

Original Research Article

Cyto-histological correlation in diagnosis of gastrointestinal lesions- a prospective study in a tertiary care institute

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ABSTRACT

Background: Gastrointestinal tract is involved by a large number of inflammatory, infectious and neoplastic diseases. There is a worldwide rising incidence of GIT lesions especially neoplasms.

Methods: This study was planned to correlate endoscopic and colonoscopic brush cytology with histopathology of gastrointestinal lesions and to determine the spectrum of gastrointestinal lesions in patients subjected to endoscopic brushings and biopsy.

Results: Sensitivity of upper GI brush cytology was 95.15% and specificity 90.41%. Sensitivity of colonoscopic brush cytology was 100% and specificity 86.79%. The accuracy of brush cytology came out to be 92.45% in upper GIT and 92.22% in lower GIT.

Conclusions: Brush cytology is a non-invasive and cost-effective method to retrieve epithelial cells from a much larger surface area of the mucosa, thus allowing thorough sampling and increasing the diagnostic yield.

Keywords: Cytology, Gastrointestinal tract, Neoplasms

INTRODUCTION

Gastrointestinal tract is involved by a large number of inflammatory, infectious and neoplastic diseases associated with a high degree of morbidity and mortality. Appropriate management of these patients depends entirely on the pathological diagnosis as this dictates the appropriate treatment. Esophageal and gastric cancers are common in the non-industrialized countries while colorectal cancer is predominant gastrointestinal malignancy in westernized countries.¹

Biopsies help to establish a specific diagnosis, determine disease extent and response to therapy and detect cancers or their premalignant stages. Brush cytology is a non-invasive and cost-effective method to retrieve epithelial

cells from a much larger surface area of the mucosa, thus allowing thorough sampling of dyscohesive malignant cells. Biopsies and brush cytology samples together significantly improves the overall diagnostic yield. This study was planned to correlate endoscopic and colonoscopic brush cytology with histopathology of gastrointestinal lesions and to determine the spectrum of gastrointestinal lesions in patients subjected to endoscopic brushings and biopsy.

METHODS

This cross-sectional study was performed from June 2011 till December 2012, i.e. for a period of 18 months in the department of Pathology in Indira Gandhi Medical College, Shimla, Himachal Pradesh. Written informed

consent was taken from all the patients. Ethical clearance was taken from the institution's ethical clearance committee before starting the study.

Inclusion criteria

The samples for cytological and histological examination were collected from the indoor/outdoor patients in the department of Gastroenterology, IGMC, Shimla in whom clinical or radiological findings and endoscopic/colonoscopic examination suggested gastrointestinal tract lesion. 474 patients were studied.

Exclusion criteria

Patients not giving written consent for the test and uncooperative patients were excluded.

Sampling techniques

The samples were obtained by flexible fibre-optic endoscopy and colonoscopy by the gastroenterologist.

Endoscopic and colonoscopic brushing material was smeared directly on to at least two clean glass slides. The air dried smears were stained with Geimsa stain. Endoscopic and colonoscopic biopsies were examined

grossly and fixed with 10% formalin. After processing, sections were stained with haematoxylin and eosin stain.

Special stains like ZN stain, PAS, Mucicarmin, alcian blue were used

Validation of cytological diagnosis was done on the basis of histological diagnosis.

Statistical analysis

The sensitivity, specificity and accuracy of brush cytology was calculated. All the data was analyzed in SPSS software version 22.0 (IBM, USA).

RESULTS

580 patients who presented with gastrointestinal tract symptoms showed lesions on endoscopy and colonoscopy. Out of these, 474 cases were subjected to both brush cytology and biopsy.

Lesions in pyriform fossa were seen in 2 patients. One had ulcer and the other had polypoid growth on endoscopy. Both revealed squamous cell carcinoma on biopsy. In both the cases, brush cytology was negative for malignancy.

Table 1: Cytohistological and clinical correlation of 94 esophageal lesions.

Clinical suspicion	Cytology results	No. of patients	Histopathology results	No. of patients
Benign lesion (n=9)				
Corrosive poisoning	Consistent with ulcer	1	Superficial biopsy	1
Barrett oesophagus	Consistent with BE	1	Inadequate tiny biopsy	1
Barrett oesophagus	Benign	1	Negative	1
Esophagitis	Benign and reactive	1	Consistent with esophagitis	1
Peptic stricture	Benign and reactive	2	Consistent with peptic stricture	2
Esophageal ulcer	Benign and reactive	3	Benign and reactive	3
Suspicious of malignancy (n=85)	Benign	23	Benign	24
	Positive for malignancy	46	SCC	51
			Adenocarcinoma	5
			Adenosquamous carcinoma	2
			Small cell carcinoma	1
Scant (suspicious)	16	Inadequate biopsy	2	

Lesions in esophagus were seen in 94 patients. Age of the patients ranged from 25-90 years. Male: female ratio was 2.24:1. 9 patients had benign appearing lesions on endoscopy. 85 patients had suspicion of malignancy on endoscopy, out of which 59 had esophageal cancer while in 2 cases biopsy was superficial, hence, inadequate for evaluation. One case suspicious of infiltration from outside did not reveal malignancy on biopsy. Two operated cases of esophageal carcinoma included in the study were suspicious of recurrence on endoscopy but were negative for malignancy on both brushings and biopsy (Table 1).

