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A study of usefulness bronchoalveolar washing cytology in diagnostic of lung cancer

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Abstract
Objective:
A regular collection of cytology specimens from bronchoalveolar washing is expected to increase the ability of bronchoscopy to diagnose lung cancer. However, we aimed to study the sensitivity of cytology washing tests for diagnosing malignant lung lesions.
Methods:
This is a retrospective study including 68 patients who underwent different thoracic surgeries for lung cancer in St. Vincent University Hospital from June 2013 to March 2020. The results of all cytology specimens from bronchoalveolar washing were reviewed from the patients' files.
Results:
Out of 68 patients, the predominant type of lung cancer was adenocarcinoma (54.4%) and squamous cell carcinoma (22.2%). Most of the patients were in stage I (67.6%). The positive cytology result as malignant cells was shown in 5 patients (7.4%). Also, another 5 patients (7.4%) had atypical cells.
Conclusion:
The value of cytology specimens from bronchoalveolar washing in this study was not significant. This may be due to increasing the incidence of adenocarcinomas. Eliminating this technique could be considered in centers with similar experiences.
Key Words: *cytology, lung cancer, sensitivity.*

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I. Introduction :

Lung cancer is the most common cancer worldwide and Despite a decrease in lung cancer mortality but it is the most common cancer-related mortality (26.2%) [1]. The critical thing for the treatment of lung cancer with the best results is the early diagnosis. An important step in the treatment of lung cancer is to confirm the cytology type of cancer. Accordingly, there are different diagnostic approaches for lung cancer, started with bronchoscopy (flexible or rigid) with lavage and biopsy, radiological images, and radiological guided biopsy, ending with surgical biopsies [2][3][4].

Bronchoscopy is one of the initial diagnostic procedures for lung cancer. Bronchial washing, lavage, Brushing, and biopsy, all of them can be performed routinely with the bronchoscopy[5][6]. The bronchoalveolar lavage initially was performed for benign conditions such as cystic fibrosis, pneumonia, etc[7]. On the other hand, it starts to take part and gain some benefit in lung cancer but there are no many studies discussed the benefit of this procedure comparing to brushing and biopsy. It is not clear if routine bronchial washing still significantly useful especially with an increasing tendency in adenocarcinoma comparing to squamous cell carcinoma[8][9][10].

Based on the above, In this study, we aimed to evaluate the sensitivity of cytology washing tests for diagnosing malignant lung lesions. Besides, we aim to find a relationship between stage, type of cancer, and the cytology washing results.

II. Methods:

This is a retrospective study including 68 patients who underwent different thoracic surgeries for lung cancer in St. Vincent University Hospital from June 2013 to March 2020. All patients underwent bronchoscopy with washing or lavage by the pulmonologist or cardiothoracic surgeon and samples sent for cytology testing. The results of all cytology specimens from bronchoalveolar washing were reviewed from the patients' files.

III. Results:

Between June 2013 and March 2020, a random sample chosen of 68 patients underwent different thoracic surgeries for malignant diseases and had bronchoscopy with washing cytology before surgery. Of these, there was 27 (39.7%) male patient and 41 (60.3%) female and the mean age was 65.5 years old. Also, 47 patients (69.2%) were active or former smokers while 21 (30.8%) was a non-smoker. Besides, there are 21 patients (30.8%) who suffered from chronic lung disease. Table 1

It is worth mentioning that just 37 patients (54.4%) had adenocarcinoma while 15 patients (22.2%) had SCC. Other types of cancer such as carcinoid tumors presented in 13 patients (19.1%), large cell tumor 2 patients (2.9%), and small cell cancer in one patient (1.4%).In addition, cytology washing showed positive or atypical cells results in 10 patients (14.8%) and 58 patients (58.2%) negative. Patient characteristics and the stage are summarized in Table 1.

Out of 10 patients who had positive or atypical cells in the cytology analysis, there was 8 patients (80%) smokers or former smoker. It is worth mentioning that all positive results were stage III lung cancer and SCC .Table.2.

IV. Discussion:

Bronchial washing with cytology specimens considered for a long time a sensitive test (45%), simple and inexpensive[11][12]. However, increasing the incidence of adenocarcinoma over the SCC with peripheral lesions more than central lesions associated with decreased sensitivity of bronchial washing cytology [13][14]. Additionally, improving the diagnostic images and screening leads to an increase in the number of patients diagnosed with early-stage lung cancer and small lesions[15][16][17]. All these issues create a debate about the benefit of bronchial washing with cytology testing.

Soto et al. did a cross-sectional study on 55 patients with lung cancer and they underwent bronchoscopy as part of their investigations. Bronchial washing was positive in 22 patients (40%). Interestingly, all these cases were confirmed by other bronchial procedures such as brushing or biopsy. As a result, the bronchial washing or lavage with cytology testing did not add any diagnostic benefit for these patients. Accordingly, they concluded that the bronchial cytology test no need to be done if other procedures are planned such as brushing or biopsy [18].

Agarwal et al. in contrast to our study, performed a Prospective intervention based observational study on 40 patients who suffering from lung cancer and had bronchial washing as part of diagnostic procedures. The results showed that the bronchial lavage specificity was 38%. Despite the low sensitivity of the test, he considered it as effective in diagnosing lung cancer[19].

Girard et al. did a retrospective study that included 667 patients. he found that Only 67 bronchial cytology specimens were positive (sensitivity 14.7%). In conclusion, they declared that bronchial washing in this study was not effective. They suggest that this result could be related to the increasing incidence of adenocarcinomas over the SCC. In conclusion, they recommend dropping bronchial washing from practice in centers with similar experiences [20].

Limitation of our study is the retrospective design of the study, a small number of patients, and maybe in the future, we need to compare this technique with other bronchial procedures like brushing and biopsy and evaluate the differences.

The strength of the study that it is clinical and financial implications. Initially, washing cytology can be performed only in large central masses, when no other diagnostic bronchial procedures are done. Also, stopping the routine bronchial washing cytology can reflect positively on the financial aspect.

V. Conclusion:

The value of cytology specimens from bronchoalveolar washing in this study was not significant. This may be due to increasing the incidence of adenocarcinomas and early-stage lung cancer. Bronchial cytology is a resource and time-consuming. Accordingly, eliminating this technique could be considered in hospitals with similar results.

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Name	value	Total (68 patients)
Sex	M F	27 (39.7%) 41 (60.3%)
Lung disease	Yes No	21 (30.8%) 47 (69.2%)
Smoking	Yes + ex No	47 (69.2%) 21 (30.8%)
Stage	I II III	46 (67.6%) 11 (16.2%) 11 (16.2%)
Type of cancer	Adenocarcinoma Squamous cell cancer Small cell caner Carcinoid tumor Large cell tumor	37 (54.4%) 15 (22.2%) 1 (1.4%) 13 (19.1%) 2 (2.9%)
Cytology result	Positive Negative Atypical cells	5 (7.4%) 58 (85.2%) 5 (7.4%)
Mean Age		65.5

Table 1 – Patients characteristics .

Name	value	Total (10 patients)
Sex	M F	5 (50%) 5 (50%)
Lung disease	Yes No	5 (50%) 5 (50%)
Smoking	Yes + ex No	8 (80%) 2 (20%)
Stage	I II III	4 (40%) 1 (10%) 5 (50%)- positive cytology
Type of cancer	Adenocarcinoma Squamous cell cancer Small cell caner Carcinoid tumor Large cell tumor	4 (40%) 5 (50%) – positive cytology 0 1 (10%) 0

Table 2 – Patients with positive cytology or atypical cells .