Left lower lobe ventilation and its relation to cardiomegaly and posture

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At the turn of this century William Ewart suggested that dullness to percussion below the angle of the left scapula was due to collapse of the base of the left lung caused by a distended pericardial sac in pericardial effusions.¹ Although Ewart's sign was subsequently applied to other causes of an enlarged heart, the phenomenon has received little attention. To clarify the relation between regional ventilation and cardiomegaly we reviewed routine ventilation lung scans and carried out a prospective study of unselected elderly patients and normal volunteers to assess the influence of posture on these changes.

Subjects, methods, and results

We compared routine ventilation (krypton-81m) and perfusion (technetium-99m macroaggregate) scans obtained in 90 elderly patients (aged 65 and over) with those obtained in 90 younger patients (aged 20-40). Images of regional ventilation were assessed for changes by two independent observers who had not seen the chest radiographs obtained. In the older patients 31 had reduced left lower lobe ventilation with normal perfusion. Twenty of these had an enlarged heart (assessed by a cardiothoracic ratio of greater than 50% in the routine posteroanterior radiograph of the chest). Conversely, of the 49 with an enlarged heart, 27 had reduced left lower lobe ventilation. The relation between heart size and reduced left lower lobe ventilation was significant ($p < 0.001$, χ^2 test). In the younger

Posterior ventilation images showing normal ventilation and changes of left lower lobe ventilation with position in a patient with cardiomegaly

group eight patients had an enlarged heart and three of these showed reduced left lower lobe ventilation. None of those with normal sized hearts had reduced left lower lobe ventilation.

We studied the effect of posture by recording posterior views of ventilation in the supine, erect, and prone positions in a further 19 unselected elderly patients and in the supine and prone positions in 10 normal subjects. Eleven of the elderly patients had enlarged hearts, of whom seven had reduced left lower lobe ventilation in the erect position; the ventilation was improved in the prone position in all seven but was worse in the supine position in five (figure). Four out of the 10 patients with normal ventilation in the erect position had an increased heart size, and a change to the supine position reduced the left lower lobe ventilation in one of these four. Two of the patients with reduced left lower lobe ventilation had a normal heart size, and a change in posture had no effect. No changes in ventilation were observed at the right base. In the normal volunteers no change was recorded when they moved from the prone to the supine position.

Comment

Our data suggest that a partial loss of ventilation in the left lower lobe may result from cardiomegaly and that this change is related to posture. Even in the erect position this loss of ventilation is seen in more than half of the routine ventilation perfusion scans of subjects with cardiomegaly; in some the left lower lobe seems not to be ventilated at all. Compression of the major airways by an enlarged left atrium has been shown to occur in infants^{2,3} but is not evident on computed tomography in adults with cardiomegaly in the supine position. Movement of the diaphragm may be restricted by an enlarged heart, but the most likely cause of the loss of ventilation is compression of the lung and minor airways. This may explain why collapse of the lower lobe in patients after operation is more commonly left sided. After cardiac operations such collapse may occur in up to 60% of patients.⁴ A simple change in position from supine to prone moving the heart away from the left lower lobe may improve ventilation in hypoxic patients with cardiomegaly.

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- 2 Cochran ST, Gyepes MT, Smith LE. Obstruction of the airways by the heart and pulmonary vessels in infants. *Pediatr Radiol* 1977;6(2):81-7.
- 3 Rivkin LM, Read RC, Lillehei CW, Varco RC. Massive atelectasis of the left lung in children with congenital heart disease. *J Thorac Cardiovasc Surg* 1957;34:116-25.
- 4 Milne EN. Chest radiology in the surgical patient. *Surg Clin North Am* 1980;60:1503-18.

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Providencia alcalifaciens and travellers' diarrhoea

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The genus *Providencia* has been implicated as a cause of diarrhoea, particularly in children.^{1,3} We looked for *Providencia alcalifaciens* in stool specimens from a group of patients with travellers' diarrhoea and a group of patients with diarrhoea but no history of recent foreign travel.

Patients, methods, and results

From August to October 1987 and July to October 1988 we studied stool samples from patients with

gastroenteritis sent to the microbiology laboratory at York District Hospital. The samples were divided into two groups according to whether or not the request form indicated that the patient had recently travelled abroad. Few children or elderly patients were among those returning from abroad, and therefore we excluded patients under 15 and over 64. Patients and contacts known to have enteric pathogens in their stools were also excluded.

Stool specimens were examined for salmonella, shigella, and campylobacter and for evidence of intestinal parasites. Specimens from patients returning from Africa, the Middle East, the Indian subcontinent, and the Far East were also examined for vibrios.

Proteae were detected with modified protease isolation medium.³ This differed from the original culture medium as it did not contain tyrosine and antibiotics were added to give a final concentration of