Thoracic Mass Lesions in Immuno-incompetent Patients*

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An aggressive surgical approach was used in the diagnosis and treatment of seven immuno-incompetent patients who presented with focal thoracic mass lesions. In five of the seven patients, minor diagnostic procedures had failed to provide a diagnosis. All seven patients were subjected to exploratory thoracotomy with resection and/or drainage of the involved area. Two patients had parenchymal masses, two had lung abscesses, two had empyemas with trapped lung, and one had a bronchial fistula. An accurate diagnosis and full resolution of the intrathoracic process was obtained in all patients. There was little morbidity and no operative mortality in this series. Resection of focal thoracic lesions in immuno-incompetent patients combines accurate diagnosis with precise therapy and is well tolerated in this high risk group of patients.

Considerable experience has now been gained in the diagnosis and treatment of pulmonary disease in immunosuppressed patients. Most of this experience and hence its documentation in the literature involves patients with diffuse pulmonary infiltrates. 1-3 With focal intrathoracic lesions being much less common, no similar expertise or rationale for management has been developed. Nevertheless, there is ample evidence to show not only the difficulty in correctly diagnosing these lesions, but also the high mortality associated with their ineffectual treatment. 6-11

When confronted with this type of pulmonary lesion in an immunodepressed patient the initial emphasis is towards accurate diagnosis with the least invasive method. Empiric medical therapy is not often used in this situation due to the toxicities of the multiple drug regimens needed to adequately treat the possible etiologic agents. Various techniques for aspiration of lower airway secretions all suffer from non-specificity of results. Transbronchial biopsies and transthoracic needle aspirations, although sometimes accurate, are often either non-diagnostic or are contraindicated due to pulmonary or hematologic compromise.

Because these diagnostic shortcomings have led to management difficulties in this group of patients, we adopted an aggressive surgical approach to the accurate diagnosis and subsequent therapy in seven immuno-incompetent patients. This report summarizes our experience with these patients and demonstrates that surgical intervention not only establishes the correct diagnosis, but also is successful as a therapeutic modality.

MATERIAL AND METHODS

Seven immuno-incompetent patients seen at the National Institutes of Health with focal thoracic mass lesions are included in this study. Reviewed are four males and three females with a mean age of 27 (range 9-68). Five patients had exogenous immunosuppression as a result of therapy for cancer, 2 systemic lupus erythematosus, 2 and systemic vasculitis. 1 Two patients had primary immunodeficiencies (Table 1).

Of the five immunosuppressed patients, two had received combination chemotherapy for the treatment of acute lymphocyte leukemia and for stage 3 bulky embryonal cell carcinoma. The other three patients, one with systemic vasculitis and two with systemic lupus erythematosus, were receiving high dose prednisone. In one of these patients, (No 8) intravenous cyclophosphamide had also been initiated in an effort to control his lupus nephritis.

The two patients with primary immunodeficiencies both had received extended courses of antimicrobial therapy. Patient 1, who had a diagnosis of combined immunodeficiency disease, had a history of multiple opportunistic infections including systemic Phialophora for which ketoconazole and miconazole therapy were employed. Patient 3 had the hyper IgE-chemotactic defect syndrome. A right upper lobectomy had been performed in early childhood for chronic bronchiectasis and was complicated by a bronchopleural fistula. Two previous attempts at closure of the fistula had been unsuccessful. Oxacillin was used to suppress a chronically infected cavity in the right upper chest.

