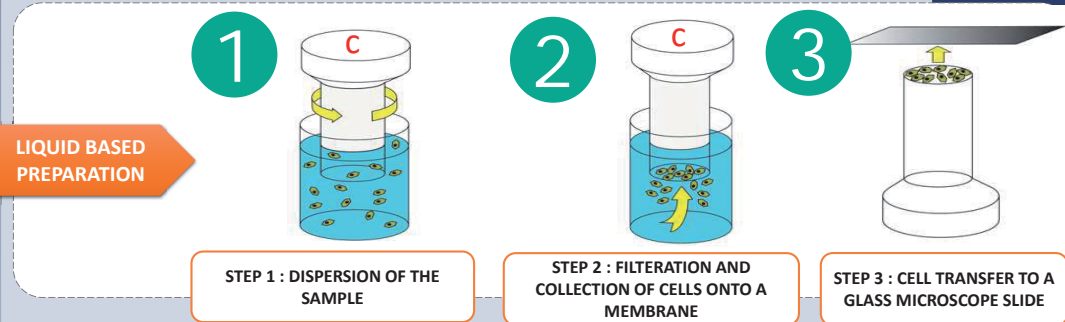


LIQUID-BASED CYTOLOGY AND CELL BLOCK – NOVEL TECHNIQUES TO AUGMENT THE DIAGNOSIS

LIQUID-BASED CYTOLOGY

Method of immediate wet cell fixation with automated slide preparation that enables cells to be suspended in a monolayer by providing a blood- and mucus-free field.

