ORIGINAL ARTICLE

Usefulness of Cytological Specimens from Bronchial Brushings and Bronchial Washings in Addition to Endobronchial Biopsies During Bronchoscopy for Lung Cancer: 3 Years Data from a Chest Clinic in a General Hospital

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Summary

A retrospective review of all bronchoscopy cases for investigation of lung cancer between January 1997 and December 1999 was done. The cases were included if endobronchial mass was visible (Group A) or when there was an abnormal mucosa and/or bronchial narrowing in the absence of a mass (Group B). All patients in Group A (n=177) underwent endobronchial biopsy (EB), bronchial brushings (BB) and bronchial washings (BW). All cases in Group B underwent transbronchial biopsy (TBB), BB and BW. Only a small increase in the positive results for cancer was seen when cytology specimens (BB and BW) were added to EB (85.3% vs 88.1%, McNemar's, P=0.06) in Group A but there was a significant increase in Group B (37.3% vs 54.2%. McNemar's, P=0.001). Therefore although cytology specimens did not significantly add to overall yield of positive results when endobronchial lesions were visible, when mass lesions were not visible, cytology specimens increased the yield by 16.9%.

Key Words: Bronchoscopy, Cytological specimens, Endobronchial biopsy, Transbronchial biopsy

Introduction

The Ministry of Health annual report in 1996 ranked malignancy as the sixth most common cause of mortality among hospitalized patients[1]. Among all malignant neoplasm in Malaysia, lung cancer is the most common type of malignancy occurring in males whilst in female it ranks as the fourth commonest[2]. The incidence of lung cancer in Malaysia is unknown but annual incidence of all cancers has been estimated to be around 30,000[3]. The number for newly diagnosed lung cancer is expected to rise, as the prevalence of smokers among adult population is rising[4].

In the United States, the majority of patients with lung cancer present quite late in the course of the disease[5] and this scenario is similar in Malaysia[6]. The most usual mode of establishing the diagnosis of lung cancer is by means of bronchoscopy. During bronchoscopy, the usual abnormal bronchoscpic findings include finding an obvious endobronchial mass or irregular musosa with narrowing of the bronchi. In addition, specimens can be obtained for histopathological or cytological examinations to confirm diagnosis and plan treatment. The bronchoscopist usually performs endobronchial biopsies (EB), transbronchial biopsies (TBB), bronchial brushings (BB) or bronchial washings (BW) depending

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on the bronchoscopic findings to increase the yield for diagnosis of cancer. In the presence of an endobronchial mass during bronchoscopy, the sensitivity of EB, BB and BW together in diagnosing lung cancer is in excess of 90%[7]. When lesions are visible at bronchoscopy, the additional yield from cytological specimens in forms of BB and BW vary between 5%[8] and 13%[9,10].

When endoscopic findings consisted of only abnormal mucosa or extraluminal bronchial narrowing with no mass lesions, the yield from cytological specimens has been found to be around 35%[9,10] whether or not fluoroscopy was used during bronchoscopy. Bronchoscopy is costly as it involves labour in terms of specimen collection and other related processes and also materials involved during the procedure. We are not aware of any local audit of these procedures. In this study we evaluated the value of cytological specimens from bronchial brushings and washings in addition to forceps biopsies (endobronchial and transbronchial) during bronchoscopy for investigation of lung cancer in a chest clinic of a general hospital in Malaysia. We evaluated all our bronchoscopy data retrospectively to find out whether our cytological specimens from BW and BB in addition to forceps biopsies (EB and TBB) significantly increased the number of positive results from bronchoscopy during investigation for lung cancer.

Materials and Methods

This was a retrospective study of all bronchoscopy records for investigation of lung cancer in the chest unit of Hospital Sultanah Aminah (HSA), Johor Bahru between January 1997 and December 1999. The chest clinic of HSA serves a population of nearly two and a half million people in the southern region of Malaysia. There is also a cardio-thoracic department adjacent to the chest clinic for thoracic surgery input. Inclusion criteria were bronchoscopy findings of obvious as endobronchial mass (Group A) and abnormal mucosa and/or bronchial narrowing when a mass was not seen (Group B). The majority of cases in Group B had contact bleeding. Bronchoscopy cases with other findings were excluded. Once cases were identified, the case notes were retrieved from the chest clinic to record the final histological or cytological diagnosis for lung cancer and the methods of arriving at the diagnosis if the bronchoscopy specimens were negative for lung cancer. Cases of repeat bronchoscopy were excluded. Bronchoscopy at our chest clinic was done using Olympus CLE-4E. There were two physicians performing bronchoscopy on regular basis and were responsible for performing all the cases under study. Bronchial brushings were performed using 47R Olympus brush and biopsy using FB21 Olympus SX/C/K-1. On average, 40ml of 1% lignocaine was used during each bronchoscopy procedure with two nurses assisting, mainly for specimen collection. Patients undergoing bronchoscopy received oral midazolam (on average 7.5mg) and an intra-muscular injection of atropine (600 microgram) half an hour before the procedure. Pulse oximetry was used to monitor cutaneous oxygen saturation throughout the procedure.