All of the patients presented with either cough or fever.
<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Age</th>
<th>Sex</th>
<th>Primary Diagnosis</th>
<th>Secondary Diagnosis</th>
<th>Recent Drug Therapy</th>
<th>Presenting Symptoms</th>
<th>Diagnostic Procedures</th>
<th>Clinical Diagnosis</th>
<th>Operative Procedure</th>
<th>Operative Findings</th>
<th>Final Pathology</th>
<th>Diagnostic Outcome</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>66</td>
<td>F</td>
<td>Combined immuno-deficiency disease</td>
<td>Systemic Pneumocystis</td>
<td>Ketoconazole</td>
<td>Cough</td>
<td>Expanding Rt. lower lobe mass</td>
<td>Needle biopsy x 3 (negative)</td>
<td>Intrapulmonary fungal mass</td>
<td>6 x 7 cm mass Rt. lower lobe</td>
<td>Rt. lower lobectomy</td>
<td>Diffuse histiocytic lymphoma</td>
<td>Yes Yes</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>M</td>
<td>Acute lymphocytic leukemia</td>
<td>Vincristine</td>
<td>Cough</td>
<td>Cavity with fungus ball</td>
<td>Pneumonitis</td>
<td>Fungal mass</td>
<td>2 x 4 cm mass Rt. lower lobe</td>
<td>Rt. lower lobectomy</td>
<td>Aspergilloma</td>
<td>Yes Yes</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>F</td>
<td>Hyper IgE—chemotactic defect syndrome</td>
<td>Oxacillin</td>
<td>Cough</td>
<td>Bronchoscopy</td>
<td>Bronchopleural fistula with chronic abscess cavity</td>
<td>Chronic inflammatory lung abscess</td>
<td>Mixed gram-negative bacteria; necrotic lung w/tumor growth</td>
<td>1) Resection of lingula &amp; rt. upper lobe abscesses; biopsy of nodules; 2) Drainage of empyema</td>
<td>Yes Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>17</td>
<td>M</td>
<td>Embryonal cell carcinoma</td>
<td>Vinblastine, Bleomycin VP-16 Cis-platinum</td>
<td>Cough</td>
<td>Bronchoscopy</td>
<td>Lung abscess w/secondary bilateral aspiration pneumonia</td>
<td>Lung abscesses; lingula &amp; Rt. upper lobe abscesses; multiple lung nodules</td>
<td>Acute and chronic vascular</td>
<td>Yes Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>F</td>
<td>Systemic vasculitis</td>
<td>Prednisone</td>
<td>Cough</td>
<td>Bilateral giant lung bullae with air/fluid levels</td>
<td>Random open lung biopsy (negative)</td>
<td>Bulbous lung disease secondary to vasculitis or infection</td>
<td>Chronic infected lung bullous</td>
<td>Acute and chronic vasculitis</td>
<td>Yes Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>25</td>
<td>M</td>
<td>Systemic lupus erythematosus</td>
<td>Prednisone</td>
<td>Fever</td>
<td>Rt. lower lobe collapse; large Rt. pleural effusion</td>
<td>Multiple unsuccessful attempts at thoracentesis</td>
<td>Empyema, etiology unknown</td>
<td>Multiloculated empyema and trapped lung</td>
<td>Decortication and drainage of empyema</td>
<td>Nocardia brasiliensis</td>
<td>Yes Yes</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>41</td>
<td>M</td>
<td>Systemic lupus erythematosus</td>
<td>Prednisone</td>
<td>Fever</td>
<td>Lt. pleural effusion</td>
<td>Thoraacoentesis positive for Ps (E. coli)</td>
<td>Chronic empyema and trapped lung</td>
<td>Decortication and drainage of empyema</td>
<td>E. coli</td>
<td>No Yes</td>
<td></td>
<td></td>
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Table 1—Clinical Summaries of Seven Immuno-depressed Patients Aggressively Treated for Thoracic Mass Lesions
Five of seven patients had either one or the other symptom and three had both. Chest pain over the area of involvement was present in two patients, while hemoptysis and respiratory distress were significant symptoms in each.

Although the lesions were well localized radiographically, a variety of minor diagnostic procedures including bronchoscopy, aspiration needle biopsy, random open lung biopsy, and thoracocentesis were successful in establishing the diagnosis in only one patient (No 7).

All seven patients underwent exploratory thoracotomy through a posterolateral approach. Operative findings correlated well with the preoperative clinical impressions and included pulmonary mass in two patients, pulmonary abscess in two, empyema in two, and bronchopleural fistula in one. The operative procedure was designed to achieve both a diagnostic and a therapeutic effect. This consisted of lobectomy in two patients, biopsy and drainage in two, decortication and drainage in two, and thoracoplasty in one.

RESULTS

In six of the seven patients, the most likely clinical diagnosis prior to surgery was in fact correct. Only in patient 1 in whom a presumed fungal mass was found to be lymphoma was the final diagnosis completely unsuspected. However, information gained by exploration led to confidence in a specific aggressive therapeutic approach in another four patients. Therefore, in five of the seven patients, the final pathologic diagnosis obtained from surgery assured the appropriate treatment of the patient’s primary disease.

In all seven patients, the operative procedure was considered a therapeutic success in that marked improvement or full resolution of the intrathoracic pathologic process was obtained. Although this uniformly resulted in a positive impact on the treatment of these patients’ primary disease, therapeutic implications as to its long-term effects are uncertain.

From a surgical viewpoint the results were very gratifying. All patients tolerated these extensive procedures well. Wounds and drainage tubes were handled according to established thoracic surgical principles and no wound healing problems were encountered. Other than tube drainage of a small, loculated empyema in a patient with lung abscesses (No 4), there were no complications related to the surgery and no operative deaths.

