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Assessment of the efficacy of brush cytology with biopsy to diagnose upper GIT neoplasms

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Abstract
Background: Various techniques for the collection of cytological samples have been described. Endoscopic direct vision brush cytology is one among them. Brush cytology technique retrieves epithelial cells from a larger surface area of mucosa than that in a tissue biopsy.4 As malignant cells possess a lower level of intercellular cohesion than normal cells, brushing can selectively sample these dyshesive cells.
Aim: To assess the efficacy of brush cytology with biopsy to diagnose upper GIT neoplasms.
Materials and method: The present study was conducted in the department of Human Pathology of the medical institution. A total of 30 patients were included in the study. After visual examination of the lesion, a cytologic brush, which is made up of small nylon bristles at the tip with an outer protective sheath, is introduced through a separate channel in the endoscope. Histological sections were routinely stained by haematoxylin and eosin method. Smears were interpreted as negative for malignancy, suspicious for malignancy and positive for malignancy.
Results: A total of 30 patients were included in the study. The age of the patients ranged from 24 to 70 years with mean age to be 54.32 years. 18 patients were females and 12 patients were males. The obtained brushing smears showed 20 positive cases. 8 cases were suspicious and 2 cases were negative for malignancy. Biopsy of the lesions showed 17 positive cases, 10 atypical cases and 3 negative cases.
Conclusion: The brush cytology is a very efficient procedure for diagnosis of GI malignancies at it is inexpensive, provides rapid diagnosis, and minimal discomfort to patients. Cytology can be used as an adjunct to biopsy in the diagnosis of upper GIT neoplasms.

Keywords: brush cytology, biopsy, malignant, GI tract

1. Introduction
Any portion of the gastrointestinal tract may be affected by malignancy, however curiously the small intestine where most of the digestion takes place (with the exception of the region of the ampulla of Vater in the second portion of the duodenum) is rarely involved. The highest incidence of malignancy is in the esophagus, stomach and colorectal regions [1, 2] Cytologic sampling of the gastrointestinal tract is particularly useful for sampling of large areas of interest (for example large segment Barrett's esophagus, ulcerative colitis) where even with more extensive biopsy sampling protocols a larger surface area is sampled with cytologic brushing techniques than the more limited visualized biopsy sites. Cytologic sampling may be the sole specimen collected in very narrow areas of the intestinal tract (ducts and strictures), in subepithelial, submucosal and mural mass lesions and in endoscopic sampling of extraintestinal tissues adjacent organs or regional lymph nodes [3] Various techniques for the collection of cytological samples have been described. Endoscopic direct vision brush cytology is one among them. Brush cytology technique retrieves epithelial cells from a larger surface area of mucosa than that in a tissue biopsy [4]. As malignant cells posses a lower level of intercellular cohesion than normal cells, brushing can selectively sample these dyshesive cells. This procedure is noninvasive, cost effective and has a rapid turn over time [5]. The use of cytology in addition to biopsy still remains controversial, as it appears to duplicate biopsy [6] Hence, the present study was planned to assess the efficacy of brush cytology with biopsy to diagnose upper GIT neoplasms.

2. Materials and method
The present study was conducted in the department of Pathology of the medical institution. We selected patients who were advised to undergo endoscopy for the upper gastrointestinal symptoms such as dysphagia, vomiting retrosternal pain and anorexia. On endoscopy, patients with visible mucosal lesions such as ulcer, polypoid or ulcerative growth in the upper GIT were included in the study during a period of 2 years. A total of 30 patients were included in the study. After visual examination of the lesion, a cytologic brush, which is made up of small nylon bristles at the tip with an outer protective sheath, is introduced through a separate channel in the endoscope. The brush is advanced up to the lesion and the exfoliated cells are obtained by leading the brush several times across the lesion until mucosal bleeding is observed. The brush is then withdrawn into its sheath and removed. Two smears were made by directly smearing the brush onto a slide. Slides were fixed with a spray fixative containing 95% ethyl alcohol in carbowax. These slides were stained by haematoxylin and eosin and Papanicolaou stain. After brushing, multiple biopsies were taken from the surface and margins of the suspicious lesion. The tissue fragments were fixed. Histological sections were routinely stained by

haematoxylin and eosin method. Smears were interpreted as negative for malignancy, suspicious for malignancy and positive for malignancy.

The statistical analysis of the data was done using SPSS program for windows. Student's t test and chi square test were used for checking the significance of the data. The statistical significance was predefined at $p<0.05$.

3. Results

A total of 30 patients were included in the study. The age of the patients ranged from 24 to 70 years with mean age to be 54.32 years. 18 patients were females and 12 patients were males. Table 1 depicts comparison of malignancy score between results from cytology and biopsy in lesions from upper GIT. The obtained brushing smears showed 20 positive cases. 8 cases were suspicious and 2 cases were negative for malignancy. Biopsy of the lesions showed 17 positive cases, 10 atypical cases and 3 negative cases. On comparing the results we observed that results are statistically significant ($p<0.05$).