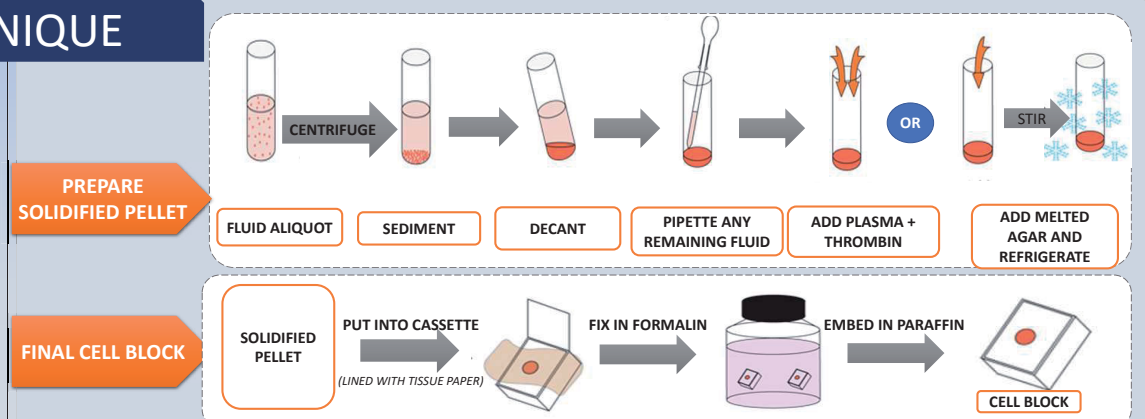
TECHNIQUE



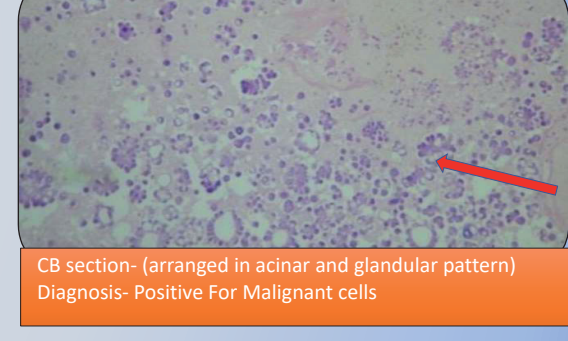
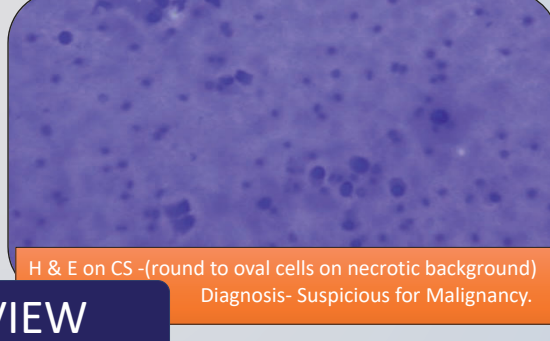
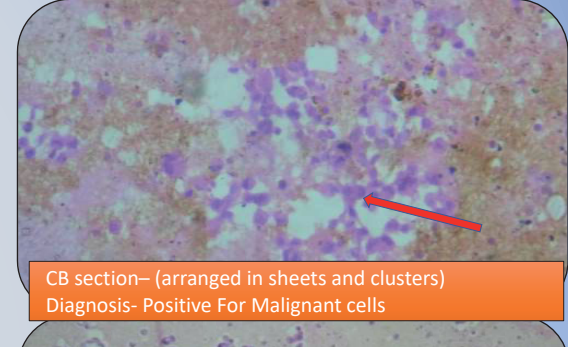
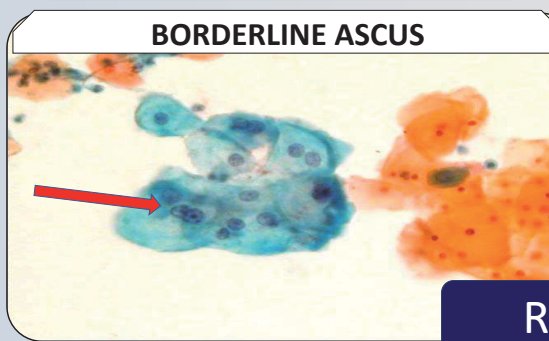
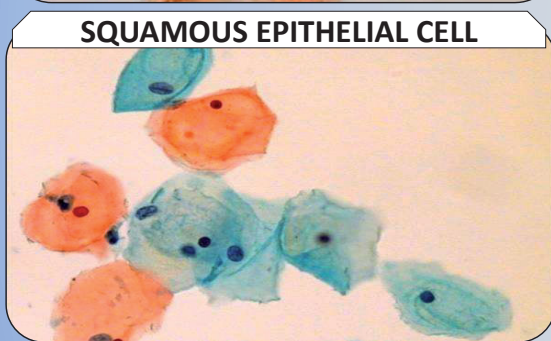
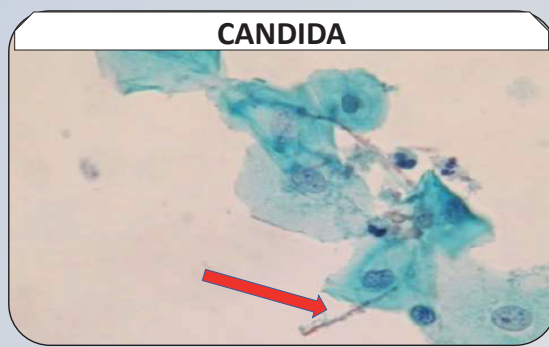
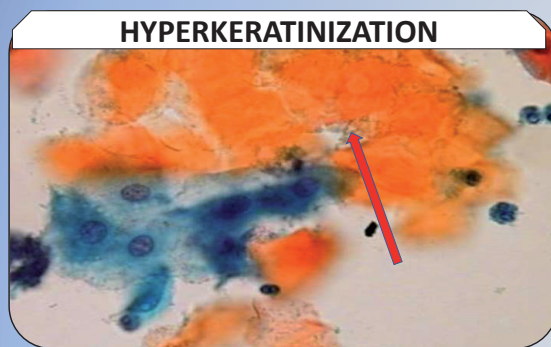
The aspirate sample is gently agitated to disperse mucus and other debris and promote random distribution of cells. A vacuum is then applied to force the broken erythrocytes and debris to pass through a thin polycarbonate filter attached to the end of the cylinder (C) while the cells of interest adhere to the surface of the filter. The cylinder is finally removed, inverted, and pressed against a slide while gentle positive air pressure is applied to ensure transfer and adherence of cells to the slide.

CELL BLOCK

Method of converting aspirated material into solid cytological material so that it can be processed, sectioned, stained, and viewed as a histological section.



Preparing a cell block requires centrifugation of aspirate sample to concentrate the cells. Supernatant is then discarded, and the cell pellet is solidified either by using the thrombin clot technique or by adding a gelling agent. The solidified pellet is put in a cassette lined with a filter paper, closed and fixed in neutral formalin for several hours followed by embedding and sectioning.



REVIEW

- Bandoh et al¹ concluded from their study that LBC with FNA specimens from cervical lymphadenopathy are a useful and reliable method for the diagnosis of malignant diseases, especially of metastatic carcinomas, due to its increased sensitivity compared with CS cytology.
- Remmerbach TW et al² highlighted that in oral cytology, LBC may replace other types of wet-fixed preparations by evaluating all collected cells, which results in enhanced specimen viewing, further improving the quality and diagnostic accuracy.

