and increases linearly with age **(11, 27,31)**. In our study also, women were more frequently affected with male to female ratio being 1:3. In our study majority (52.5%) of cases were between 31 to 40 years.

Most of the patients in our study presented with an asymptomatic thyroid mass. Exposure to radiation is a known risk factor for benign and malignant thyroid nodules **(2,28,29)**. Nodules are most likely to be malignant in patients younger than 20 and older than 60 years **(27,30)**. Our study is in concordance with these data as all our patients (100%) presented with asymptomatic thyroid mass. we did not encounter any malignant case.

Physical findings such as non tender nodules, firm to hard, fixation to adjacent tissue, vocal cord paralysis, jugular venous distension, and regional lymphadenopathy are risk factors suggestive of malignancy **(Peter A. Singer, 1996)**. (95%) of cases in our study had thyroid swellings with either soft or firm consistency and only 2 cases (5%) had swelling of cystic consistency. None of the cases had pressure effects, fixation to adjacent tissue or vocal cord paralysis and only 2 cases (5%) had cervical lymphadenopathy. These findings are concordant with results of above mentioned studies.

In this study 2 cases (5%) had hyperthyroidism while all the other 38 cases (95%) were euthyroid. This is in concordance with available studies, as reported incidence of thyroid cancer in multinodular goitre is upto 10%, similar to that seen in solitary thyroid nodule and coexistent cancer is more common with non-functioning nodules **(1,3,5,20,22)**.

On FNAC, approximately 80% of thyroid nodules are colloid nodules. The cytological examination shows abundant colloid, normal epithelial cells and often foam cells indicating degeneration **(Hossein Gharib, 1997)**.

The suspicious category (5% to 23%) consists of features suggestive of but not definitive for malignancy **(Peter A. Singer, 1996)**. This group includes follicular neoplasms, Hurthle cell neoplasms and lesions with cellular atypia. The most common type is follicular neoplasm in which cytologically benign follicular neoplasms cannot be separated from malignant ones. These lesions produce hypercellular aspirates with the cells arranged in microfollicular patterns, decreased or absent colloid with mild nuclear atypia **(Hossein Gharib, 1997)**.

Follicular or Hurthle cell neoplasms can be diagnosed as either benign or malignant only histologically, with malignant lesions demonstrating either capsular or vascular invasion. Approximately 10-20% of follicular or Hurthle cell neoplasms prove to be malignant at surgery **(7, 11, 14, 16, 26)**. False negative results reported to occur is 1%-11% (mean 3%) **(2, 6, 12, 13)**. The sensitivity of FNA ranges from 65% to 98% (mean 83%) and specificity from 72% to 100% (mean 92%). The overall accuracy for cytological diagnosis ranges from 85% to 100% [mean 95%] **(Hossein Gharib, 1997)**.

In our study, cytological findings were satisfactory in 97% and unsatisfactory in 3% cases. The most common cytodiagnosis was that of colloid (benign) thyroid nodule 80% and this value approaches to that reported by **Hossein Gharib (1997)**. 3% of thyroid nodules were non diagnostic which was confirmed on histology to be benign cystic lesion. Suspicious category constituted 17% of cases of which follicular neoplasia constituted 80% and Hurthle cell neoplasia 20%. None of these lesions proved to be malignant at surgery. The former figure is in agreement to that reported by Hossein Gharib **(1997)** while latter figure is less than that of reported values.

In our study, false negative rate was 3%, sensitivity rate of FNAC was 97% and specificity rate was 80%. The accuracy of FNAC in our study approached 80%. These data are in agreement to those reported by Hossein Gharib **(1997)**.

Colloid (adenomatous) nodules are most common thyroid nodules and constitute about 40% **(Peter A. Singer, 1996)** to 64% **(Hossein Gharib, 1997)** of all thyroid nodules. 80% colloid nodules were reported in our study. Most were hypofunctioning, only a few were hyperfunctioning. Cytological studies usually reveal abundant colloid and benign follicular cells.

Follicular adenomas are thought to be monoclonal tumours arising from follicular epithelium with well developed fibrous capsules and a uniform histological structure distinct from normal surrounding thyroid **(Ernest L. Mazzaferri, 1993)**. These are most commonly seen in middle aged females, rarely become toxic and are not premalignant **(Stell and Maran, 2000)**. 75% of the follicular adenomas in our study, occurred in middle aged persons.

Hurthle cell neoplasia consists of large polygonal thyroid follicular cells with abundant granular cytoplasm and numerous mitochondrial oncocytes **(15, 24, 25)**. Hurthle cell neoplasm is an encapsulated group of follicular cells with atleast 75% Hurthle cell component. It represents about 5% of all thyroid neoplasms. Hurthle cell adenomas are usually unilateral, whereas bilaterality is high in Hurthle cell carcinoma. Only one 36 year old male having unilateral Hurthle cell neoplasm, diagnosed as adenoma on histology in our study.

In our study, 11 cases (approx. 23%) had multinodular colloid goitre. Out of these, 29% had follicular neoplasia on FNAC which were managed with subtotal thyroidectomy and 71 % were colloid goitres which were managed with near-total thyroidectomy (40%) and subtotal thyroidectomy (60%). The reported incidence of nodular recurrence following subtotal thyroidectomy for multinodular goitre ranges from uncommon **(18,19,21)** to 10% **(4,10, 17)**. **Kraimps et al.**

(21) reported that after subtotal thyroidectomy, recurrence occurs in 3.4% cases with MNG. In our study, none of cases required revision surgery. Most likely the best prevention of recurrent post-operative multinodular goitre is near-total thyroidectomy.

In remaining 29 (77%) patients, 96% had thyroid lesions confined to either of thyroid lobes and 4% of these lesions involved isthmus. Of these, 29 (77%) cases, 9% cases were of follicular neoplasia, 4% were of Hurthle cell neoplasia and rest (87%) had colloid goitre on FNAC. All these cases were managed with lobectomy (96%) and isthmusectomy (4%). Following postoperative histopathology none of the cases required revision surgery.

Thirteen percent of lobectomies were associated with post-operative complications of vocal cord palsy and reactionary bleeding, whereas 50% of near total thyroidectomies were associated with post-operative complications of vocal cord palsy, respiratory obstruction and hypoparathyrodism. Complications of total thyroidectomy are no different from those of subtotal thyroidectomy in expert hands **(9)**.

SUMMARY AND CONCLUSION

Nodular enlargement of the thyroid gland may comprise multiple nodules or a single nodule. Nodular goitres are more common in women. Middle aged persons are the most commonly affected age group. Goitres may be asymptomatic with normal TSH levels or may be associated with systemic thyrotoxic symptoms. Diagnostic evaluation of patients with nodular goitres consists of clinical evaluation, biochemical testing, FNAC and imaging studies. The serum TSH should be initial screening test to assess thyroid function. FNAC should be obtained as the initial diagnostic test to exclude malignancy in prominent palpable or suspicious nodules.

In conclusion, fine needle aspiration cytology is cost effective, simple procedure with high degree of accuracy thereby limiting the number of surgeries in benign conditions. A negative diagnosis should be followed up with ultrasound and FNA should be repeated in suspicious cases. FNAC does not help in differentiating benign and malignant counterparts of follicular neoplasia and Hurthle cell neoplasia and definitive pathology is established only on histopathology performed post-operatively. Correlation of cytology and histopathology is an important quality assurance measure. Management of nodular goitre by surgery is highly effective with extent of surgery being dictated by the proportion of thyroid involved.

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