

# Chest x-ray investigation in newly discovered asthma

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Chest X-ray in 60 children (0–6 yr old) with newly diagnosed asthma at the primary care level showed normal findings in 85% at paediatric follow-up. The pathological findings were transient. The only X-ray that led to a change in treatment was performed on clinical grounds due to concurrent disease. In conclusion, routine X-ray need not be part of the initial routine work up of asthma in preschool children.

**Carl-Axel Hederos<sup>1</sup>, Staffan Janson<sup>1</sup>,  
Henry Andersson<sup>2</sup> and Gunilla Hedlin<sup>3</sup>**

<sup>1</sup>Primary Care Research Centre, <sup>2</sup>Department of Radiology, Karlstad and <sup>3</sup>Astrid Lindgren Childrens Hospital, Karolinska Institutet, Stockholm, Sweden

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Carl-Axel Hederos, Primary Care Research Centre, Vårdcentralen Gripen, Box 547, 65112 Karlstad, Sweden

Fax: +46 5 4616619

E-mail: carl-axel.hederos@liv.se

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It can be difficult to confirm the diagnosis of asthma in childhood. In addition to the history and clinical investigation it used to be a rule that 'all patients with asthma should have chest X-rays at some time – to rule out parenchymal disease, congenital anomaly and foreign body' (1). Modern textbooks take a slightly different point of view like 'every child suspected of having asthma does not require radiograms of the chest, but these are often appropriate to exclude other possible diagnosis or complications such as atelectasis or pneumonia' (2). When it comes to assessment and management of severe asthma it is recommended that 'whenever possible a chest X-ray should be performed' (3). To our knowledge there is no modern report on the question of performing a chest X-ray as part of the routine investigations in newly diagnosed preschool asthmatics. We hypothesize that this should be performed only on clinical suspicions of reasons other than asthma.

## Patients and methods

The children who entered the study were 0–6-year old and were referred from general practitioners or childrens hospital for a follow-up and further investigations at our paediatric outpatient clinic when their acute asthma symptoms were in remission.

They were classified as asthmatics if they had either of: (i) three episodes of wheezing before 2 yr of age, (ii) one episode of wheezing after 2 yr

of age, and (iii) one episode of wheezing in children with other atopic diseases.

To catch those with the greatest risk of getting chronic asthma they should have, in addition to the listed criteria, at least one of the following: (i) asthmatic problems without signs of upper respiratory tract infection (URTI), (ii) other atopic diseases, (iii) positive skin test or radio-allergosorbent test, and (iv) family history of severe atopic disease (4).

We included consecutively 60 children who fulfilled the criteria. In the initial work up a chest X-ray was taken when this had not been done earlier on clinical grounds. The X-ray was taken with one frontal plus one lateral projection so that the basal parts of the lung could be studied in a proper way. If there were any indication of a foreign body more extensive procedures with radiograms at the end of inspiration and expiration were carried out. The X-rays were taken at the Department of Radiology at the Central Hospital of Karlstad and the radiologists involved were unaware that a study was in progress. The regional ethical committee approved the investigation.

## Results

At inclusion the mean age of the children was 27 months (range 3–72 months). Of the patients 65% were classified to have severe or moderate asthma. One girl dropped out before she had an X-ray taken due to side-effects of drug therapy.

Table 1. Patients with pathological X-ray findings

| Number | Age (yr) | Sex  | URTI | X-ray findings                                             | Further investigations | Control X-ray      |
|--------|----------|------|------|------------------------------------------------------------|------------------------|--------------------|
| 1      | 4.5      | Girl | Yes  | Basal infiltration right lung, diaphragm slightly elevated | No                     | Normal             |
| 2      | 3        | Boy  | Yes  | Basal infiltration left lung, elevated diaphragm           | Yes                    | Partial regression |
| 3      | 4.5      | Boy  | No   | Bilateral thin infiltration close to the hilus             | No                     | Normal             |
| 4      | 3        | Boy  | Yes  | Bilateral thin infiltration close to the hilus             | No                     | Normal             |
| 5      | 4        | Girl | Yes  | Bilateral thin infiltration in the lower parts             | No                     | Normal             |
| 6      | 1.5      | Boy  | No   | Thin infiltration in the medial lobe                       | No                     | Normal             |
| 7      | 4        | Boy  | Yes  | Small infiltration behind the heart                        | No                     | Not done           |
| 8      | 3.5      | Girl | No   | The contour on the left side close to the carina deviates  | Yes                    | Normal             |

URTI, upper respiratory tract infection.

As this is a clinical investigation some of the investigations were performed in close connection with an identified URTI and this is specified in Table 1.

Fifty patients had normal X-ray investigations including one girl of 18 months who later was diagnosed as also having a cystic fibrosis. One 13-month-old girl (not included in Table 1) had a chest X-ray taken 1 month before entering the study. She had symptoms of pneumonia and the X-ray showed bilateral infiltrates. She later had several pneumonias and further investigations verified the diagnosis of primary ciliary dyskinesia apart from her asthma symptoms. In all, eight patients had pathological findings. Number 2 was a boy who was treated with daily inhalations with corticosteroids. He had no history of aspiration but had several antibiotic treatments due to otitis media combined with severe cough. A second X-ray with extended investigations 6 wk later showed partial regression and no signs of a foreign body. The boy had no further problems.

Number 7 was a boy with severe asthma who was treated with high-dose corticosteroid inhalation when the X-ray was taken. He was followed clinically without further medication and the symptoms disappeared. No control X-ray was taken.

Number 8 was a girl who had only intermittent cortisone treatment. She was free of symptoms when the X-ray findings indicated an anomaly of the great vessels. Ultrasound investigation of the heart and lungs showed normal result and a magnetic resonance imaging of the thorax concluded that the deviation was due to a prominent left thymus lobe.

## Discussion

This study showed that 50 of 59 routinely performed chest X-ray investigations on pre-school children with newly diagnosed asthma and with relatively high risk for permanent illness were normal. Most investigations were per-

formed when the child was free of symptoms as part of a routine follow-up plan.

Over 25 yr ago Eggleston et al. (5) found that 20% of patients with asthma had infiltrates, atelectasis, pneumonia or a combination of the three. One study found that 94% of X-rays on children presenting with first attack of asthma were normal (6). Ninety-five per cent with positive films could be identified on the basis of clinical signs.

In children with first attack of asthma 9% of radiographs were pathological, but the same could only be identified on clinical grounds in 15% (7). They were unable to find whether chest radiography altered treatment or the patients' final diagnoses. However, Linna et al. (8) found that several children who later were found to have central airway stenosis had been treated in vain as asthmatics since early childhood.

Seven of our patients had abnormal X-rays but none of these findings led to any change in the treatment and the follow-up showed normal X-ray. In one girl an anomaly of the great vessels was suspected but further investigation confirmed a prominent left thymus lobe only. Thus routine X-ray may also lead to unnecessary follow-up investigations.

The single X-ray with clinical significance in this study was taken on clinical grounds before the study started on the girl with primary ciliary dyskinesia who initially presented with asthma symptoms.

Considering the possible long-term negative effects of radiation on preschool children where the effective dose given is estimated to be 0.05 mSv and the risk of cancer induction is three times higher than in grown-ups and adding the price of about 70 US\$ per investigation, our opinion is that chest X-ray might be useful in the investigation of an acute asthma episode but need not be part of the routine check up of newly discovered asthma in children. This standpoint is in concordance with the latest guidelines (9, 10).

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