Lesions in gastroesophageal junction were seen in four patients. Male: female ratio was 1:1. Two cases positive for malignancy on cytology revealed adenocarcinoma and squamous cell carcinoma. The other two cases had scant material on cytology and one had no evidence of neoplasia while other had inadequate biopsy.

Lesions in stomach were seen in 251 patients. Age of the patients ranged from 8-85 years Male: female ratio was 1.82:1. 20 had benign appearing lesions on endoscopy, rest of the cases were suspicious of malignancy. There were 97 biopsy proven cases of malignancy. Among the

cases negative for malignancy, two cases of GIST, one benign polyp and one case of strongyloides hyperinfection involving stomach were detected. Out of 97 biopsy proven cases of malignancy, 95 cases were of adenocarcinoma (one of them revealing oncocyctic

differentiation) and 2 cases of NHL. IHC was advised in one case of poorly differentiated adenocarcinoma to rule out NHL. IHC was negative for lymphoma. Brushings were positive in 83 (85.57%), negative in 5 (5.15%) and suspicious in 9 (9.27%) cases (Table 2).

Table 2: Cytohistological and clinical correlation of 251 gastric lesions.

Clinical suspicion	Cytology results	No. of patients	Histopathology results	No. of patients
Benign lesions (n=20)				
Erosions	Benign and reactive	2	Gastritis with erosions	2
	NHL	1	NHL	1
	Scant cellular material	1	NHL	1
Gastric ulcer	Benign, consistent with ulcer	12	H pylori chronic active gastritis	2
			Healed gastric ulcer	1
			Chronic superficial gastritis	9
			Chronic superficial gastritis	2
H Pylori gastritis	Benign and reactive	2	Chronic superficial gastritis	2
ZE syndrome	Scant benign	1	Consistent with ZE syndrome	1
Diminutive polyp	Benign	1	Heterotopic pancreatic rest	1
Suspicious of malignancy (n=231)	Benign	121	No evidence of neoplasia (chronic gastritis/ulcer)	124
	Positive for malignancy	93	GIST	2
	Scant (suspicious)	17	Benign polyp	1
			Strongyloides hyperinfection	1
			Adenocarcinoma	95
			Inadequate biopsy	8

Table 3: Cytohistological and clinical correlation of 33 small intestinal lesions.

Clinical suspicion	Cytology results	No. of patients	Histopathology results	No. of patients
Brunner gland hyperplasia	Benign	1	Non-specific duodenitis	1
Tuberculosis/ CD	Benign and reactive	1	Non-specific ileitis	1
	Benign	12	No evidence of neoplasia	12
Periampullary pathology	Positive for malignancy	1	Adenocarcinoma	1
	Poor preservation	1	No evidence of neoplasia	1
	Poor preservation	1	Strongyloidiasis	1
IPSID	Poor preservation	1	Strongyloidiasis	1
GIST/ Duodenal ulcer	Benign and reactive	1	No evidence of neoplasia	1
Chronic duodenal ulcer	Benign and reactive	5	No evidence of neoplasia	5
Infiltration from outside	Benign	2	No evidence of neoplasia	2
Carcinoma duodenum	Positive for malignancy	2	Adenocarcinoma	3
	Benign	2	NHL	1
	Scant (suspicious)	4	No evidence of neoplasia	4
Carcinoma rectum	Benign	1	SRUS	1

33 patients presented with lesions in small intestine. Age of the patients ranged from 18 to 85 years. There were 30 males and 3 females with male:female ratio of 10:1. Biopsy was positive for malignancy in 5 cases (Table 3).

Colorectal and anal lesions were seen in 90 patients. Age of the patients ranged from 21-85 years. There were 55 males and 35 females with male:female ratio of 1.57:1. 10 had benign appearing lesions on colonoscopy, rest were suspicious of carcinoma and/or IBD. Biopsy was positive for malignancy in 37 cases. Brushing was

positive in 33 cases (89.19%) and scant suspicious in 4 (10.81%) cases. One polyp suspicious of malignancy proved to be a tiny adenomatous polyp both on biopsy and brushings. Among cases suspicious of recurrence, two were positive for malignancy in brushing as well as biopsy (Table 4).

Sensitivity of upper GI brush cytology was 95.15% and specificity 90.41%. Sensitivity of colonoscopic brush cytology was 100% and specificity 86.79%. The accuracy of brush cytology came out to be 92.45% in upper GIT and 92.22% in lower GIT.

Table 4: Cytohistological and clinical correlation of 90 colorectal & anal lesions.

