

CASE REPORT

NECROTIZING PNEUMONIA: SEQUENTIAL FINDINGS ON CHEST RADIOGRAPHY

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Cavitary necrosis, or necrotizing pneumonitis, is a complication of severe lobar pneumonia and is associated with intense illness. Both the CT and radiographic findings of cavitary necrosis have been well described. However, the sequential radiographic and CT findings of cavitary necrosis, the expected course of imaging changes, and significance of radiographic findings in relation to the clinical status of the patient are helpful in establishing the role and timing of imaging in both the initial investigation and follow-up of children with severe pneumonia and cavitary necrosis. The purpose of this article is to describe the sequential clinical and radiographic findings of cavitary necrosis complicating pneumonia in childhood.

We present a case of a male child, 2.5 years old who presented with progressive illness of fever, respiratory distress and sepsis despite therapy with antibiotics.

Sequential chest radiographs of the patient were reviewed for the distribution of lung opacities and the presence of detectable lung cavities. CT scan was obtained after IV administration of contrast material [2ml of non ionic contrast per Kgm body weight] administered by manual injection. The findings on chest radiographs were correlated

with the results of CT scan concerning the appearance of the cavities, their content and wall thickness.

DISCUSSION

Cavitary necrosis represents a complication of severe pneumonia in which a dominant area of consolidation containing a variable number of thin-walled cavities is found.^(2,7) The mechanism of necrosis complicating pneumonia is related to thrombotic occlusion of alveolar capillaries associated with adjacent inflammation, resulting in ischemia and eventually necrosis of the lung parenchyma.^(2,7) Cavitary necrosis has been described as uncommon and usually associated with staphylococcal pneumonias.^(1,3-5,7-13) Most reported cases have been in adults. Cavitary necrosis complicating *S. pneumoniae* pneumonia in children has been sparsely reported.^(1,2) 17 children with cavitary necrosis complicating pneumonia have reported over a 3-year period, of which eight cases were documented to be caused by *S. pneumoniae*.⁽¹⁴⁾ In these children, radiography was less sensitive for detecting cavitary necrosis than was CT. Of the cases of cavitary necrosis identified on CT, 41% showed no evidence of necrosis on radiography.

The identification on radiography seemed to be in part related to the content of the cavities. Those cavities that were air-filled were more apt to be shown on radiography than those cavities that were fluid-filled. This finding is most likely related to the fact that fluid-filled cavities are the same radiodensity as the adjacent consolidated lung and, therefore, are unlikely to be identifiable on radiography. When lung first becomes necrotic, the necrotic tissue liquefies and forms fluid filled cavities. When portions of this necrotic fluid are expectorated via bronchial communications, the cavities may fill with air. This sequence of progression from fluid-filled to air-filled cavities contributes to the earlier detection and increased sensitivity of CT compared with radiography.⁽¹⁴⁾

Children with cavitory necrosis are severely ill. Most patients required admission to the intensive care unit and suffered from other complications related to their pneumonia. However, despite the intensity of the illness, only patients, developed progressive sepsis and shock, required surgical resection.

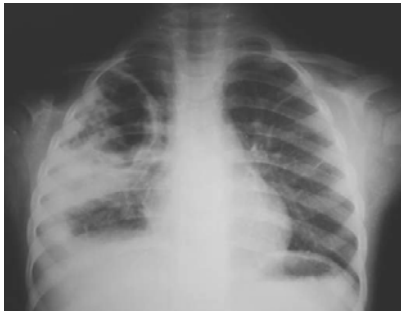
All other children usually recover completely from their illness with medical management. The high success rate of nonsurgical treatment seen in this group of children differs from what has been reported for cavitory necrosis in adult patients. The outcome for adult patients with cavitory necrosis complicating pneumonia is poor, and the mortality rate with nonsurgical treatment is high.^(5,8-13) Early surgical removal of gangrenous lung has been advocated.^(5,8) In comparison with adults, the presence of cavitory necrosis complicating pneumonia in children should not be considered an indication for surgical resection. However, the detection of cavitory necrosis may influence patient management decisions such as

intensity of patient monitoring, length of treatment, and timing of patient follow-up.^(2,6)

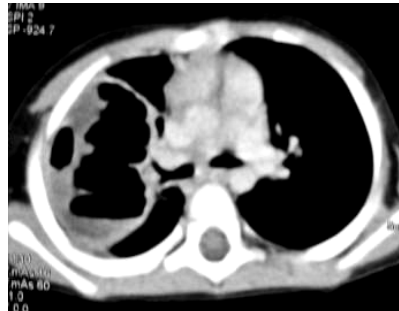
Amazingly, despite the necrosis and cavitory formation involving large portions of pulmonary lobes in these children, long-term follow up radiographs showed clear lungs without evidence of volume loss, scarring, or chronic cavitory disease. A typical temporal pattern of resolution was seen with progressive resolution of visualized cavities. Airspace opacification decreased progressively, evolved into transient linear densities, and eventually resolved. The time until complete resolution was more than 40 days. These persistent pulmonary changes seen on radiographs obtained fewer than 40 days after the diagnosis of cavitory necrosis should neither be unexpected nor considered a sign of unresponsive pneumonia. In these patients, absence of pulmonary sequelae should be the expected course and, as with children with pneumonia without evidence of cavitory necrosis, long-term follow-up chest radiography is not considered routinely necessary.

It remains unclear how lung that is nonviable and has formed cavities associated with necrosis could appear normal on follow-up radiography. It is also unclear why the prognosis of children with necrotic lung is much better than that of adults with the same complication. Both issues may be related to the profound ability of the young to heal. We can conclude that cavitory necrosis can complicate *S. pneumoniae* pneumonia in children. CT is more sensitive than chest radiography for detection of cavitory necrosis. Although cavitory necrosis associated with intense illness, most children recover with nonsurgical treatment and show normal-appearing lungs on long-term follow up radiography.

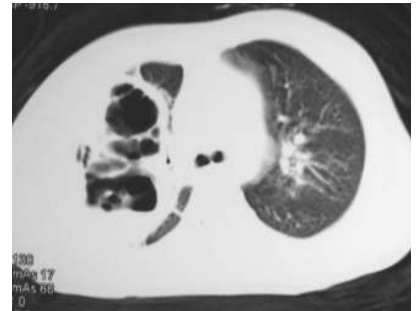
Sequential imaging of 2.5 years old boy with cavitary necrosis complicating right upper lobe *streptococcus pneumoniae* pneumonia.



A



B



C

A. Chest X- ray showing large right upper lobe area of air space consolidation with cavitation in its upper part. Parapneumonic effusion is seen obliterating the right costophrenic angle.

B,C. CT scan obtained in the same day showed a large cavitary lesion with internal septations and multiple air- fluid levels. The total loss of the normal lung architecture.



D



E

D. Follow up chest radiograph obtained two weeks later showed marked regression of the lesion with residual air space consolidation and small cavity. There is also regression of the associated pleural effusion.

E. Chest radiograph obtained 3 days after [D] showed further regression of the lesion.

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