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Original Research Article

# Cyto Histological Correlation of Brush Cytology with Biopsy in Upper GI Lesions

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**Abstract:** Neoplasms of upper gastrointestinal tract specially malignancy is one of the leading causes of death worldwide. Endoscopy has greatly facilitated the detection and diagnosis of gastrointestinal lesions. Early cancer is highly curable. Unfortunately most early cancers are asymptomatic. Brush cytology and biopsy are complimentary procedures for the detection of upper gastrointestinal neoplasms. 100 cases of non-neoplastic and neoplastic lesions were studied over a period of one year from January 2015 to December 2015 at the Department of Pathology, Gandhi Hospital/Medical College, Hyderabad, Telangana, India. Patients between 21 to 75 years of age presenting to the department of Gastroenterology with complaints of dysphagia, retrosternal pain, vomiting and loss of weight were included in the study. Endoscopy was done using flexible video endoscopy on patients with ulcer or polypoid and ulcerative growths in the upper GIT. Exfoliated cells from the lesion were collected by means of a brush introduced through the endosope. Smears were made by directly smearing the brush on to a slide and fixed with a spray fixative containing 95% ethyl alcohol. Slides were stained by Hematoxylin & Eosin and Papanicoulou stains. After brushing, multiple biopsies were taken from the representative area of the lesions. Cytohistological correlation was done. Brush cytology is a useful, inexpensive procedure that gives rapid diagnosis in cases of endoscopically visible suspicious lesions of upper GIT. It is an accurate diagnostic adjunct to biopsy in the detection of cancers at an early stage.
**Keywords:** Upper GI lesions, endoscopy, brush cytology, effective screening, rapid diagnosis

## INTRODUCTION

Upper Gastrointestinal tract is a common site for different lesions, especially malignant lesions. In India, according to National Cancer Registry, esophageal cancers rank third after carcinoma Breast and Cervix [1-3]. Early detection of malignancy greatly improves the survival rate of patients. An early detection of esophageal cancers gives five year survival rate of 83.5% and that of gastric cancer gives more than 90% five year survival rate [4]. Various techniques for the collection of cytological samples have been described [5]. Endoscopic direct vision brush cytology is one among them. In 1996, Kameva *et al* introduced brush cytology under direct vision using fibreoptic gastroscopy [6]. This technique retrives epithelial cells from a larger surface area of mucosa than a tissue biopsy. Malignant cells will have a lower level of intercellular cohesion than normal cells. Brushing can selectively sample these discohesive cells. This procedure is non-invasive, cost effective and rapid for the early diagnosis of upper GI lesions. Some studies have shown increased diagnostic accuracy with combined use of biopsy and cytology [7, 8]. The cytological and histopathological interpretations were done according to WHO classification and criteria proposed by Takeda *et al* and Shu [9, 10].

## MATERIAL AND METHODS

The present study which included 100 patients was carried out at Department of Pathology, Gandhi Hospital/Medical College, Hyderabad, Telangana, India over a period of one year from January 2015 to December 2015. Patients presenting to the Gastroenterology Department with clinical symptoms of upper GI lesions such as dysphagia, vomiting, anorexia, loss of weight, mass abdomen and retrosternal

pain were included in the study. Detailed history was taken including their food habits. Endoscopy was done using flexible video endoscopy in patients with ulcer or polypoid and ulcerative growths in the upper GIT. The site and morphologic appearance of the lesion were recorded prior to biopsy. A cytologic brush with small nylon bristles at the tip with an outer sheath is introduced into the endoscope. Once the brush reaches the lesion, exfoliated cells are obtained by the brush by two and fro movements on the lesion several times. The brush is withdrawn into its sheath and removed. Smears made by directly smearing the brush on to a slide. Spray fixative containing 95%ethyl alcohol is used for the fixation of the slides, stained by H & E and Giemsa Stain. After brushing, multiple biopsies were taken from the representative area along with margins of the lesions. The biopsy material was fixed in 10% buffered formalin and processed routinely. Histological sections were stained by Hematoxylin and Eosin methods. Special stains for demonstration of mucin were done with PAS where required.

## RESULTS

A total number of 100 patients presented with upper GIT symptoms and lesions suspicious of malignancy on endoscopy. The age of the patients ranged from 21 to 75 years. It was noted that most of the patients were non-vegetarian (97%) accustomed to hot and spicy food. The highest number of patients were seen in the age group of 45 to 65 years. Most malignancies occurred in the 5$^{th}$ decade. There were 75 males and 25 females with a male to female ratio of 3:1. Malignancies occurred more commonly in males in the ratio of 4:1. On endoscopy the common presentations of growth seen were fungating, infiltrative and ulcerative. Other endoscopically visible lesions presented as nodules and surface erosions. Most of the lesions involved the stomach with 50 cases (50%) followed by esophagus with 34 cases (34%) and duodenum with 16 cases (16%). The cytohistological spectrum of upper GIT lesions consisted of inflammatory lesions, Barrets esophagus, dysplasia, Squamous cell carcinoma (Fig.1 & 2) of varying degrees of differentiation from mild to severe, Adenocarcinoma (Fig.3 & 4) of varying degrees of differentiation along with five cases of Signet ring cell carcinoma (Fig.5), Gastro Intestinal Stromal Tumor (GIST) (Fig.6) MALT and Secondaries.