BW specimens (average of 3) were collected using 20-30ml normal saline aspirated through the bronchoscope into collecting bottles. BB were smeared onto glass slides (average of 3) and preserved in 95% ethyl alcohol. During the biopsy procedure, an average of 3 samples were also taken for either TBB or EB. These specimens were preserved in the same way and sent to pathology laboratory located one floor above the chest clinic after the procedure. The standard practice in our clinic was to perform EB, BB and BW on all bronchoscopy cases with findings as in Group A and TBB, BB and BW for cases in Group B. Statistical analysis was done using McNemar's test for matched group analysis and P value of less than 0.05 is considered significant.

Results

A total of 495 bronchoscopies were performed between January 1997 and December 1999 of which 437 (88%) were done to investigate lung cancer (Figure 1). Two hundred and thirty-six (54%) bonchoscopy cases were included in the study. There were 177 cases in Group A and 59 cases included in Group B. Figure 1 shows the number of cases classified as Group A and B, including the number of cases excluded.

The indication for bronchoscopy in both groups was mainly abnormal chest x-ray (CXR) findings. Table I shows the indication for bronchoscopy by CXR appearances in cases from both groups.

All cases in Group A underwent EB, BB and BW. Positive histological diagnosis for cancer was obtained in 151 specimens of EB (85.3%). There was only one additional increase in the number of positive cases when BB was combined with EB. The percentage of positive results for cancer however increased to 88.1%

when EB was combined with both BB and BW (85.3% vs 88.1%, McNemar's, P=0.06). Table II summarises the details of all results in Group A and Group B. Twenty-one cases had negative results from all three specimens, EB, BB and BW. Twelve of these underwent repeat bronchoscopy with the results of repeat EB were all positive for cancer and 9 had fine needle aspiration cytology (FNAC) of palpable supraclavicular or cervical lymph node that confirmed metastatic lung cancer. Table III summarises these results.

All 59 patients in Group B underwent TBB, BW and BB during bronchoscope and TBB yielded 22 (37.3%) positive results for cancer. TBB and BB together marginally increased the number of positive results to 40.7% but when all three specimens of TBB, BB and BW were combined, the number of positive results significantly rose to 32 (37.3% vs 54.2%, McNemar's, P=0.002), an additional increase of 16.9% (Table II). Table III summarises the investigations performed to confirm the presence of malignancy in those with negative bronchoscopy results (n=27) from Group B. Table IV shows all the types of cancer diagnosed in cases from Group A and B.

Table I: Indication for bronchoscopy by CXR appearances in both groups

Type of appearance	Group A	Group B
Mass lession on CXR*	107	29
Pleural effusion	27	24
Partial lung collapse on CXR	33	4
Persistent consolidation on CXR	10	2

CXR is posterior-anterior cheast readiograph.

*Mass lession could be single or multiple with hilar or mediastinal enlargement

Table II: The yield of positive results for cancer from (EB/TBB), (BB) and (BW) in both Group A and Group B

Specimen	Group A {%, {CI} n=177	Group B {%, {CI}} n=59
EB/TBB*	151{85.3, {79.90}}	22{37.3,{26,50}}
EB/TBB* + BB	152{85.9,{80,90}}	24{40.7,{29,54}}
EB/TBB* + BW	155{87.8,{82,92}}	30{50.8,{39,63}}
EB/TBB* + BW	156{88.1,{82,92}}	32{54.2,{41,66}}

*Group A underwent EB and Group B Had TBB
CI stands for 95% confidence interval

Table III: Methods to confirm malignancy in cases with negative bronchoscopy specimens from Group A and Group B

Type	Group A	Group B
Repeat bronchoscopy	12	
FNAC of lymph nodes*	9	4
Pleural biopsy		11
CT quided FNAC of lung mass		6
FNAC of Lymph nodes		4
Sputum cytology		3
Pleural fluid cytology		1
Thoracotomy		1
FANC skin nodules		1
Total	21	27