	CS	LBC
Sensitivity	96.30%	97.53%
Specificity	90.63%	68.75%
PPV	96.30%	88.76%
NPV	90.63%	91.67%

- Kshatriya A S et al³ emphasized that cellblock method allows recovery and processing of minute amount of cellular material and facilitates better classification of tumor and therefore should be considered in all FNAC specimens when possible.
- Comparison between CB and SC methods for pancreatic lesion diagnosis in various studies as follows-

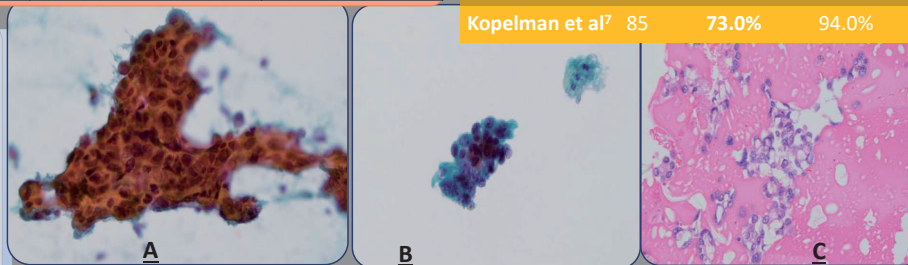
	CB					CS				
	n	SENSITIVITY	SPECIFICITY	PPV	NPV	n	SENSITIVITY	SPECIFICITY	PPV	NPV
Noda et al ⁴	85	92.0%	100%	100%	88.9%	85	60%	62.5%	93.8%	60.6%
Ardengh et al ⁵	178	85.2%	93.1%	98.4%	55.1%	178	61%	100%	100%	36%
Haba et al ⁶	956	74.9%	78.6%	99.8%	38.2%	963	88%	95.2%	100%	54.5%
Kopelman et al ⁷	85	73.0%	94.0%	96.0%	66.0%	99	63%	100%	100%	63%

ADVANTAGES

- Immediate fixation with enhanced nuclear and cytoplasmic detail
- All material collected is available for microscopic evaluation
- A small representative field
- Clear background
- Sample screening is less time consuming

CHALLENGES

- LBC is more expensive than conventional test
- Blood mucous inflammation and malignant diathesis are still present
- Epithelial cells appear mostly as single cells and are slightly smaller than they appear in conventional smears
- Loss of relationships between cells and spread of abnormal cells



Yeon M H et al⁸ gave microscopic images of bile fluid. (A) CS shows larger tumour clusters with dirty background (PAP, x200). (B) LBC shows smaller tumour clusters with a clear background (PAP, x400). (C) CB shows cell clusters (x400).

Qin S-y et al⁹ concluded Diagnostic efficacy of SC, LBC, and CB methods in pancreatic lesions

	CS	LBC	CB
Sensitivity	70.0%	73.3%	90.0% *
Specificity	100%	100%	100%
PPV	100%	100%	100%
NPV	30.0%	31.6%	66.7% *

ADVANTAGES

- Simple, reproducible and readily adaptable in the lab
- Preservation of architectural pattern and better appreciation of morphological feature
- Shows intact cell membranes and crisp chromatin details
- Adequate cellularity and delineation of nucleus and cytoplasmic details
- Loose cells, cell aggregates, and microscopic tissue fragments are easily recoverable

CHALLENGES

- Delay in diagnosis as compared to conventional smear
- Risk of losing material during processing
- Due to centrifugation, artefacts mesothelial cells may form pseudoacini, pseudopapilla that may cause confusion

CONCLUSION

The literature search concludes that LBC and CB techniques are superior than conventional techniques and are used in medical practice due to accurate diagnosis. However, use of this technique in oral pathologies is limited. So, more studies are needed to be done in order to evaluate their sensitivity and specificity in head and neck pathology.

REFERENCES

- Clin Oral Investig 2017 Jan 11.
- J Cytol 2016 Jul-Sep;33(3):141-144.
- J Gastroenterol 45: 868-875.
- World J Gastroenterol 13: 3112-3116.
- World J Gastroenterol 13: 3112-3116.
- J Gastroenterol 48: 973-981.
- Cytopathology 22: 174-178.
- KJIM. 2017 Sep 13
- PLoS ONE 9(9): e108762. doi:10.1371/journal.pone. 0108762
- Pleura and Peritoneum 2016; 1(1): 45-56
- IOSR-JDMS. Apr. 2016. 15; 4 : 86-99
- Cancer Cytopathol 2016 Jul;124(7):508-18
- Am J ClinPathol.2000;114:599-606.