Clinical suspicion	Brush cytology results	No. of patients	Histopathology results	No. of patients	
Polyp	Benign	4	Benign polyp	4	
IBD with polyposis	Positive for malignancy	1	Adenocarcinoma	1	
SRUS	Benign	1	Superficial biopsy	1	
IBD/tuberculosis	Granulomatous lesion	1	Granulomatous lesion/CD	1	
	Benign	3	No e/o tuberculosis/IBD	3	
IBD/Tuberculosis/ carcinoma	Benign	7	Adenocarcinoma	1	
	Positive for AFB	1	Non-specific colitis	7	
	Scant cellular material	1	Granulomatous colitis	1	
Carcinoma anal canal	Benign	1	No e/o neoplasia	1	
	Scant (suspicious)	1	Squamous cell carcinoma	1	
Carcinoma colon/rectum	Positive for malignancy	29	Positive for malignancy	32	
	Benign	19	Non-specific colitis	22	
	Adenomatous polyp with atypia	1	Adenomatous polyp with atypia	1	
	Scant (suspicious)		12	Granulomatous colitis	1
				Inadequate	5
Recurrence of carcinoma	Positive for malignancy	2	Positive for malignancy	2	
	Benign	4	Non-specific colitis	4	
Carcinoma urinary bladder extending to rectum	Benign	1	Non-specific colitis	1	
Carcinoma rectum	Benign	1	SRUS	1	

DISCUSSION

This study was undertaken to assess the efficacy of brush cytology in the diagnosis of gastrointestinal lesions. Mean age of the patients was 57.62 years. The mean age is comparable to the studies conducted by Giramizah et al and Vidyavathi et al.^{2,3} In our study, out of 474 patients, 315 (66.46%) were males and 159 (33.54%) were females, the male to female ratio being 1.98:1. This ratio is in conformity with the ratio reported by Bardawil et al, Geramizah et al and Vidyavathi et al.²⁻⁴

Maximum number of patients presented with lesions in stomach (52.95%) followed by esophagus (19.83%) and colorectum (18.98%) while in study by Bazaz-Malik et al and Sharma et al, colorectum was the predominant site with maximum number of cases.^{5,6} However, a study from south India revealed stomach as the commonest site (48.4%) followed by esophagus (27.7%), rectum (6.5%) and colon (5.0%) which was similar to the results of our study.⁷

86.44% cases from esophagus revealed squamous cell carcinoma. Other studies also show that squamous cell carcinoma is the most common malignancy in the esophagus.⁸

80% cases of small intestinal malignancy revealed adenocarcinoma.

In lower GIT, anorectal region was the predominant site with 43.33% cases. Similar findings were seen in studies

conducted by Sayeed et al and Kontzoglou et al.^{9,10} Adenocarcinoma was the most common malignancy (97.3%) in lower GIT as seen in other studies. Left side colon was predominant site of lower GIT malignancy with 59.46% cases of malignant lesions. Right side colon showed 24.32% cases with malignant lesions, 10.81% cases were of transverse colon carcinoma and 5.40% cases were of recurrence of carcinoma at anastomosis site. There was one case of synchronous carcinoma in the colon in our study. The results of present study are comparable to that of previous studies.

Sensitivity of upper GIT brush cytology in this study was 95.15% and specificity was 90.41% while sensitivity and specificity of lower GIT brush cytology were 100% and 86.79% respectively. The accuracy came out to be 92.45% in upper GIT and 92.22% in lower GIT brush cytology. Cook et al in their study found sensitivity of combined cytology and biopsy to be 91%.¹¹ They concluded that brush cytology should be reserved for situations in which difficulty is encountered in obtaining adequate tissue for histological examination. In a study by Geramizah et al sensitivity was 95.4% and 100%, respectively with combined use of cytology and biopsy.²

In the present study, there were 8 false negative cases in upper GIT (one in esophagus, 2 in pharynx and 5 in stomach). These cases could be due to incorrect brushing of the suspicious lesion leading to a sampling error or inadequate number of collected cells. In some of the cases of brush cytology, smears were so poorly preserved that a definite cytological diagnosis was not possible.

There were 29 false positive cases (2 in esophagus, 19 in stomach and 7 in colorectal region). In some cases, biopsy was superficial, containing only necrotic material or having extensive inflammatory and regenerative changes. Presence of false positive results by brush cytology in relation to biopsy indicates the need to include other investigative procedures in addition to biopsy to diagnose gastrointestinal lesions.

CONCLUSION

Therefore, from this study we conclude that brush cytology can be used as an adjunct to tissue biopsy during the investigation of patients with suspicious mucosal lesions of gastrointestinal tract. Since cytology report is prepared in one day while biopsy report takes a minimum of 5-6 days, early tentative diagnosis can help in preparing the patient for surgery/appropriate management till the biopsy report is prepared.

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Ethical approval: The study was approved by the Institutional Ethics Committee of Indira Gandhi Medical College, Shimla

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