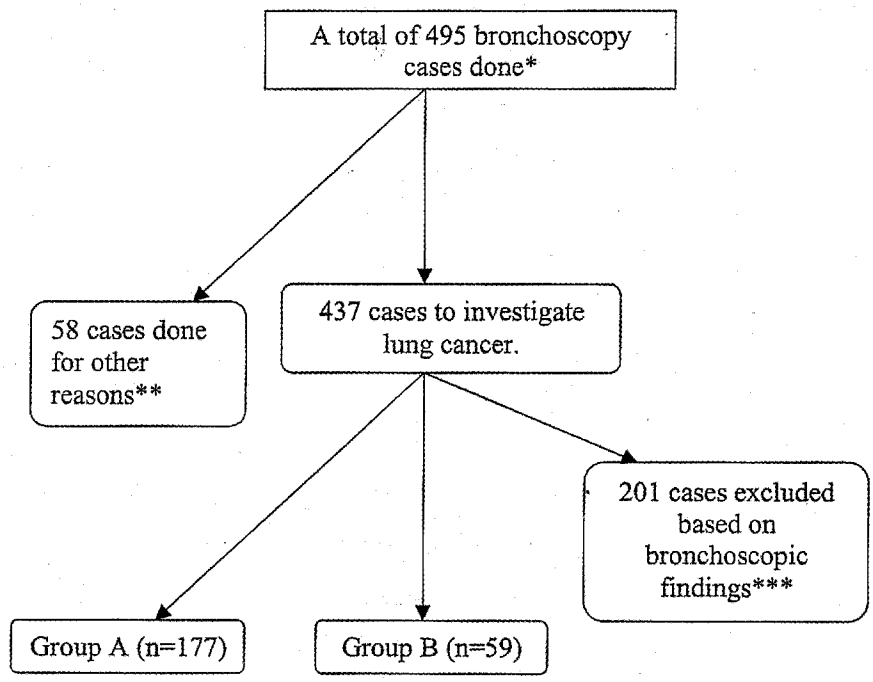
*Lymph nodes were mainly supraclavicular nodes with 2 cases with nodes in the lower cervical region.
All cases of repeat bronchoscopy had positive EB results for cancer.
CT stands for computerised tomography.
FNAC stands for fine neddle aspiration cytology.

Table IV: Lung cancer by types in both groups

Type	Group A	Group B
Squamous	53	20
Adenocarcinoma	49	17
Large cells	13	6
Small cell	33	12
Undifferentiated carcinoma	24	4
Adenosquamous	5	0
Total	177	59

Figure 1.

Distribution of all bronchoscopy cases done within the study period. Fifty eight cases were done for reasons other than investigation for lung cancer, while 437 cases were done to investigate for lung cancer.



* Total included 10 cases recorded in the bronchoscopy record but the notes were missing
**They were done for microbiological analysis (51), suspected sarcoidosis (4) and to rule out extension of oesophageal cancer into bronchus (3)
***The cases excluded were those without the findings of Group A or GroupB. The findings were normal appearance (161) mucopurulent secretions (18) and bronchial scarring (12)
Group A=endobronchial mass seen
Group B=abnormal mucosa and/or bronchial narrowing in absence of mass lesion

Discussion

This study has divided bronchoscopic findings in investigation for lung cancer into two groups. Group A represents visualization of obvious endobronchial mass. Endobronchial biopsies in this group of cases are highly rewarding in that the percentage of positive results from biopsy alone approach 90%[7]. Additional yield from cytological specimens from washing and brushings however are quite variable[8, 9, 10].

Our study shows that this is also the case in a local chest unit that offers regular bronchoscopy service. The yield of positive results for cancer from EB at our unit is 85.3% and this is comparable to other studies[8, 9]. The additional yield from cytology from both BB and BW in our study is only 2.8%. Combination of biopsy and cytology (BB and BW) therefore did not significantly increase (85.3% vs 88.1%, McNemar's, P=0.06) the number of positive results undergoing bronchoscopy for investigation of lung cancer. A recent study by Chittoock et al[11] has also confirmed that routine cytological specimen collection in this group of cases has low additional positive yield and is not cost effective. We therefore feel that routine cytological specimen collection (BB and BW) in cases of visible endobronchial lesions during bronchoscopy has low additional value and should be discouraged.

Our study has also looked at another group of cases with no obvious mass lesion but with mucosal abnormalities or evidence of bronchial narrowing or both. Our results show that the yield for TBB alone was 37.3%. The addition of BB to TBB increased the yield by 2 cases to 40.7%. When BW was included, the yield increased significantly to 54.2% (37.3% vs 54.2%, McNemar's, P=0.002). Our results show that there is a significant increase in the number of positive results when cytology specimens (BW and BB) were combined with TBB by 16.9%. This finding is lower than results from other studies (Govert et al 1996) and 13% (Mak VHF et al 1996, Lam YK et al 1983)[8, 9] that had looked at cases similar to ours in Group B but the study by Lam et al[8] however had used fluoroscopy to guide bronchoscopy. We are unable to explain why our figure is slightly low. A recent article (Chechani V 1996) [12] revealed an overall diagnostic rate of 80% for non-endoscopically tumor by bronchoscopy under biplane fluoroscopy screening. Our chest unit does not have such facility and we performed bronchoscopy without the guidance of fluoroscopy in all our cases.

Nevertheless, our results show significant advantage in adding cytology specimens to TBB when lesions as in cases in Group B were present. We therefore advocate routine collection of cytology specimens by BW especially and BB in addition to TBB when lesions such as our cases were present. In places where fluoroscopy service was available, this should be used to increase the overall yield from bronchoscopy. In conclusion, our study shows that when endobronchial mass was present during bronchoscopy, cytological specimens in addition to EB did not significantly increase the number of positive results for cancer. When lesions were not visible except for abnormal mucosa or bronchial compression or both, cytology specimens significantly increased the yield for diagnosis of lung cancer.

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