

'Sentinel lines'—an unusual sign of lower lobe contraction

BASIL STRICKLAND

Department of X-ray Diagnosis, Brompton Hospital, London SW3

Strickland, B. (1976). *Thorax*, 31, 517–521. **Sentinel lines—an unusual sign of lower lobe contraction.** Of the various densities occurring in the lower zones of the standard postero-anterior chest radiograph, one sign has been ignored. Coarse linear densities at the bases may be due to adjacent lower lobe contraction. The cause is related to bending or kinking of the lower zone bronchi, usually the superior and inferior branches of the lingular bronchi. The densities are probably due to mucus-filled bronchi or alveolar atelectasis distal to the kink, resulting from poor bronchial drainage, and may indicate more extensive disease. The left lower lobe collapse may not be visible on the chest radiograph but the presence of these densities should alert the observer to the more important associated abnormality.

Radiologists and chest physicians are well aware that the presence of a collapsed left lower lobe is easily overlooked on the relatively underpenetrated chest radiograph unless the slight shift of adjacent structures or the transradiancy resulting from an over-inflated upper lobe alerts the observer to this abnormality. In 1960 Nordenström and Novek described three cases of left lower lobe collapse which were associated with basal 'lamellar' atelectasis on the affected side. They attributed these linear densities to kinking of the lingular bronchi resulting from the mechanical adjustments of the heart, lungs, and diaphragm to the collapsed lower lobe. Perusal of the literature has failed to reveal any further reference to these valid and relevant findings. The radiographic changes are uncommon but are sufficiently useful to warrant wider recognition.

In our experience, the basal linear densities which occur only when a lower lobe is collapsed may be horizontal, oblique or slightly curved, concave upwards (Figs 3a and 4a). They are seen most often at the left base but rarely they may be right-sided or bilateral. Nordenström described the lingular bronchus kinking on the raised diaphragm and stated that the linear densities were cast by the kinked bronchi themselves. Reid (1974) suggests that such opacities could be caused by infolding of the visceral pleura which may occur as a local manifestation of underlying inflammatory or atelectatic change. That such

changes are present when an adjacent lobe is de-aerated or contracted would imply that the pathological change causing the lower lobe disorder is also present to a lesser extent in the adjacent distorted lobe but, because that lobe is still full of air, probably because of collateral drift, the necessary 'contrast medium' is present to highlight any visceral pleural wrinkling.

Reid's hypothesis is given considerable credence from our material because these 'sentinel lines' have been present more often when there is established bronchiectasis in the shrunken lower lobe (Figs 2, 3 and 4) than in simple lobar collapse (Fig. 1a), and in one patient (Fig. 4) the linear densities were associated with severe bronchiectasis in a partially aerated lingula where the lower lobe was collapsed and presumably fibrotic. The lingular bronchi kink because of the general medial displacement and do not kink directly on the diaphragm. As judged from a co-relation of bronchograms and plain film appearances, the distortion of the segmental or subsegmental bronchi, resulting from kinking or bending of the lobar or intralobar bronchi, appears to prevent adequate drainage of the airways beyond the kinked bronchus, and hence secretions accumulate in the distal bronchial branches. The mucus-filled distal bronchi either cast direct linear densities on the radiograph or cause atelectases in the respiratory lobule units which themselves cast distorted linear densities. If the lower lobar contraction is per-

