



## Imprint and Scrape Smear Cytology as A Rapid Diagnostic Tool

### KEYWORDS

imprint/scrape smears cytology, intra operative cytology

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**ABSTRACT** *Background: Intra operative pathological assessment has offered a very valuable service in patient management. Frozen section (FS) is routinely used by many surgical pathology laboratories and has been the mainstay of rapid diagnosis in histopathology laboratories. Nonetheless, certain relative limitations and precautions still exists can result in grave mistakes that will be detrimental to the patient's management. In many centers frozen section facility not available. Many studies have been done in the past to evaluate the role of cytology in intra operative diagnosis.*

*Aim and objectives: To evaluate the utility of imprint /scrape cytology for the rapid diagnosis of surgically removed specimens and its utilization for learning cytopathology.*

*Materials and Methods: 130 surgically removed specimens from various organs and systems were studied. Smears were taken from each specimen before formalin fixation and stained by modified rapid H&E and Papanicolaou staining. Cytological diagnosis was made and then results were compared with the histological diagnosis taking the latter as the gold standard.*

*Results: Out of the 130 cases sampled, 130 were satisfactory for evaluation. Overall accuracy rate was 96.15% and in 107 cases could be specifically diagnosed as nonneoplastic/ benign and malignant tumors (82.3%). Two cases of false positive diagnosis (5.9%) and 3 false negative diagnosis (3.1%) were made. Positive predictive value was 97.9% and negative predictive value was 91.4%.*

*Conclusions: Imprint /scrape cytology is a good complement for the rapid diagnosis in histopathological study of tumor/tumor like lesions and intra operative cytology can be used an adjunct to frozen section. In addition the skill and expertise developed by routinely practicing intra operative cytological technique can be applied to the interpretation of FNAC.*

### Introduction

Intraoperative pathological assessment is frequently requested to establish the nature, lesion, grade of a neoplasm or to determine the adequacy of margins/biopsy material. Frozen section (FS) is routinely used by many surgical pathology laboratories with an overall accuracy rate of 92% to 98% depending on type of cases/centre studied. Nonetheless, certain Sampling/Technical/ Interpretative limitations and precautions still exist can result in grave mistakes that will be detrimental to the patient's management so it must be used prudently to avoid the indiscriminate usage of this important technique<sup>1</sup>.

In a large series of 2,250 intra-operative cytology performed along with FS, Scucchi LF et al reported the diagnostic accuracy of each technique alone was 94.9% for FS and 96% for cytology. They noted that although specific diagnoses were more frequently formulated on the basis of FS examination, FS were not diagnostic in 113 cases in which cytology allowed a specific diagnosis<sup>2</sup>. Wakely PE et al concluded that intra-operative cytology (IOC) serves as a useful supplement in FS diagnosis and, in some situations (particularly when tissue is limited), can replace histologic FS examination<sup>3</sup>. Many studies have demonstrated that the diagnostic efficacy of IOC is comparable to that of FS<sup>4</sup>.

Since the introduction of ultrasound and CAT scan guided fine needle aspiration almost any deep seated lesions/ tumors in the body can be sampled for preoperative diagnosis. So, practicing pathologists have to get familiarized with the cytomorphological pattern of lesions of various organs.

The skill and expertise developed by routinely practicing IOC technique can be applied to the interpretation of FNAC. As compared to FS, IOC is a simple, fast, easy, reliable, inexpensive technique with excellent preservation of cellular details, and does not require special instrument like the cryostat, nor any loss of tissue as occurs with cryostat sections and can be interpreted in the light of gross findings. The utility of imprint /scrape cytology as a rapid diagnostic tool of surgically removed specimens and its utilization for learning cytopathology was done by comparing Cytological results with the histological diagnosis.

### Materials and Methods

The study included 140 surgically removed specimens from various sites of body of patients admitted in Medical College Kottayam, Kerala with clinical suspicion of malignancy during a period of 2 years from Dec.1989 to 1991. The smears prepared from 10 cases especially during early period of study were unsatisfactory due to paucity of diagnostic cells and were excluded from study. Immediate Gross examination of the specimen of tumor removed from the patient was done by inspection and palpation. The specimen was then cut with a sharp knife into two halves. The cut surface was wiped off the excess blood, if present, with the help of a filter paper. The most appropriate area thought to be representative of lesion was chosen. Depending on the consistency of the lesion, touch, scrape or crush techniques were used to prepare cytological smears. Imprint smears are made from soft/fleshy lesions. The crush/Squash smears technique was used for lesions that were friable or necrotic, are made by crushing

a small fragment of representative tumor tissue between two glass slides and then smearing it. Scrape smears from dense/sclerotic lesions. The area was scraped with a sharp scalpel or the end of a glass slide. A semi fluid drop thus obtained was spread over a glass slide in the same manner as FNAC. On an average, five labeled smears per case were taken from different representative areas. The slides were immediately put into 95% ethyl alcohol and stained with modified rapid H&E staining, Papanicolaou stain and special stains if needed. Total time taken for smear preparation, staining and reporting was about 10 minutes. The slides were examined immediately and diagnosis made after correlation with clinical findings as nonneoplastic/ benign or malignant (Table-1). The specimens were then fixed in 10% formal saline. Sections were taken from the same area from where scrapings were taken. Paraffin blocks of the sections were processed in the routine way and 4 µm thick sections were stained with hematoxylin and eosin (H and E). The diagnosis obtained by cytology was compared with final histopathological diagnosis and analyzed (Table-2). The diagnostic sensitivity specificity, accuracy, to differentiate between benign and malignant lesions is assessed (Table-3).