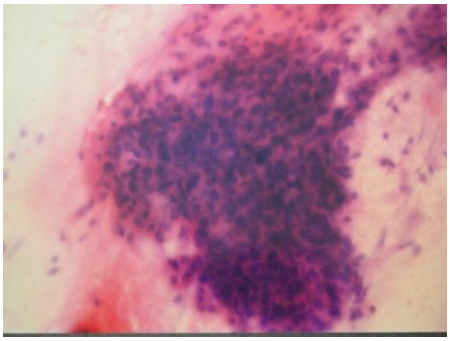

**Fig-1: Cytosmear squamous carcinoma**

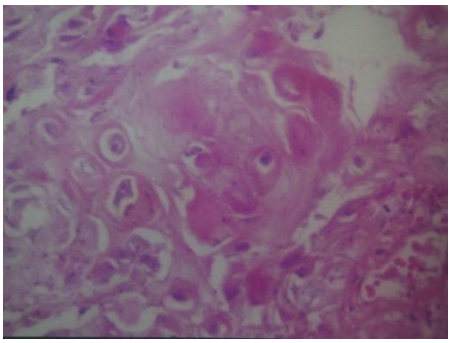

**Fig-2: Histopathology of Squamous Cell Carcinoma**

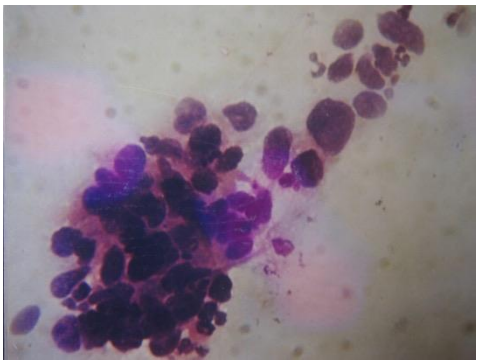

**Fig-3: Cytosmear of Adenocarcinoma**

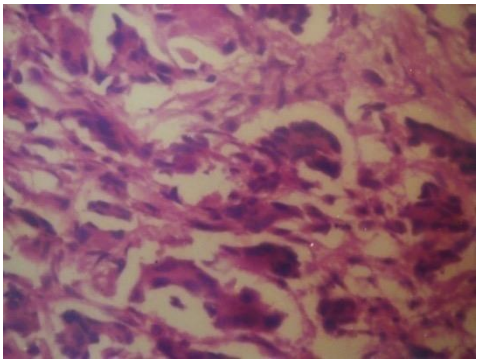

**Fig-4: HP of Adenocarcinoma**

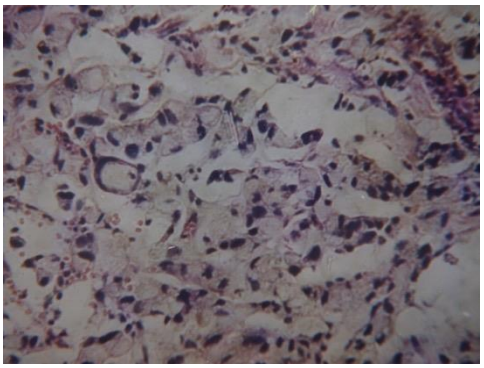

**Fig-5: HPE Signet Ring cell carcinoma**

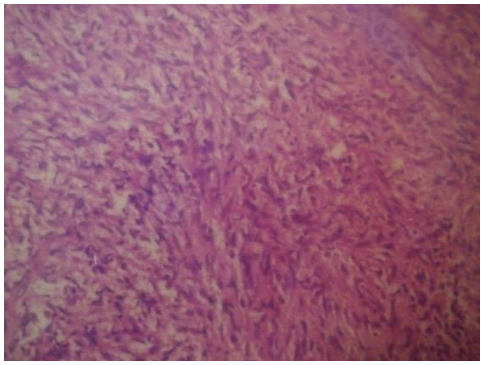

**Fig-6: HPE of GIST**

There were two cases of Barret's esophagus which could not be detected by fibreoptic endoscopic brush cytology. Biopsy was confirmatory in these two cases. Cytohistological correlation was possible in all inflammatory lesions and adenocarcinomas. In dysplatic lesions of esophagus there was discrepancy in two cases on brush cytology. These two cases were categorized as well differentiated squamous cell carcinoma but on histopathology the diagnosis of moderate dysplasia was made.