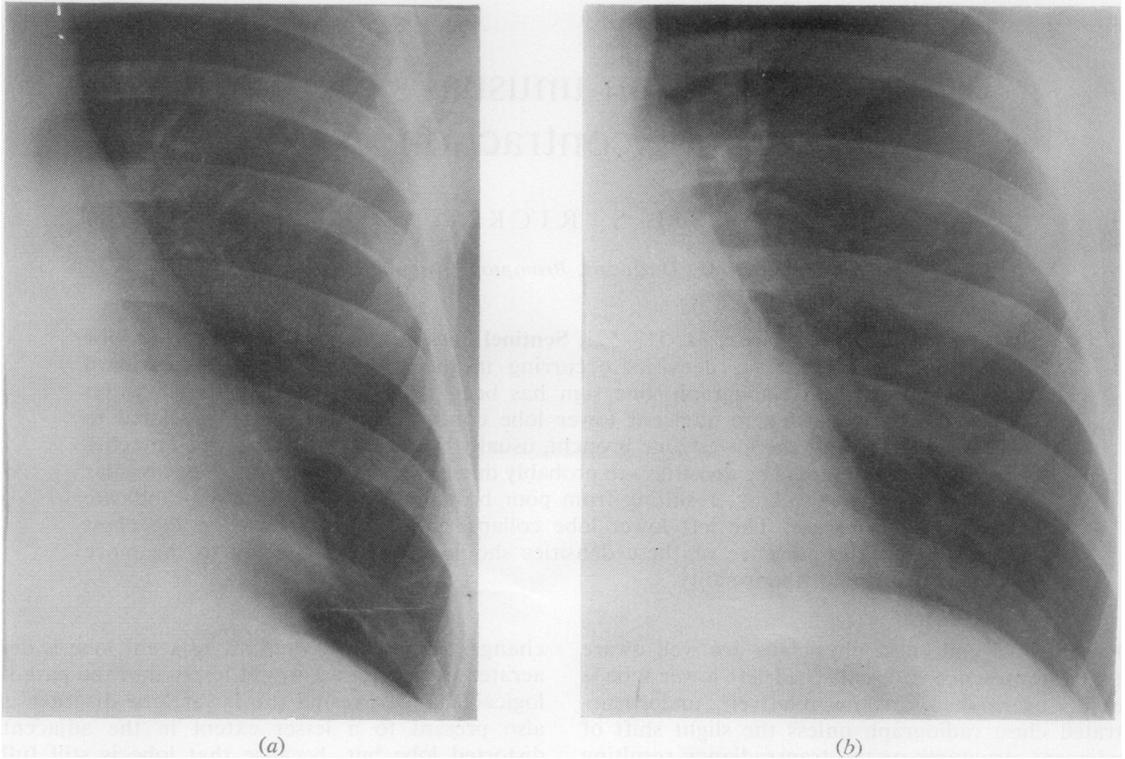


FIG. 1. (a) There is a linear density at the left base. The line is semihorizontal, concave upwards. The lower lobe is collapsed. (b) The line is no longer present. The lower lobe has re-aerated.

manent these 'sentinel lines' remain, but if the collapsed lower lobe re-expands, the 'sentinel lines' will disappear (Fig. 1). Care must be taken to differentiate between these lines and other well-known basal horizontal densities of different implication, ie, plate atelectasis (Fleischner, Hampton, and Castleman, 1941), septal lines (Kerley, 1951), venous thromboses (Simon, 1971), lymphatic obstruction, neoplastic infiltration or the transient

densities of resolving infection or infarction.

Whatever the explanation of the densities described in this communication, the presence of several more or less horizontal lines at one base should alert the observer to the possibility of lower lobe collapse or fibrosis, especially in relation to the left lower lobe, and should warrant the obtaining of more appropriate films to confirm or refute the suspicion.

