# THE VALUE OF ROUTINE CHEST RADIOGRAPHS IN ACUTE ASTHMA ADMISSIONS

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*ABSTRACT*

***We reviewed 116 chest radiographs done in 70 adult asthmatic patients who were admitted to the Hospital Universiti Sains Malaysia from January to December 1989. The chest radiographs were abnormal in 23% of cases. Twelve percent showed hyperinflation and 7% had pneumonia. Eight patients diagnosed clinically to have pneumonia had normal chest radiographs. Seven patients had radiographic findings of conditions which were unsuspected clinically. These included two cases of pneumonia, one case each of fibrosing alveolitis, pneumothorax, pneumomediastinum, mitral stenosis with left ventricular failure and right pleural effusion. In conclusion, we found that significant chest radiograph abnormalities in adult patients admitted for asthma were uncommon although chest radiographs were helpful in detecting complications or coincidental conditions. Chest radiograph is therefore an important investigation in adult asthmatic patients who are admitted. However, considering the cost and the risk of radiation, it should be done only in selective cases rather than as a routine procedure.***

***Keywords:*** *asthma, adult admissions, chest radiograph, pneumonia.*

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## INTRODUCTION

Asthmatic patients are frequently admitted for unremitting attacks. Some had multiple admissions over a short period of time. It is a common practice to subject these patients to chest radiographs. In 1952, Royle[1] in a study of radiographic appearances in 200 asthmatics at the allergy clinic at York, found that 4% of children and 10% of adult asthmatics had important radiographic abnormalities. He concluded that although chest radiographs in uncomplicated asthma are usually normal, they are helpful in the elucidation of complications and in the discovery of coincidental conditions.

Since then, numerous other papers had emphasised the need for chest radiograph in asthmatics to rule out pneumonia, segmental collapse, pneumomediastinum and pneumothorax[2-4]. Against this background is the cost as well as the risk of excessive exposure to radiation[5].

The aim of our study is to evaluate the value of the chest radiograph in the management of adult asthmatic patients who were admitted to the hospital.

## MATERIALS AND METHODS

A retrospective study of the case records and chest radiographs of adult asthmatic patients (age 12 to 60 years) admitted to Hospital Universiti Sains Malaysia, Kelantan, Malaysia, from January to December 1989 was done. A total of 116 admissions in 70 asthmatic patients (27 males, 43 females) were included in the study. All patients had bronchial asthma as defined by the American Thoracic Society. Those patients with a clinical diagnosis of chronic bronchitis and emphysema were excluded. Seventy percent of the patients were admitted once, 21% had two to four admissions and 8% had more than four admissions during the period. At least one chest radiograph was taken during each admission. The radiographs were reviewed by the authors and any difference in the interpretation was resolved by unbiased interpretation of another radiologist. The course of hospitalisation was reviewed to determine whether any management decision was attributable to the chest radiograph.

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## RESULTS

The findings on the chest radiographs are shown in Table I. The majority (77%) of the radiographs was normal. Hyperinflation was the commonest abnormality detected. Hyperinflation was considered to be present when the diaphragm is in a low position with a tendency to flatten. Significant abnormalities were seen in 13 cases (11%), out of which pneumonia accounted for 8 cases (7%). The other abnormalities discovered were one case each of pneumothorax, pneumomediastinum and pleural effusion. In the remaining two cases, chest radiographs showed pulmonary infiltrates which on further evaluation were found to be due to fibrosing alveolitis and pulmonary congestion secondary to mitral stenosis respectively.

In 15 patients, the management was changed on the basis of the chest radiograph findings. Eight patients were initially treated

**Table I – Chest radiograph findings in 116 adults asthmatic admissions**

| Chest radiograph findings | Number of cases | (%) |
|---|---|---|
| 1. Normal | 89 | (77%) |
| 2. Hyperinflation | 14 | (12%) |
| 3. Pneumonia | 8 | ( 7%) |
| 4. Pneumothorax | 1 | (<1%) |
| 5. Pneumomediastinum | 1 | (<1%) |
| 6. Pleural effusion | 1 | (<1%) |
| 7. Pulmonary infiltrates | 2 | ( 2%) |

for pneumonia with antibiotics which were discontinued subsequently when the chest radiographs showed no evidence of pneumonia changes. Seven patients had radiographic findings showing conditions which were not detected clinically. These included two cases of pneumonia, one case each of fibrosing alveolitis, pneumothorax, pneumomediastinum, mitral stenosis with left ventricular failure and right pleural effusion.