### Results

The study included 130 surgically removed specimens. Primary aim of study was to differentiate malignant from non malignant lesions. (Table-2) Sensitivity of detection of malignancy was 96.9%, specificity was 94.1%. Two false positive diagnosis (5.9%) and three false negative (3.12%) were made with a positive predictive value of 97.9% and negative predictive value of 91.4%.

### Discussion

History of scrape/imprint cytology can be traced back to 1927 when Leonard S. Dudgeon and Vincent Patrick at

the University of London raised the horizons of the rapid cytological diagnosis of freshly cut specimens with reliable accuracy rates. Following this, several studies done in the past have discussed the use of imprint and touch preparation, especially as a tool for intraoperative diagnosis. Recently, Touch imprint cytology is also used as an adjunct to assess the adequacy of the sample obtained by Ultra Sound or CT guided biopsies and is found to be very useful in reducing the number of passes a radiologist may have to perform on a particular patient<sup>5</sup>. Commonly used methods for cytological evaluation are touch preparation, fine needle aspiration cytology (FNAC), and squash and scrape smear preparation. Sachin S Kolte, Rahul N Sankar<sup>6</sup> found that smears prepared after scraping of tumor yielded uniformly cellular smears. Sato et.al<sup>7</sup> described a modified rapid Papanicolaou stain for imprint smears. Diagnostic accuracy of the present study is compared with previous and new ones (Table-3)<sup>8</sup>. Conclusions: Imprint or scrape smears are a good complement to histopathology in the study of neoplasms. At the centers where the facilities of frozen section are not available, intraoperative scrape cytology is a useful tool for intraoperative diagnosis of tumor. This significant educational value coupled with its intrinsic simplicity and rapidity and cost effectiveness will likely necessitate the widespread implementation of this diagnostic technique in the near future.

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**Table-1: System/Organ wise distribution of cases and Results of 130 surgical specimens**

System	Non-neoplastic	Cytology Results					No. of histologically accurate cases
		Benign	Suspicious	Malignant	False (+ve)	False (-ve)	
FG S							
Ovary		9	1	15	1	1	21
Uterus		1	1	2			4
Vagina		1					1
BREAST	4	2		22			26
Male UGS	3			3			5
Kidney		1		4			3
Uri. bladder				1			
GIT							
Salivary glands		2		2			4
Stomach		1		6			6
Small Int.	1	1	1	1		2	2
Large Int.				6			6
Lung & Mediastinum	1	2					3
Skin				5			5
Soft tissue	2	1	2	18	1		14
Bone		1		2			2
Miscellaneous	1	1		3			5
<b>TOTAL</b>	<b>12</b>	<b>23</b>	<b>5</b>	<b>90</b>	<b>2</b>	<b>3</b>	<b>107</b>

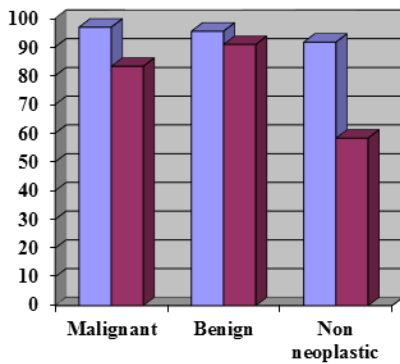
**Table-2: Distribution of cases diagnosed on cytology and histology**

Cases	Cytology number	Histopathology Diagnosis			
		Non Neoplastic	Benign	Borderline	Malignant
Non Neoplastic	12	11	-	-	1
Benign	23	-	21	-	2
Suspicious	5	-	1	4	-
Malignant	90	1	-	-	89
<b>Total</b>	<b>130</b>	<b>12</b>	<b>22</b>	<b>4</b>	<b>92</b>

**Table-3.comparison with other studies in literature**

Author	Year	No. of cases	% of accuracy
K. C. Suen et.al.,	1978	1258	98.3
Sherley et.al.,	2005	120	92.2
Badami Harnish et.al.,	2010	119	92.63
<b>Present study</b>	<b>1991</b>	<b>130</b>	<b>96.15</b>

**Graph-1: Diagnostic Accuracy according to type of lesion**



■ Diagnostic accuracy according to the Lesion  
■ Diagnostic accuracy in relation to specific histological type

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