Yield of bronchoscopy in the diagnosis of neoplasm metastatic to lung

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Abstract  The yield of fiberoptic bronchoscopy (FB) in the diagnosis of pulmonary metastases has not been conveniently analyzed. With the advances in the surgery of pulmonary metastases, there is a need to evaluate the diagnostic yield and the usefulness of FB to exclude other diseases with similar radiological patterns. To determine the value of FB in the diagnosis of pulmonary metastases we have retrospectively analyzed our experience in 113 patients with proven pulmonary metastases. An endobronchial lesion was identified in 57/113 (50.4%). The most frequent tumors with endobronchial lesions were thyroid (100%), head–neck (67%) and breast carcinomas (59%). The highest diagnostic yield was obtained combining techniques of brushing, washing and biopsy (72.6%); in cases with endobronchial lesions (84.2%) and with certain histological types (head–neck 100%; breast 90.9% and colon 84.6%). The most frequent radiological findings were single or multiple nodules (77.9%). Atelectasis were associated with endobronchial lesions. In conclusion, bronchoscopy is a valuable diagnostic procedure in selected patients with metastatic lung disease.

Keywords bronchoscopist; endoscopic

INTRODUCTION

Combining techniques of brushing, washing and biopsy by fiberoptic bronchoscopy (FB), the diagnosis of bronchogenic carcinoma can be confirmed in 79–85% of patients (1–13). However, in cases of metastatic cancer to the lungs, the diagnostic yield of FB has been very low and very different among groups who have reported their experience (30% positive cytology and 50% transbronchial biopsy (2); 54% combining techniques of brushing, washing and biopsy (4,5).

With the advances in surgery of pulmonary metastases (6,7), it is necessary to evaluate the diagnostic yield of FB and its usefulness to exclude other diseases (opportunistic pulmonary infection, pulmonary hemorrhage or drug-induced lung disease) which may simulate radiological patterns of metastases in patients with controlled or uncontrolled extrapulmonary neoplasms.

We retrospectively reviewed 113 patients with proven pulmonary metastases in order to assess the diagnostic yield of FB in patients suspected of having metastatic lung disease. We attempted to identify the endoscopic, roentgenographic and pathologic features that are useful in predicting a positive result.

MATERIAL AND METHODS

We retrospectively reviewed 153 patients with proven pulmonary metastases. They had been referred to the Bronchoscopy Unit between 1993 and 2000 because of an abnormal chest roentgenogram and had either a history of prior extrapulmonary malignancy or unexplained pulmonary disease without prior history of malignant disease but where further work-up determined the lung disease to be metastatic. The Bronchoscopy Unit is located at Ramón y Cajal Hospital, a referred tertiary medical center in Spain.

Selective inclusion criteria were: (a) known or unknown primary tumor with cytopathologic proven metastases; (b) known primary tumor with abnormal X-ray and without cytopathologic proven metastases and (c) unknown primary tumor with suspected metastases in chest X-ray and proven extrapulmonary metastases. Selective exclusion criteria were: (a) bronchogenic carcinoma; (b) hematologic malignancy; (c) uncontrolled esophageal or larynx carcinoma. All of the cases were cytopathologic proven (sputum, washing, brushing, biopsy, surgical or postmortem examination).

The Olympus BF-T30 or Olympus BF-P20 bronchoscopes were utilized. Individual and combining techniques of washing and brushing were performed in all patients, bronchial biopsy in patients with visible endobronchial lesions and transbronchial biopsy under
fluoroscopic guidance in patients without visible endoscopic lesions by decision of the bronchoscopist.

Information obtained from each record included (1) visible or not visible endoscopic lesion; (2) site of primary malignancy and pathologic type; (3) radiological findings and (4) surgical indication.

The data underwent statistical analysis using chi-square and Fisher exact test with Yates correction. Statistical significant difference was considered with $P < 0.05$.

**RESULTS**

One hundred and thirteen fiberoptic bronchoscopic procedures were analyzed in 113 patients with proven pulmonary metastases. Forty cases were excluded on applying selective criteria. Finally, there were 53 men (46.9%) and 60 women (53.1%) with a mean age of $46.5 \pm 11$ years. All cases were cytopathologic proven (washing, 44.2%; brushing, 50.4%; endobronchial biopsy, 61.1%; surgical, 10.6%; or postmortem examination, 16.8%). In 11 patients no primary cancer could be detected.

Examination with a flexible bronchoscope was diagnostic in 82 cases (72.6%). The specimens obtained and the yield of each are listed in Table 1. In the group as a whole, there was no difference in the diagnostic yield between washing, brushing or biopsy, but combining techniques performed significantly better than individual ones (Table I).

An endobronchial lesion was visible in 57 patients (50.4%) and a positive result was obtained by either forceps biopsy, washing and/or brushing in 48 patients (84.2%). When an endobronchial lesion was not visible, a positive diagnosis was recorded in 34 of the 56 (60.7%). The diagnostic yield was significantly better for all specimens except for biopsy in cases of visible lesions in contrast with those without visible ones.

The roentgenographic pattern of atelectasis favored a positive result while the identification of multiple nodules was associated with the fewest diagnoses of malignancy (Table 2). There was a significant correlation between the presence of an endobronchial lesion and a pattern of atelectasis.

Table 3 shows the diagnostic yield of different specimens according to the site of the primary neoplasm. The highest diagnostic yield was obtained in cases of head–neck and breast tumors and the lowest one in sarcomas and kidney neoplasms.

