Flexible Transbronchial Needle Aspiration in the Diagnosis of Sarcoidosis*

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The histopathologic diagnosis of sarcoidosis requires the presence of noncaseating granulomas. Transbronchoscopic lung biopsy (TBLB) has been considered the procedure of choice when less invasive tissue samples are unavailable. A total of 51 consecutive patients suspected of having sarcoidosis underwent combined TBLB and flexible transbronchial needle aspirate (TBNA). In 18 of the 30 patients (60 percent) with stage I disease, the diagnosis was confirmed by TBLB and 16 (53 percent) were confirmed by TBNA. The combined use of both procedures increased the diagnostic yield to 83 percent. The remaining 21 patients with stage II disease had their diagnosis confirmed in 16 (76 percent) cases by TBLB and 10 (48 percent) by TBNA with a combined diagnostic yield of 86 percent. Seven (23 percent) patients with stage I disease and 2 (10 percent) with stage II disease had their conditions diagnosed by TBNA. We conclude that combining TBNA with TBLB increases the diagnostic yield in pulmonary sarcoidosis; TBNA should complement TBLB in the diagnosis of this disease. (Chest 1994; 106:709-11)

Sarcoidosis is a multisystem granulomatous disorder of unknown etiology. The diagnosis is established most securely when clinicoradiographic findings are supported by histologic evidence of noncaseating epithelioid-cell granulomas.1 The choice between different diagnostic procedures to obtain a diagnosis is based on risk vs diagnostic yield. Transbronchoscopic lung biopsy (TBLB) through a fiberoptic bronchoscope is considered the procedure of choice for patients suspected of having pulmonary sarcoidosis regardless of the stage of disease.2,3 Unfortunately, the diagnostic yield for stage I disease (hilar lymphadenopathy) is in the order of 44 percent to 66 percent as compared with 83 percent to 96 percent in stage II disease (hilar lymphadenopathy and pulmonary infiltration).2,5 A recent study described the use of flexible transbronchial needle aspirate (TBNA) to increase the diagnostic yield in this disorder.6 We describe our experience using the flexible 19-gauge TBNA in 51 consecutive patients suspected of having sarcoidosis.

**MATERIAL AND METHODS**

Fifty-one patients diagnosed as having sarcoidosis by clinical and radiographic criteria as well as histologic evidence of noncaseating epithelioid cell granulomas were seen at Wilford Hall Medical Center between June 1989 and May 1993. All patients underwent flexible fiberoptic bronchoscopy with TBLB and TBNA. Patients were grouped according to their chest radiographs into stage I (hilar lymphadenopathy alone), 30 cases, and stage II (hilar lymphadenopathy with parenchymal infiltrates), 21 cases. There were 17 men and 13 women with a mean age of 36 years (range, 21 to 58 years) in the stage I group. The stage II group consisted of 15 men and 6 women with a mean age of 34 years (range, 22 to 70 years). A histopathologic diagnosis of sarcoidosis was confirmed by TBLB and/or TBNA in all patients with the following exceptions: five patients with stage I (two by cervical mediastinal exploration and three by parotid biopsy) and three patients with stage II (one by cervical mediastinal exploration and one by parotid biopsy).

Computed tomography (CT) of the chest was performed for all patients prior to any diagnostic procedure. After informed consent, transnasal fiberoptic bronchoscopy was performed with a minimum of four transbronchial lung biopsy specimens obtained. This technique has been described previously.7 If parenchymal infiltrates were present, biopsy specimens were obtained from the basal segments of the lower lobe with the greatest involvement. If no infiltrates were present, the biopsy specimens were obtained from either of the lower lobes at the discretion of the bronchoscopist. A Wang 19-gauge histologic needle (Mill-Rose Laboratories, Mentor, Ohio) was used for TBNA; the technique has been described previously.8,9 The TBNA biopsy specimens were obtained at the endotracheal or endobronchial location corresponding with the site of adenopathy localized by chest CT. The area of adenopathy with the largest short-axis diameter on chest CT was selected for biopsy. One to three samples were collected for both histologic and cytologic evaluation. A biopsy specimen was considered adequate if the architecture of lymph nodes was present (Fig 1). All TBLB and TBNA were done during a single procedure. The diagnosis of sarcoidosis required the (1) presence of a noncaseating epithelioid granuloma with the absence of foreign body reaction or allergic tissue reaction, and (2) negative modified Ziehl-Neelsen carbolfuchsin and methamine silver stains as well as negative cultures for acid-fast bacilli.

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RESULTS

Of the 30 patients with stage I disease, TBLB was positive in 18 (60 percent) and with stage II, 16 of 21 patients (76 percent). TBNA was positive in 16 of 30 patients (53 percent), and 10 of 21 patients (48 percent) with stage I and stage II, respectively. The combined use of both procedures increased the sensitivity to 25 of 30 patients (83 percent) in stage I, and 18 of 21 patients (86 percent) with stage II disease (Table 1).

