RADIOLOGICAL FINDINGS IN TRACHEO-BRONCHIAL FOREIGN BODY ASPIRATION

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INTRODUCTION

Aspiration of foreign body may result in sudden death by tracheal obstruction or may lead to chronic symptoms from emphysema and bronchiectasis. Radiographic methods for the diagnosis of tracheobronchial foreign body include chest radiograph, inspiration and expiration chest x-rays,[1] inspiratory and assisted expiratory chest[2] radiographs, fluoroscopy, isotope examination of the lungs[3] and CT scanning. [4] Various radiological techniques are employed to demonstrate the consequences of air way obstruction to inhale air producing collapse consolidation or to exhale air giving obstructive emphysema. In about 12 to 20% of patients the chest x-ray is normal requiring further radiological workup or bronchoscopy[5-6]

The present study reviews the findings on chest radiography in patients with bronchoscopically proven tracheobronchial foreign bodies.

PATIENTS AND METHODS

Fifteen cases were seen at the Aga Khan University Hospital from January 1986 to June 1988. Chest tadiographs were taken in all. In six, aspiration and expiration films were available. All patients had tracheobronchial foreign bodies removed at bronchoscopy and post-bronchoscopy chest films were taken in all. Each radiograph was scrutinized for evidence of aspirated foreign body, collapse consolidation, mediastinal shift, evidence of air trapping in way of hyperlucency of the lung fields and visualisation of opaque foreign body. The degree of mediastinal shift into mild, moderate and severe were recorded by concurrence of two radiologists.

RESULTS

Tracheo-bronchial foreign bodies were removed on bronchoscopy in all patients. They included betel nut (supari) in 9, nuts in 4, nut shell and pen tip in one case each. Ages of the patients ranged between 2 to 11 years with a mean of 4 years with a 2 :1 male to female ratio. In 11 cases the foreign body was lodged in the main bronchus (left side 7 and right 4). In 3 it was in the trachea while in one the pieces were found in both bronchi.

More than one findings were present in the same patient.

Chest radiograph was abnormal in 11 (74%) out of 15 patients at presentation (Table)

TABLE . Roentgenographic findings at presentation and Post-bronchoscopy.

Findings	At Presentation		Post-bronchoscopy
	No.	%	No.
Normal	4	26	5
Abnormal	11	74	6
Ipsi-lateral Hyperlucency	4	26	0
Mediastinal shift	6	40	2
Mild	2	13	2
Moderate	4	26	
Severe	2	13	
Collapse	5	33	2
Consolidation	4	26	7
Radiopaque FB	1	7	0

showing evidence of obstructive emphysema, collapse and mediastinal shift (Figure).