DISCUSSION

The present study clearly demonstrates that an aggressive surgical approach to the undiagnosed focal pulmonary lesion in the immunocompromised host is feasible, diagnostic, often curative and associated with few, if any, complications. For the most part, the patients in this study had already either received a trial of empiric therapy or had undergone minor diagnostic procedures in attempting to diagnose their lesion. Only then were they subjected to exploratory thoracotomy which gave a definitive diagnosis in all five patients who were undiagnosed preoperatively. Thoracocentesis and chest tube drainage had established the causative organism in one patient with an empyema (No 7), but continued sepsis and a trapped lung required surgical intervention. Although the source of recurrent hemoptysis in the young girl with a persistent bronchopleural fistula was localized by bronchoscopy, surgical closure with obliteration of the cavity offered the only chance for control of the bleeding.

The degree of therapeutic success obtained by thoracotomy in this group of patients was impressive. All seven patients have had full resolution or a dramatic decrease in the size of their intrathoracic process. One patient has developed a recurrence of pulmonary disease. Patient 1 with combined immunodeficiency disease and systemic Phialophora infection who had resection of a lymphomatous mass in her right lower lobe now has a large left lung mass, presumptively recurrent lymphoma.

The patients in this study accurately illustrate the deficiencies in diagnosing these localized mass lesions. Sputum samples, transtracheal aspirates, and random bronchoscopic washings are of little value due to their nonspecificity. Bronchoscopy with sampling of endobronchial secretions18 and fluoroscopically guided transbronchial biopsy18 should be attempted on all intraparenchymal lesions if feasible. Unfortunately, because of poor clotting parameters precluding a safe biopsy, multiple organisms contaminating the lower airway, and often the peripheral location of these lesions, bronchoscopic diagnosis is often not possible. Castellino and Blank3 reported a 73 percent diagnostic yield using percutaneous needle aspiration under fluoroscopic guidance in 108 attempts at diagnosing focal pulmonary lesions. Their technique, which involves use of an 18 gauge thin wall needle, resulted in 26 percent incidence of pneumothorax and hemoptysis in 3 percent. However, the procedure was not attempted in patients with bleeding diatheses, respiratory insufficiency, bullous lung disease, or in uncooperative patients. All of these situations are not uncommon in this group of patients.

For patients with focal pleural processes, thoracocentesis, ideally under ultrasound control, should give an accurate diagnosis. However, surgical drainage and possibly decortication is often still necessary for complete resolution as it was in two patients in this series.

Random open lung biopsy also appears to be inadequate for diagnosing these lesions. Experience in two patients where this was performed in lieu
of directly attacking the mass lesion was unrewarding. One patient, the young woman (No. 5) with systemic vaculitis and giant bullous lung disease, is reported in this series. The other patient, a 19-year-old man with acute lymphocytic leukemia, developed cough, fever, and a progressively enlarging left lower lobe mass. A needle aspirate failed to provide a diagnosis; therefore, he underwent left chest exploration through a limited thoracotomy. At operation, a 4 cm hemorrhagic, necrotic-appearing mass was noted in the left lower lobe. Because of his precarious hematologic status and presumed high operative risk, only a limited biopsy of the edge of the mass was performed. This biopsy gave no diagnostic information. Ten days later the patient died of massive hemoptysis secondary to a potentially resectible aspergilloma which had eroded into the lobar pulmonary artery.

Either because less invasive procedures have failed to provide a diagnosis or there was some contraindication to their use, thoracotomy for diagnosis will be considered in many of these patients. Five of our seven patients presented with just such a dilemma. An aggressive surgical approach to diagnosis and therapeutic intervention was resorted to in these five patients. Two other patients in whom the diagnosis was known were subjected to aggressive therapeutic surgical procedures. This approach has been used previously in the treatment of immunosuppressed patients. Pappas and associates,11 citing the experience in handling acute intra-abdominal complications, reported six renal transplant patients in whom surgical resections were performed in an effort to control severe focal intrapulmonary infections. The two patients who still had localization of the process to the lung parenchyma had uneventful recoveries. However, all four patients in whom surgery was performed after perforation into the pleural space had occurred, died of sepsis. Williams8 described three patients who developed focal pulmonary complications of immunosuppression related to renal transplantation. Each patient had protracted fevers and no response to antibiotic therapy and all responded well to surgical resection.

Based on the limited experience now available we conclude that: 1) focal thoracic lesions in immunodepressed patients have a high morbidity and mortality rate with medical therapy alone; 2) diagnostic procedures short of thoracotomy often give insufficient data to confidently treat these lesions with a specific therapeutic regimen; 3) the anticipated severe complications of major thoracic surgery in this high risk group of patients was not seen in our series; 4) therefore, an aggressive surgical approach to diagnosis and treatment of these lesions is recommended.

REFERENCES