

Role of Scrape Smears in the Intraoperative Diagnosis of Thyroid Nodules.

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Abstract: Aim: To assess the role of scrape smears as an intraoperative diagnostic tool in thyroid nodule surgeries.

Methods: In our study we analysed the efficacy of scrape smears in 56 cases of thyroid nodules intraoperatively by comparing it with Histopathology, considering the latter as gold standard.

Results: We found the overall accuracy of scrape smears to be 91.1% with a sensitivity of 68.8%, specificity of 100% and a significantly high positive predictive value in thyroid malignancies.

Conclusion: Scrape smears can be used as a reliable intraoperative tool especially in suspicious cases of Papillary Thyroid carcinomas.

Date of Submission: 23-09-2019

Date of Acceptance: 12-10-2019

I. Introduction

Thyroid lesions are common among general population especially in women and elderly and is a common cause of endocrine referrals.¹ Clinical importance of a thyroid nodule rests with need to exclude the malignancies. Here comes the role of intraoperative diagnostic procedures which help in the detection of malignancies and has an immediate impact on surgical decision making.² Intraoperative cytology (IOC) is an intraoperative consultation method with the help of cytology smears with high accuracy rates. It is simple, inexpensive without any requirement of special instrument or technique and provide excellent preservation of cellular details.³ Initial use of scrape smears was for examination of neurological specimens in 1930,s. But it is now used for all types of tissues and organs like thyroid, parathyroid, ovary etc. It is of special value if the tissue sample is very small and brittle. Scrape smears yield large number of cells and cells can be spread well on the slides providing better aid for diagnosis.

II. Materials and methods

Scrape cytology smears was done in 56 thyroid nodule surgery cases over a period of two years from September 2012 to August 2014. All patients who underwent thyroidectomy for nodules with suspicious radiological and cytological features (FNAC) in the department of Endocrine surgery at MES Medical college during the period of September 2012 to August 2014 were included in the study.

Study Design: Prospective observational study

Inclusion criteria:

- 1.Thyroid nodules showing microcalcification, irregular margins, hypoechogenicity ,increased intranodular flow, absence of halo in ultrasound scan.
2. Thyroid nodules with FNAC diagnosis ofFollicular/Hurthle cell neoplasm, Scanty material, Nuclear atypia, Nuclear inclusions and inconclusive.

Exclusion criteria:

- 1.Swelling in front of neck other than thyroid lesions
2. Thyroglossal ductcyst excision
- 3.Incidental thyroid resections as part of laryngectomy or neck surgery for other indications.

Procedure: Following surgery unfixed specimen was received at pathology lab with clinical details of patient. Specimen is examined , adequate dissection will be performed. Scrapings are taken from representative area with sharp scalpel/end of glass slide, smears are prepared, slides fixed in 80% isopropyl alcohol and stained with rapid Hematoxylin & Eosin stain.. All the smears were studied microscopically under low and high power by two pathologists. The report was conveyed to the surgical team, who then proceeded with the appropriate course of surgery. The average time taken for the entire procedure (sending the sample to obtaining the result) was approximately 15 minutes. Scrape smear diagnosis was later compared with the final paraffin section diagnosis (gold standard).

Statistical analysis

Statistical Package for the Social Sciences (SPSS) version 17 software was used to analyse data.

We calculated the sensitivity(true positive / true positive +false negative), specificity(true negative / true negative and false positive), positive predictive value (ppv) (true positive / true positive + false positive) and negative predictive value (npv) (true negative / true negative and false negative) of scrape smear cytology in intraoperative diagnosis of thyroid nodules.