Table 1: Comparison of malignancy score between results from cytology and biopsy in lesions from upper GIT

Malignancy score	Cytology	Biopsy	p-value
Negative	2	3	0.02
Suspicious	8	10	
Positive	20	17	
Total	30	30	

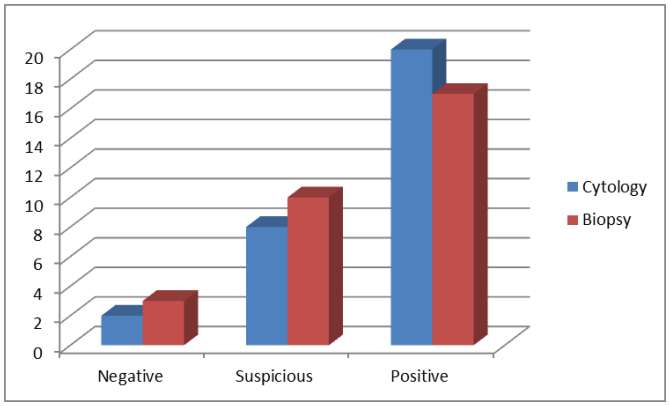

Fig 1: Prediction of malignancy by cytology and bipsy of lesions from upper GIT

4. Discussion

Over the past 25 years, there has been a remarkable progress in the various techniques used in the diagnosis of gastrointestinal cancer. The advent of endoscopy and endoscopic biopsy has greatly facilitated the detection and diagnosis of gastrointestinal lesions. However, the diagnostic value of cytology has been less recognized in the evaluation of malignant lesions [7].

In the present study we assessed the efficacy of brush cytology with biopsy to diagnose upper GI malignancy. We observed that brushing smears showed 20 positive cases. 8 suspicious cases and 2 negative cases for malignancy. Biopsy of the lesions showed 17 positive cases, 10 atypical cases and 3 negative cases. The results on comparison were statistically significant. The results were compared with previous similar studies from literature. The results were observed to be consistent. Qizilbash AH *et al* performed brush cytology and biopsy under direct vision on 250 patients. Of the 44 proven cases with cancers of the upper gastrointestinal tract, brush cytology yielded positive results in 88.6%, and multiple mucosal biopsies yielded positive results in 93.2%. With the combined technique the results increased to 95.4%. False-negative results were due to large tumors with necrotic surfaces or to infiltrative tumors at the cardioesophageal junction. There was one false positive with brush cytology and none with biopsy. Four cases of early gastric cancer were diagnosed with the combined technique. Moreno-Otero R *et al* performed endoscopy complemented by directed biopsies and exfoliative cytology on 593 patients with different gastric lesions. Of the 194 cases of proven adenocarcinoma of the stomach, cytology was positive for malignancy in 176 (90.7%) and yielded the highest diagnostic rate. Endoscopy correctly diagnosed 171 cases (88.1%), and biopsy had the lowest accuracy, 153 cases (78.9%). The combined use of the three techniques increased the positive diagnosis to 185 adenocarcinomas (95.4%). Only three early gastric cancers were diagnosed by the combined methods, with only cytology positive in all three cases. There were five (1.3%) false-positive cytologic reports, principally due to benign gastric ulcers. It is concluded that these techniques have a complementary function in distinguishing benign from malignant gastric lesions. Since the value of endoscopic signs is limited, biopsy and cytology should always be performed. Exfoliative cytology plays an effective diagnostic role in cancer of the gastrointestinal tract and should be used more frequently by gastroenterologists, who, however, should be aware of the risk of false-positive results [8, 9].

Shroff CP *et al* conducted direct-vision endoscopic examination on 4,000 patients for persistent upper gastrointestinal (GI) complaints over a period of five years revealed 350 visible lesions that were subjected to brushing cytology and biopsy. Cytologic examination of brushing smears from all 350 cases showed malignant cells in 67 (19.14%), cells suggesting benign polypoid neoplasms in 4 (1.14%), ulcerative and reparative features with attendant atypias in 186 (53.14%), inflammatory findings in 91 (26%) and false-negative findings in 2 cases (0.57%). Only 259 (74%) of the visible lesions were also subjected to endoscopic biopsy. Of the 67 patients with positive cytology, 52 were judged positive on the biopsy specimen; the 2 false-negative cytologic reports were confirmed as positive by biopsy. In four patients with gastric ulcers, malignant cells were seen along with gastric repair cells. This study indicates that brushing cytology is very useful in detecting benign ulcerative lesions with their atypias, a feature that could be useful in monitoring and controlling lesions in high-risk groups of patients, such as in India. In this study, endoscopic brushing cytology gave a better diagnostic yield than did endoscopic tissue biopsy. However, the two techniques are complementary for the diagnosis of upper GI malignancies. O'Donoghue JM *et al* examined the role of cytology in the differentiation of benign from malignant mucosal lesions in 2,183 consecutive patients who underwent esophagogastroduodenoscopy. Malignancy was confirmed in 394 patients. Both endoscopic biopsy and cytology were

positive in 275 of 394 (69.8%) patients. Endoscopic biopsy provided the diagnosis in the presence of negative cytology in 73 of 394 (18.5%) cases, while cytology was positive after a negative biopsy in 36 of 394 (9.2%) patients. Ten of 394 (2.5%) patients were not diagnosed preoperatively using either modality. Endoscopic biopsy yielded a sensitivity of 88.3%, specificity of 99.9%, positive predictive value of 99.7% and negative predictive value of 97.6%. Cytology alone, in contrast, yielded a sensitivity of 79%, specificity of 98.5%, positive predictive value of 92.3% and negative predictive value of 95.6%. With the additional use of cytology, the diagnostic yield was increased from 88.3% to 97.5%. They concluded that upper gastrointestinal exfoliative cytology is a useful adjunct in the investigation of patients with suspicious mucosal lesions [10, 11]

5. Conclusion

Within the limitations of present study we conclude that brush cytology is a very efficient procedure for diagnosis of GI malignancies at it is inexpensive, provides rapid diagnosis, and minimal discomfort to patients. Cytology can be used as an adjunct to biopsy in the diagnosis of upper GIT neoplasms.

6. References

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