**DISCUSSION**

The lung is often involved when extrapulmonary malignancies metastasize, and FB is frequently performed as

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**Table 1.** Bronchofiberoscopic yield in pulmonary metastases according to method and endobronchial visibility

<table>
<thead>
<tr>
<th>Method</th>
<th>Visible (%)</th>
<th>Not visible (%)</th>
<th>Total (%)</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>57 (50.4%)</td>
<td>56 (49.6%)</td>
<td>113 (100%)</td>
<td></td>
</tr>
<tr>
<td>Washing (W)</td>
<td>34 (39.6%)</td>
<td>16 (28.6%)</td>
<td>50 (44.2%)</td>
<td></td>
</tr>
<tr>
<td>Brushing (BR)</td>
<td>41 (71.9)</td>
<td>16 (28.6%)</td>
<td>57 (50.4%)</td>
<td>NS $^b$</td>
</tr>
<tr>
<td>Biopsy (BP)</td>
<td>35 (61.4%)</td>
<td>34 (60.7%)</td>
<td>69 (61.1%)</td>
<td>NS $^c$</td>
</tr>
<tr>
<td>W–BR</td>
<td>44 (77.2%)</td>
<td>23 (41.1%)</td>
<td>67 (59.3%)</td>
<td>0.03 $^d$</td>
</tr>
<tr>
<td>W–BR–BP</td>
<td>48 (84.2%)</td>
<td>34 (60.7%)</td>
<td>82 (72.6%)</td>
<td>0.04 $^e$</td>
</tr>
</tbody>
</table>

$^a$ Transbronchial biopsy performed in five cases (positive 3/5).

$^b$ Brushing vs. washing.

$^c$ Biopsy vs. brushing.

$^d$ Washing and brushing vs. washing.

$^e$ Washing, brushing and biopsy vs. washing and brushing.

**Table 2.** Bronchofiberoscopic yield according to radiographic findings

<table>
<thead>
<tr>
<th>Radiographic finding</th>
<th>Single nodule N (%)</th>
<th>Multiple nodules N (%)</th>
<th>Atelectasis N (%)</th>
<th>Diffuse infiltrate N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (%)</td>
<td>43 (38.0)</td>
<td>45 (39.8)</td>
<td>17 (15.0)</td>
<td>8 (7.1)</td>
</tr>
<tr>
<td>Washing (W)</td>
<td>19 (44.2)</td>
<td>16 (35.5)</td>
<td>10 (58.8)</td>
<td>5 (62.5)</td>
</tr>
<tr>
<td>Brushing (BR)</td>
<td>21 (48.8)</td>
<td>18 (40.0)</td>
<td>12 (70.6)</td>
<td>6 (75.0)</td>
</tr>
<tr>
<td>Biopsy (BP)</td>
<td>26 (60.5)</td>
<td>23 (51.1)</td>
<td>15 (88.2)</td>
<td>5 (62.5)</td>
</tr>
<tr>
<td>W–BR</td>
<td>25 (58.1)</td>
<td>23 (51.1)</td>
<td>13 (76.5)</td>
<td>6 (75.0)</td>
</tr>
<tr>
<td>W–BR–BP</td>
<td>31 (72.1)</td>
<td>29 (64.4)</td>
<td>16 (94.1)</td>
<td>6 (75.0)</td>
</tr>
<tr>
<td>Endoscopic lesion</td>
<td>26 (60.5)</td>
<td>13 (28.9)</td>
<td>15 (88.2)</td>
<td>3 (37.5)</td>
</tr>
</tbody>
</table>
part of the patients’ subsequent evaluation. We conducted this study to investigate which malignancies most commonly metastasize endobronchially and what radiographic clues suggest abnormal endobronchial anatomy so that a reasonable decision can be made as to when FB will be a potentially high-yield procedure.

Endobronchial biopsy was positive in 48 of 57 patients (84.2%) with endobronchial lesions and in 60.7% of patients with normal FB. We do not agree with Argyros et al. (8) that FB must not be performed in patients with a low pretest probability of endobronchial abnormality. Our study supports the benefit of combining forceps biopsy with brush cytology when bronchoscopy is done in the patient with metastatic disease.

We agree with Poe et al. (9) and Braman et al. (10) that the roentgenographic finding of atelectasis is frequently associated with endobronchial metastases and a higher yield of tissue diagnosis.

Breast carcinoma accounts for a large number of patients in our series. Our findings agree with prior reports (4,8,9,11,12). We attribute this to the prevalence of this disease in the general population. We found FB most frequently diagnostic in patients with head and neck carcinoma followed by breast carcinoma. Perhaps, this is because the high frequency of endobronchial lesions associated with this cancer in the population studied. Carcinoma of the kidney, described as frequently metastasing to large airways simulating bronchogenic carcinoma (13,14), was not as frequently seen at bronchoscopy in our patient population.

In conclusion, our study indicates that FB is safe and of great value in the diagnosis of metastatic cancer to the lungs, and is particularly helpful in cases of endobronchial visible lesions. Endobronchial metastases are relatively common and even more in the presence of atelectasis in the chest X-ray. Both forceps biopsy and brush cytology specimens should be obtained in order to achieve the maximum diagnostic yield. Breast and head–neck carcinoma were the most common primary sites of malignancy.

### REFERENCES


