Endobronchial Polyposis Secondary to Thermal Inhalational Injury


A 28-year-old man who sustained inhalational injury in a house fire developed symptoms of chronic cough and hemoptysis requiring bronchoscopy. Two months after the initial injury, numerous endobronchial polypos were found in the trachea and throughout the bronchial tree. His symptoms have subsequently improved over a six-month period while receiving steroid therapy. To our knowledge, this delayed complication of inhalational burn injury has not been previously reported.

Pulmonary injury from thermal accidents contributes significantly to the mortality and morbidity in the burn patient. The acute pulmonary complications have been divided on a temporal basis into respiratory in-

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sufficiency, pulmonary edema, and pulmonary infection. Several authors have described delayed complications including tracheal stenosis, bronchiolitis obliterans, and bronchiectasis. The following case describes endobronchial polyposis as a delayed complication of thermal respiratory injury.

CASE REPORT

A 28-year-old Latino man was transferred to the Burn Unit 12 hours after sustaining flame burns from an extensive house fire. The patient was intubated prior to transfer because of respiratory insufficiency and hypoxemia. Examination at the time of admission revealed partial and full thickness burns over both hands, shoulders, elbows and the entire face with carbonaceous exudate noted in the nose, oropharynx, and sputum. Diffuse rales and expiratory wheezes were noted on auscultation of both lung fields. His arterial blood gases shortly after admission on an MAl respirator with the FiO2 at 50 percent and 5 cm of PEEP were Po2 73, Pco2 37, and pH 7.37. Portable chest x-ray film revealed diffuse bilateral alveolar infiltrates compatible with pulmonary edema.

On the second hospital day, the patient developed pneumomediastinum with subcutaneous emphysema which resolved spontaneously. He was eventually extubated on the 11th day. Because of a persistent right middle lobe infiltrate and chronic productive cough with hemoptysis, the patient was examined with a flexible fiberoptic bronchoscope. This was undertaken at the time of initial skin grafting one month after admission. At that time, the bronchial mucosa appeared congested with accompanying copious secretions. Oxacillin was given for staphylococcal endobronchitis. The patient was discharged after 50 days in the hospital, given oral antibiotics, and beclomethasone in the hopes of decreasing the endobronchial reaction. At the time of discharge, he showed clinical signs of obstructive airway disease.

The patient was admitted one week later because of an exacerbation of his cough and dyspnea. He was also febrile with a temperature of 38°C, and he had constitutional symptoms of anoxia and malaise. Gram stain of his sputum showed numerous polymorphonuclear forms and intracellular Gram-positive cocci in clumps. He was started on vancomycin and nafillin. Chest x-ray film at this time was interpreted as normal. His symptoms were relieved with aminophylline, metaproterenol and iodides, and his fever defervesced promptly.

On the fourth hospital day, he again developed significant hemoptysis, and on physical examination, a disparity was noted in breath sounds between the left and right lung. He was examined with the bronchoscope for a second time using a flexible fiberoptic scope two months after his initial insult. At this time, the vocal cords were markedly edematous but freely movable. Polypoid mucosal lesions were noted in a row along the lateral tracheal wall. Another polyp was seen at the carina (Fig 1A) and numerous other polyps were seen throughout both lungs. (Fig 1B-C) These polyps were broad based and friable and were located on the septae of bronchial bifurcations. Because of the engorgement and friability of these lesions, a biopsy was not attempted. He was discharged on a regimen of oral antibiotics, prednisone, and beclomethasone. As an outpatient, he has shown clinical improvement in his hemoptysis, dyspnea, and pulmonary function (Table 1). Bronchoscopy was repeated for the third time six months following thermal injury because of recurrence of hemoptysis. There was marked reduction in the size of the polyp at the carina. Initially, 12 polyps were visualized, and now only six of them were noted. Some of the polyps had a yellowish discoloration.

DISCUSSION

Immediate complications of the postburn period include carbon monoxide poisoning, V/Q imbalances, bronchoconstriction, and shunting of unoxgenated blood as high as 13 to 15 percent. Early complications include inhalation injury from products of incomplete combustion such as the oxides of nitrogen. These byproducts lead to surfactant destruction and tracheobronchitis. Other early complications include upper airway obstruction from tissue edema, pulmonary insufficiency with hypoxemia-hyperssecretion, and noncardiogenic

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**Table 1—Pulmonary Function Studies, Post Burn**

<table>
<thead>
<tr>
<th></th>
<th>Six Weeks</th>
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<th>16 Weeks</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Percent</td>
<td>Predicted</td>
<td>Percent</td>
<td>Predicted</td>
</tr>
<tr>
<td>Measured</td>
<td>Measured</td>
<td></td>
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<tr>
<td>TLC, Liters</td>
<td>3.7</td>
<td>70</td>
<td>4.2</td>
<td>79</td>
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<tr>
<td>FVC, Liters</td>
<td>1.5</td>
<td>37</td>
<td>2.1</td>
<td>51</td>
</tr>
<tr>
<td>FEV1, Liters</td>
<td>.78</td>
<td>22</td>
<td>1.3</td>
<td>37</td>
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<tr>
<td>FEV1/FVC</td>
<td>52 percent</td>
<td>62 percent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MMEF, Liters/sec</td>
<td>.35</td>
<td>9</td>
<td>.65</td>
<td>16</td>
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<tr>
<td>MVV, Liters/min</td>
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<td>64</td>
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<tr>
<td>DLco, ml/min/mm Hg</td>
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<td>56</td>
<td>18.5</td>
<td>64</td>
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</table>
pulmonary edema. Late complications seen about one week postburn are primarily due to pneumonia and sepsis from a variety of Gram-negative organisms and staphylococci.

Our patient experienced most of the classic acute respiratory complications of a burn and went on to develop a chronic cough, dyspnea, hemoptysis, and endobronchial polyps. The polyps were observed at multiple segmental bifurcations below the level of the carina. Direct thermal injury below the level of the vocal cords is a rare event except in steam injury. Our patient developed polyps from 30 to 60 days following thermal injury. The number of polyps were too numerous for surgical resection. The use of steroids has been reported in burn injury to the respiratory tract but no controlled studies have as yet been done. Our patient seemed to benefit from their use as manifested by improvement in symptoms over a six-month period with decrease in hemoptysis, improvement of his pulmonary function testing, and reduction in the size and number of polyps. The yellow discoloration of the polyps may be a stage in the evolution of these polyps. Close follow-up of our patient will hopefully give us the natural history of these endobronchial polyps.

The advent of intensive management of the initial shock and respiratory failure along with aggressive treatment of infection and sepsis have decreased the initial postburn mortality. Patients are now living long enough to manifest delayed respiratory complications from burns. Except for isolated case reports, little is known about these delayed complications. Most of the data available in the literature elucidate the acute pathophysiologic changes seen in the lungs of burn patients. Perez-Guerra et al have described tracheal stenosis and bronchiolitis obliterans 5 months after a respiratory burn. Donell et al reported bronchiectasis and bronchial stenosis in a child less than one year after burn involvement. Our patient exhibits one other delayed complication of thermal inhalational injury, namely, endobronchial polyps.

REFERENCES
9 Beal DD, Lambeth JT, Conner GH: Follow-up studies on patients treated with steroids following pulmonary thermal and acrid smoke injury. Laryngoscope 78:396-403, 1968