**Table 1: Cytohistological correlation of Esophageal Lesions**

| Sl. No | Lesions | Cytology | Histopathology | Non-correlated cases |
|---|---|---|---|---|
| 1. | Inflammatory | 05 | 05 | nil |
| 2. | Barretts | - | 02 | 02 |
| 3. | Dysplasia | 05 | 07 | 02 |
| 4. | Sqauamous cell carcinoma | 17 | 15 | 02 |
| 5 | Adeno carcinoma | 05 | 05 | nil |

**Table 2: Cytohistological correlation in stomach lesions**

| Sl.No | Lesions | Cytology | Histopathology | Non-correlated cases |
|---|---|---|---|---|
| 1. | Inflammatory | 18 | 12 | 06 |
| 2. | Dysplasia | 05 | 03 | 02 |
| 3. | Adeno carcinoma<br>Well differentiated<br>Mod differentiated<br>Poorly differentiated<br>Signet ring cell carcinoma | <br>07<br>05<br>13<br>02 | <br>08<br>08<br>10<br>05 | <br>01<br>03<br>03<br>03 |
| 4. | GIST | - | 01 | 01 |
| 5. | MALT | - | 01 | 01 |
| 6. | Secondaries | - | 01 | 01 |

Of eighteen cases diagnosed as inflammatory lesions on final histopathological examination, only twelve could be categorized as inflammatory. Cytohistological correlation of dysplasia was good, except a case which on cytology diagnosed as moderate dysplasia turned out to be well differentiated adeno carcinoma. There was discrepancy in the degree of differentiation in cases of adeno carcinoma. Signet ring cell carcinoma could be made out in only two out of five cases by brush cytology. GIST, Lymphoma, secondaries and three cases of signet ring cell carcinomas could not be made out on brush cytology. The final histopathologic diagnosis in these cases was done after repeated endoscopic biopsies or on gastrectomy specimens as there was a high clinical suspicion.

**Table 3: Cytohistologic correlation in Duodenal Lesions**

| Sl.No | Lesions | Cytology | Histopathology | Non-correlated cases |
|---|---|---|---|---|
| 1. | Inflammatory | 04 | 02 | 02 |
| 2. | Adenomatous Polyps | - | 02 | 02 |
| 3. | Dysplasia | 04 | 04 | Nil |
| 4. | Adeno carcinoma | 06 | 06 | Nil |

Of 100 cases of upper Gi lesions 16 cases were seen in the duodenum. Brush cytology diagnosis in two cases of Adenomatous polyps were reported as inflammatory lesions on cytology. The confirmation was based on histological examination. Malignant lesions adenocarcinoma and premalignant lesions dysplasia correlated well.

## DISCUSSION

The primary role of GI cytology is cancer detection. Early GI malignancies are highly curable but unfortunately most of them are asymptomatic and advanced by the time of diagnosis. Early detection of a premalignant lesion can improve the survival rate and reduce morbidity. It can also improve the patients quality of life because less aggressive treatment is necessary [11]. The introduction of flexible fibreoptic endoscope which allows brushing under direct visual control has greatly expanded the usefulness and precision of this procedure [1, 11]. So direct vision brush cytology of the upper GIT mucosa as obtained through endoscope is now a standard method of diagnosis. The Japanese pioneered fibreoptic and brushing cytology because of the high rate of gastric carcinoma in Japan. Thus diagnostic brushing cytology is a well-established technique for the diagnosis of precancerous and cancerous lesions of upper GIT [12]. In India many institutions are adopting these techniques now. Its reliability has been reported to range from 75 to 90% in various series [13, 14]. Cytology as a sole modality of diagnosis of upper GIT lesions been used in mass screening projects in parts of the world where this disease is common [12]. In our study, the age of the patients ranged from 21 to 75 years with maximum number of patients between 45 to 65 year 75 males and 25 females. Most malignancies occurred in the $5^{th}$ decade. In the study of Vidyavathi *et al* majority of the patients were in the age group of 51 to 60 years with 48 males and 36 females [1]. Sensitivity and specificity in our study is 90% and 91% respectively. The sensitivity of this study is compared to other studies (table 4).

**Table 4: The sensitivity of this study is compared to other studies**

| Authors | Diagnostic sensitivity % |
|---|---|
| Vidyavathi *et al* [1] | 98.03% |
| Donoghue *et al* [7] | 97% |
| Cook *et al* [15] | 91% |
| Qizilbash *et al* [16] | 95% |
| Bita *et al* [17] | 100% |
| Present study | 90% |

The high sensitivity of our study and other similar studies underline the role of brush cytology in the diagnosis of endoscopically visible lesions of upper GIT. The limitation of cytology is its inability to distinguish dysplasia/carcinoma in situ and invasive carcinoma[1] Some authors prefer to perform the brushing after biopsy. But other studies have shown that the accuracy of cytology is more when brushing is done before biopsy. In our study, endoscopic brushing was done before biopsy.

## CONCLUSION

Brush cytology is a useful, inexpensive procedure that gives rapid diagnosis in cases of endoscopically visible suspicious lesions of upper GIT. It is an accurate diagnostic adjunct to biopsy in the detection of cancers at an early stage. It also serves as a good screening procedure for high risk patients and in the follow up of patients.

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