III. Observations and Results

We intraoperatively analyzed 56 thyroid nodule surgery cases with scrape smears. Maximum number of patients in our study belonged to the age group 21- 40 years. In total of 56 patients 51 were females and 5 were males. Among the 56 cases studied most common presentation was painless, progressive thyroid nodule. 26 patients presented with right solitary thyroid nodule, 19 patients presented with left solitary thyroid nodule, 1 patient presented with isthmic nodule and in 10 patients nodules were multiple. Out of 56 cases analysed by scrape smears, 30 were non neoplastic (53.6%), 15 were neoplastic indeterminate (26.8%) and 11 were malignant (19.6%).Out of 30 non neoplastic lesions majority were colloid goiter (36.7%). There were 8 cases of Multinodular goitre, 9 cases of hyperplastic nodule and 2 cases of Hashimoto thyroiditis.15 cases were reported as indeterminate which included 12 cases of follicular neoplasm and 3 cases of Hurthle cell neoplasm. On final histopathological assessment 5 cases were proved to be follicular carcinoma. All the 3 cases of Hurthle cell neoplasm were reported in histopathology as benign-Hurthle cell adenomas.11 cases of papillary carcinoma was reported in scrape smears, all turned out to be papillary carcinoma in histopathology.

Sensitivity of scrape smears in diagnosis of neoplastic thyroid lesions was found to be 100%.the specificity was 96.8%, positive predictive value was 96.2% and negative predictive value was 100%.Sensitivity of scrape smears in diagnosis of Malignant thyroid lesions was found to be 68.8% the specificity was 100%, positive predictive value was 100% and negative predictive value was 88.9%.Accuracy was 91.1%.Scrape smears showed 100% accuracy,sensitivity, specificity,positive and negative predictive values in cases of Papillary thyroid carcinomas.Sensitivity of scrape smears in diagnosis of neoplastic thyroid lesions was found to be 100%.the specificity was 96.8%, positive predictive value was 96.2% and negative predictive value was 100%.Sensitivity of scrape smears in diagnosis of Malignant thyroid lesions was found to be 68.8% the specificity was 100%, positive predictive value was 100% and negative predictive value was 88.9%.Accuracy was 91.1%.Scrape smears showed 100% accuracy,sensitivity, specificity,positive and negative predictive values in cases of Papillary thyroid carcinomas.

Table No1:Comparison of Scrape smears vs Final histopathological diagnosis

Scrape smears	Total no of cases	Malignant- Histopathology	Benign- Histopathology	Non neoplastic- Histopathology
Malignant	11	11	0	0
Indeterminate	15	5	9	1
Non neoplastic	30	0	0	30
Total	56	16	9	31

Fig 01 – Tumour cells with grooves and intranuclear inclusions: Papillary carcinoma (Rapid H & E, 100X. Case-50)

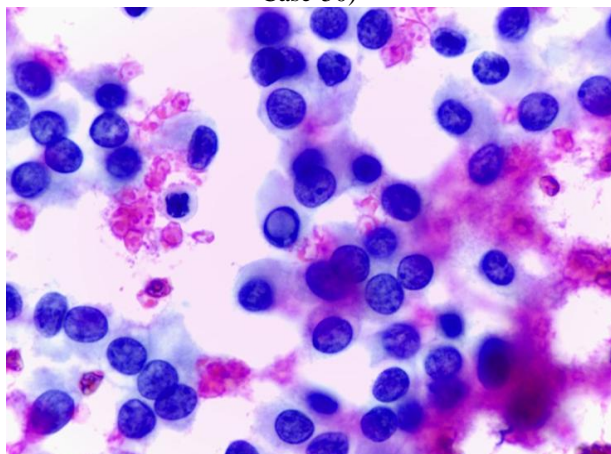


Fig 02 – Hurthle cells in background of polymorphous population of lymphocytes-Hashimoto's thyroiditis (Rapid H & E, 40X. Case-32)