The diagnostic rates for combined diagnostic procedures (TBLB, TBNA) as a function of radiographic disease stage are shown in Table 2. In stage I disease, 7 of 30 patients had their conditions diagnosed exclusively by TBNA, increasing the diagnostic yield by 23 percent. The addition of TBNA to TBLB in stage II disease improved the diagnostic rate by 10 percent (2 of 21 patients). There were no significant complications from the procedures. Minimal bleeding at puncture sites always resolved spontaneously.

DISCUSSION

Transbronchial needle aspirate has been established as a useful diagnostic tool in multiple clinical settings, including peripheral pulmonary nodules, paratracheal masses, necrobiotic endobronchial lesions, and during mediastinal staging of lung cancer. Pauli et al. reported an increase in the diagnostic yield of a total of 258 patients with suspected sarcoidosis by combining TBNA to TBLB using rigid bronchoscopy. In their study, patients with stage I and II disease had a positive diagnosis by TBNA alone of 42.1 percent and 21.6 percent, respectively. The authors were able to demonstrate that the addition of TBNA increased their overall diagnostic yield from 66.3 to 77.7 percent.

Flexible fiberoptic bronchoscopy is currently considered the diagnostic procedure of choice in sarcoidosis due to its high diagnostic yield, comfort, and lack of need for general anesthesia. The use of TBNA with flexible fiberoptic bronchoscopy for the diagnosis sarcoidosis was described by Wang et al. in 1989. These investigators reported their findings in 20 patients (12 with stage I and 8 with stage II). Eighteen of 20 patients (90 percent) had one or more positive TBNA. Six of these patients had their conditions diagnosed exclusively by TBNA when used in addition to TBLB and/or bronchial mucosal biopsy. The high sensitivity (90 percent) of TBNA in the diagnosis of sarcoidosis in this study was thought by the authors to be due to the high density of granulomas in lymph nodes as compared with lung tissue.

All patients in our study had a TBNA and TBLB, and we were able to compare the sensitivity of these tests directly. Our sensitivity for TBLB for stage I and II was 60 percent and 76 percent, respectively. This is compatible with prior reports in the literature. The sensitivity for TBNA of 53 percent for stage I and 48 percent for stage II is lower than those reported by Wang et al. Seven of 30 patients (23 percent) in stage I and 2 of 21 patients (10 percent) in stage II had their conditions diagnosed exclusively by TBNA. The addition of TBNA to TBLB increased the diagnostic yield in stage I and II sarcoidosis to 83 percent and 86 percent, respectively. Considering that patients with negative TBNA by flexible fiberoptic bronchoscopy for stage I disease are usually referred for surgical mediastinal exploration, the addition of TBNA offers a less invasive means for establishing a definitive diagnosis.

Throughout our experience, contrast-enhanced

Table 1—Sensitivity of Transbronchial Lung Biopsy and Transbronchial Needle Aspirate Alone and Combined as a Function of Radiographic Disease Stage

<table>
<thead>
<tr>
<th>Stage</th>
<th>TBLB</th>
<th>TBNA</th>
<th>TBLB+TBNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>18/30 (60)</td>
<td>16/30 (53)</td>
<td>25/30 (83)</td>
</tr>
<tr>
<td>II</td>
<td>16/21 (76)</td>
<td>10/21 (48)</td>
<td>18/21 (86)</td>
</tr>
</tbody>
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Flexible Transbronchial Needle Aspiration in Sarcoidosis Diagnosis (Morales et al.)
chest CT has been an invaluable guide for TBNA through its ability to localize paratracheal adenopathy precisely. As health care expenses continue to soar, emphasis must be placed on containing the cost of medical care. Is it cost-effective to perform a chest CT on all patients undergoing bronchoscopy for possible sarcoidosis even without radiographic evidence of adenopathy? The estimated cost to perform chest CT for our 51 patients was $17,500.10 The added cost required to do TBNA by the addition of chest CT in these patients compares favorably to the alternative expense of performing a surgical procedure (ie, open lung biopsy or surgical mediastinal exploration), for those who require a definite pathologic diagnosis. For comparison, a conservative estimate of the cost to perform a surgical mediastinal exploration that includes the surgeon and anesthesiologist fees, operating and recovery charges, hospitalization, and generally a chest CT, is approximately $2,500.10 By utilizing chest CT, nine patients who otherwise would have required the surgical procedure had their conditions diagnosed by TBNA, saving $22,500 which more than pays for the cost of the additional CT scan. In addition, these patients avoided the greater morbidity associated with surgery. This information suggests that CT-guided TBNA is cost-effective in these patients. We believe that TBNA, in conjunction with routine TBLB, should be performed in all patients with suspected stage I and II sarcoidosis because it is cost-effective and increases the diagnostic yield.

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