Table II shows the rate of detection of complications clinically by symptoms and signs elicited at admission compared with radiographic abnormalities. For this analysis, hyperinflation was not included as an abnormal finding because of its common occurrence in acute asthma attacks and its minor influence on therapy. Of the 14 patients who were diagnosed to have pneumonia on clinical grounds, six patients (43%) had radiographic evidence of pneumonia while the remaining eight patients had normal chest radiographs. One hundred and two patients were thought to be normal on clinical assessment. However seven patients (7%) had radiographic abnormalities, that is two had pneumonia, one each had pneumothorax, pneumomediastinum, pleural effusion, fibrosing alveolitis and mitral stenosis. Therefore, chest radiographs give significantly higher pick up rate in the clinically abnormal patients against the clinically normal patients (43% against 7%, p value < 0.0005).

**Table II – Comparison between clinical and radiographic detection of abnormalities in adult asthmatic patients**

| | Chest radiographs | | |
|---|---|---|---|
| | Normal | Abnormal | Total |
| Clinically Normal | 95 | 7 | 102 |
| Clinically Abnormal | 8 | 6 | 14 |
| Total | 103 | 13 | 116 |

($x^2 = 12.615$; $p < 0.01$)

## DISCUSSION

Routine chest radiographs are generally unnecessary in the management of asthmatics who respond to therapy in an outpatient setting. For those who are admitted, it has always been the practice to do routine chest radiographs but this practice has been seriously questioned. Previous studies had demonstrated that the likelihood of a significant finding on chest radiograph in acute asthmatics is very low in both adults and children[2-4]. Most authors found the value of chest radiography in asthmatic admissions to be helpful only in complicated asthma[6,7]. Hence it is timely to review the local practice where chest radiographs are still routinely taken for asthmatic patients who are admitted.

In our study, all patients who were admitted for acute asthma had chest radiograph done. Abnormalities were detected in 23% of the cases. This percentage is low compared to 46% and 72% reported by Royle[1] and Rebuck[3] respectively. In fact hyperinflation accounted for over half of these abnormalities and being such a common finding in bronchial asthma, it is not considered to be clinically useful.

Pneumonia is reported to be seen in 16-20% of patients[3,4] but we found it only in seven percent of patients. The incidence of pneumothorax and pneumomediastinum is comparable with other series[3,4,8]. In all these patients the clinical evidence suggested the diagnosis such that the role of chest radiographs was to confirm the diagnosis. In seven instances, the chest radiographs discovered unsuspected conditions. The interesting findings of fibrosing alveolitis and pulmonary congestion secondary to mitral stenosis masquerading as asthma have been noted by others[2]. The other diagnoses discovered were two cases of pneumonia, one case each of pneumothorax, pneumomediastinum, and pleural effusion. In these patients, chest radiographs were essential in the diagnosis. In the 14 episodes of acute asthma with abnormal clinical findings (apart from asthma), chest radiographs helped to confirm or exclude pneumonia.

The chance that chest radiographs were likely to be abnormal was significantly higher in patients who were clinically abnormal (all had pneumonia) compared with those patients who were clinically normal. This suggests that a clinical suspicion of pneumonia would warrant a request for chest radiograph.

In conclusion, our study confirms that chest radiograph abnormalities in adult asthmatic admissions were uncommon especially if no clinical abnormalities (other than asthma) were found. The most important role of chest radiograph was in the diagnosis of pneumonia. Hence, although chest radiograph is an important investigation in adult asthmatic patients who are admitted, it should be considered only in selected cases rather than as a routine procedure.

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