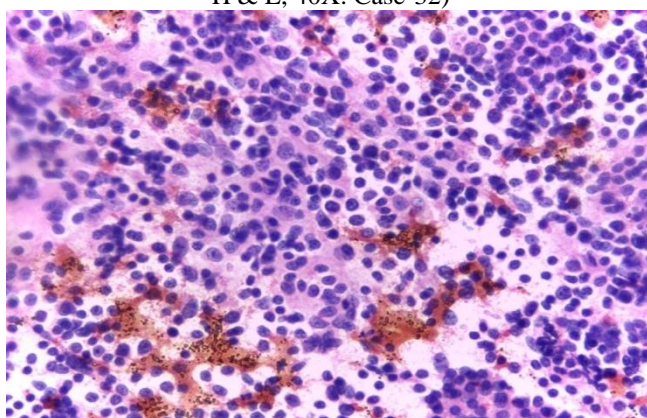
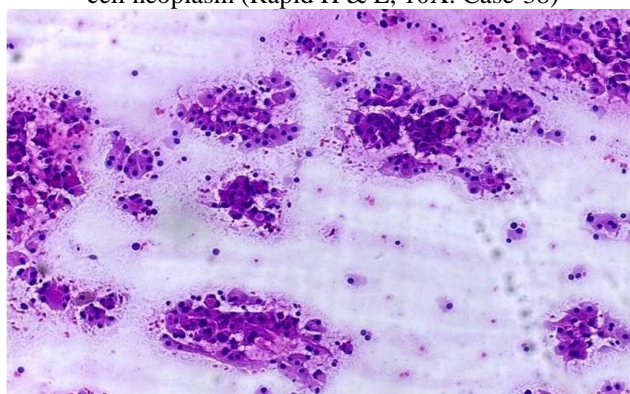


Fig 03 - Repetitive microfollicles with hurthle cell change in a background of scant colloid and RBC's.: Hurthle cell neoplasm (Rapid H & E, 10X. Case-38)



IV. Discussion

Prevalence of thyroid nodule ranges from 4% by palpation to 67% by ultrasonography. Most of thyroid nodules are benign, but about 5% are malignant.^{4,5} Importance of thyroid nodule examination is to exclude malignancies and avoid unnecessary surgical treatment. History, clinical examination and thyroid stimulating hormone (TSH) estimation are considered as the initial steps in diagnosing thyroid lesions. Fine needle aspiration cytology (FNAC) is considered as an initial screening test. It is a simple, cheap, cost effective procedure which provide guidance for surgical planning. But FNAC is not a conclusive test and negative finding do not exclude malignancy.⁶ No single ultrasound feature or combination is adequately sensitive to identify all

malignant nodules even though certain features and combination of features have high predictive value to indicate if a nodule is likely to be malignant.⁷

Intraoperative histological assessment of thyroid nodules help surgeon to select an appropriate surgical procedure for patients and to decide whether to proceed with total thyroidectomy or neck dissection. Scrape smears are simple, inexpensive intraoperative procedure without any requirement of special instruments.³ Anton et al⁸ in his study prefer scrape smears for intraoperative cytology because of high cellular yield. Basolo F et al⁹ suggest scrape smear as an useful adjunct in intraoperative management of thyroid nodules. Mahesh Kumar et al¹⁰ state that cases in which there is a possibility of papillary carcinoma exists, intraoperative cytology with imprint or scrape preparations has to be performed for evaluation of nuclear features.

The present study was conducted to assess role of scrape smears in intraoperative diagnosis of thyroid nodules. Present study group constituted patients from first to sixth decade. Maximum number of patients belonged to the age group 21- 40 years. Mean age was 35.6 years. In our study out of total 56 patients, 51 were females and 5 were males. common clinical presentation was painless, progressive thyroid nodules. 46 patients presented with solitary thyroid nodule (82.1%) with majority involving Right lobe and 10 patients presented with multiple nodules (17.9%). Out of 26 right solitary nodules, 4 turned out to be malignant (15.3%). 7 Out Of 19 left solitary nodules became malignant (36.8%). 4 out of 10 cases with multiple nodules turned out to be malignant (40%). Scrape smears were highly sensitive and specific in diagnosis of papillary carcinoma and was not accurate in diagnosis of follicular neoplasm as was seen in our study. Both sensitivity and specificity of scrape smears in diagnosing papillary carcinoma in our study was 100% . Low sensitivity in follicular carcinoma was due to inability to assess capsular or vascular invasion which was a major limitation of scrape smears.

V. Conclusions

In our study scrape smear showed 100% sensitivity in differentiating neoplastic and non neoplastic lesions of thyroid. Scrape smears showed a significantly high positive predictive value in thyroid malignancies and showed 100% sensitivity, specificity and significantly high negative predictive value in papillary thyroid carcinoma thus proving its role in surgical management of thyroid nodules..

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Dr. Anitha Das P.H. "Role of Scrape Smears in the Intraoperative Diagnosis of Thyroid Nodules." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, vol. 18, no. 10, 2019, pp 01-04.