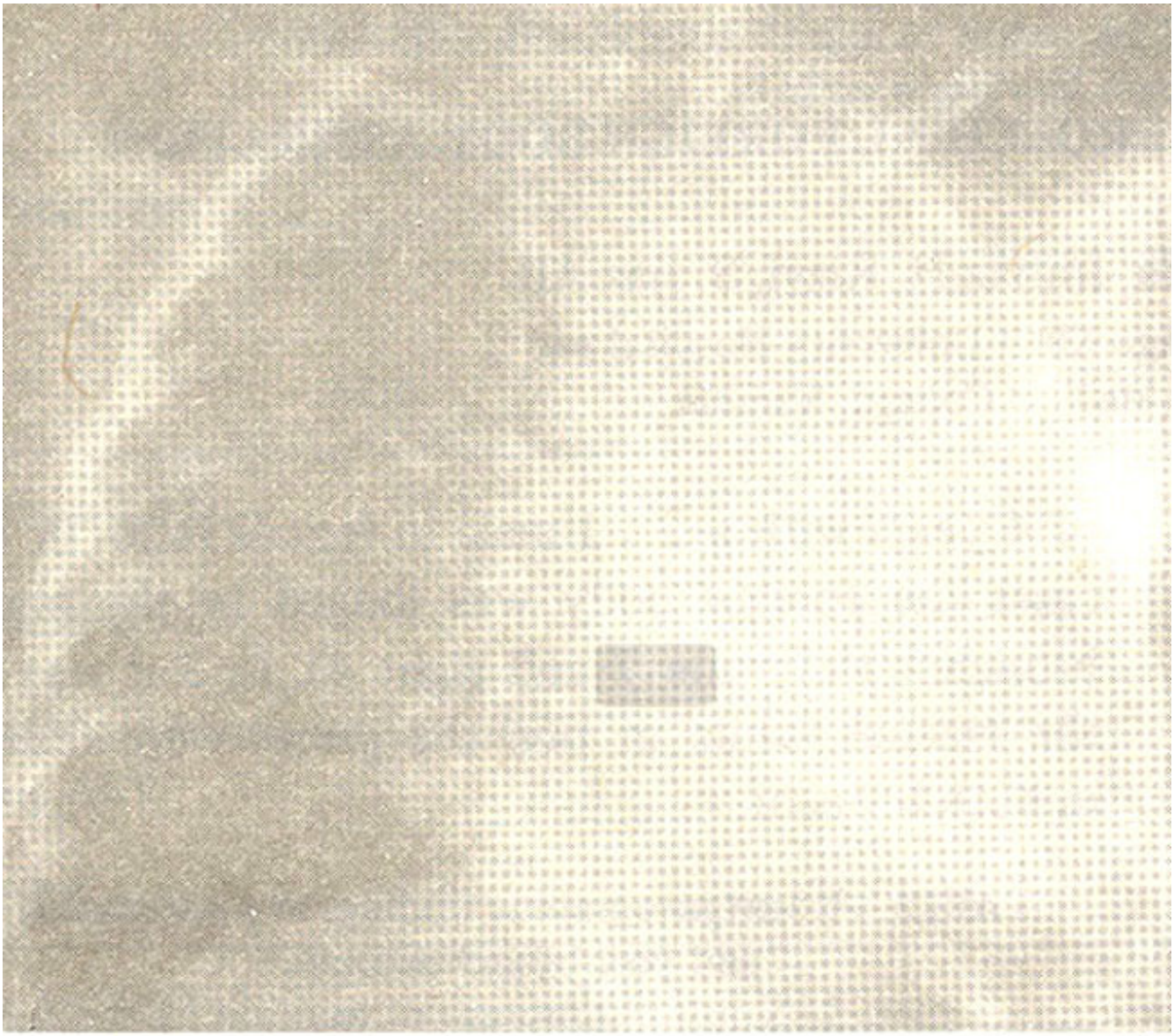

Figure. Chest radiograph showing complete collapse of left lung in a patient with foreign body in left main bronchus.

Of the 6 patients, in whom inspiratory and expiratory films were taken, in one mild mediastinal shift was detected. In the other five there was virtually no difference in the lung expansion between the inspiratoiy and expiratory films because of inability of paediatric patients to co-operate.

DISCUSSION

There is a wide range of radiographic findings on chest x-rays in patients with tracheobronchial foreign bodies. There may be lung collapse with severe mediastinal shift or obstructive emphysema. Chest radiography, may be normal in 12.5-20% cases[5-6] orthey may be entirely normal. [1] In the present study 4(26%) cases had a normal chest radiograph. Three of these, foreign bodies were in the trachea. Equal involvement of both lungs prevents comparison of the two sides, therefore, tracheal foreign bodies

most commonly give normal chest x-ray. Hence, further radiological workup may become necessary. Although widely recommended, inspiratory/expiratory chest films in infant and children usually do not prove very useful for technical reason. In only one of our six patients, this technique helped to lateralize the foreign body by showing evidence of obstructive emphysema (Figure). Utility of the mspiratoiy/expiratory films is unquestionable, but technical problems necessitate the use of other methods like assisted expiratory radiography. In using this technique, the patient is appropriately immobilized and firm pressure is applied to the epigastrium with a lead gloved hand during exposure in order to achieve good expiratoiy film, thus overcoming the difficulties of achieving voluntary expiration. In a reported series of 50 patients with foreign body, 47 showed evidence of localized air trapping[2]. There were only three false negative where the foreign body was located in the trachea, a specificity of 94%.

In patients with tracheal and laryngeal foreign bodies fluoroscopy showing paradoxical movements of mediastinum (PMM)[4] can provide diagnostic informatkm[7]. During inspiration in partially obstructed trachea from foreign body, there is decrease in the intra-alveolar pressure and further drop in negative intra-pleural pressure thereby increasing the suction effect of the diaPhragm on blood containing structures of the medistiunm leading to increase in venous return and widening of mediastinum. The reverse happens in expiration. In 18 of the 97 children studied by Grunebaum et al, the foreign body was suspected to be above the tracheal bifurcation, in all 18, PMM was present during fluoroscopy, indicating a very high degree of reliability of this method. The only drawback is, that fluoroscopy may deliver higher radiation dose to the patient compared with radiography.

Isotope Lungs Scanning is not widely available and the positive findings may become apparentonly after 24 hours of aspiration. Therefore, lungs scanning never became a popular method of investigation. CT scanning has also been used in detection of occult tracheobronchial foreign body. This method should be employed only after other less expensive techniques have failed to establish a diagnosis.

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