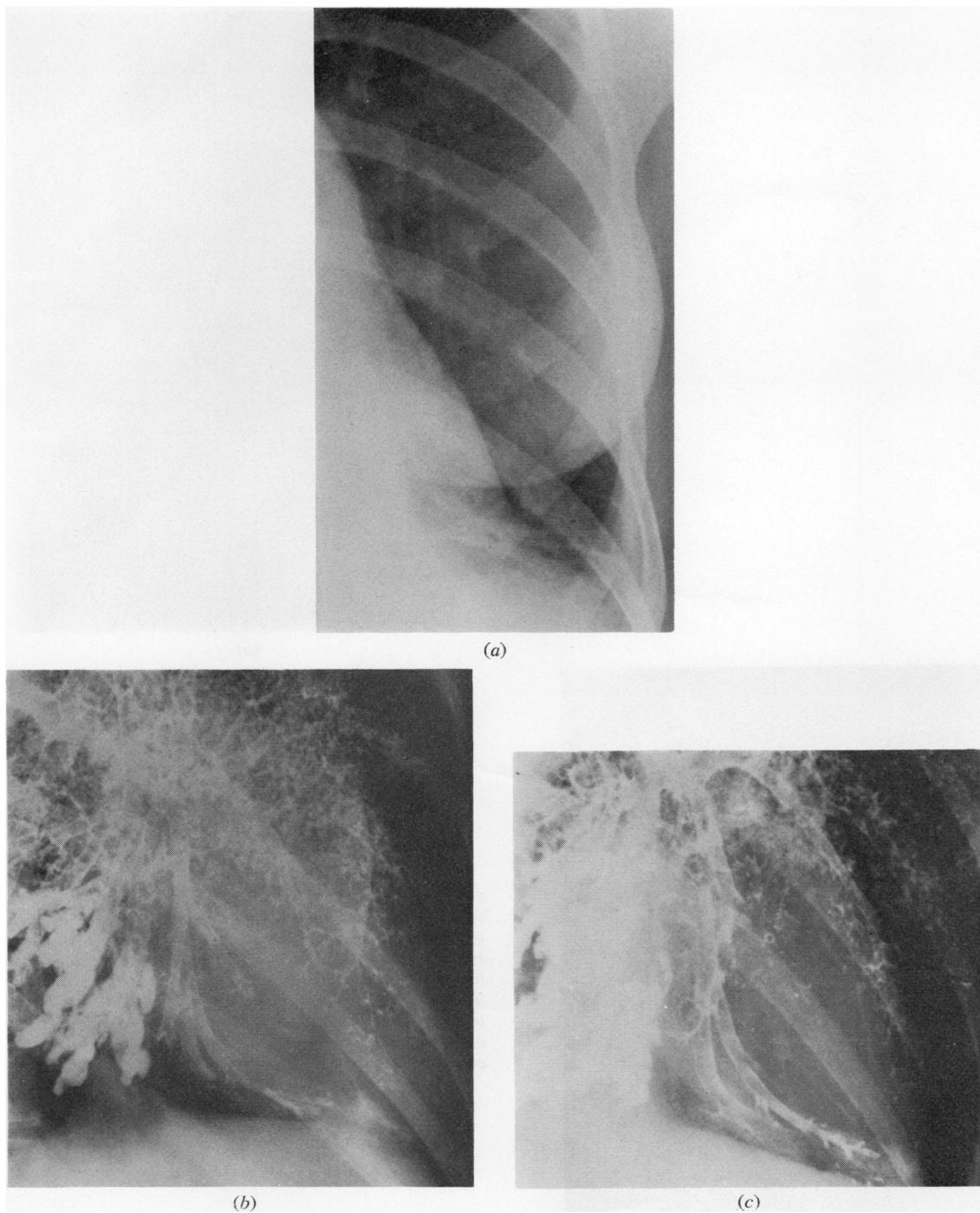
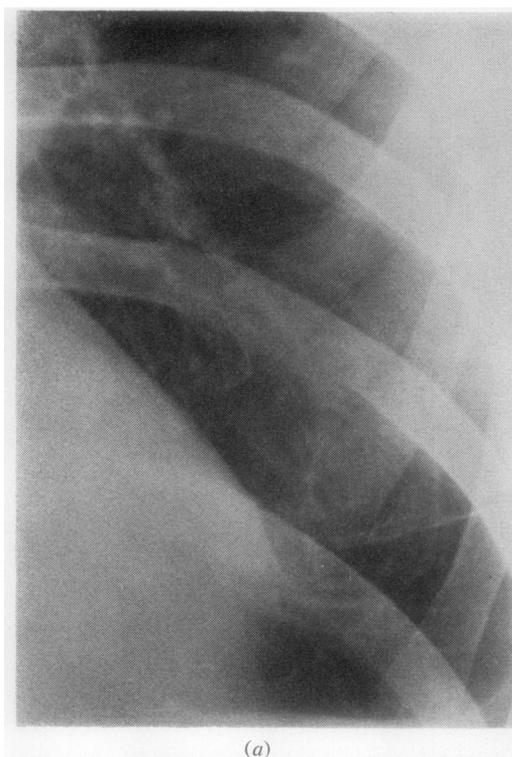
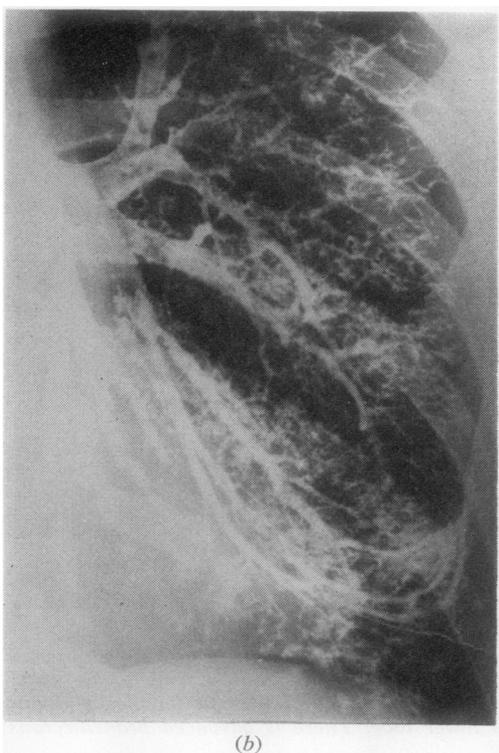


FIG. 2. (a) There are several horizontal linear densities at the left base. The triangular shadow of a contracted lower lobe is just visible through the heart shadow. (b and c) The linear densities correspond to distal branches of the lingular bronchi outlined against a well aerated background, but the main lingular divisions are bent from the mechanical displacement of the contracted lower lobe. There is advanced bronchiectasis in the lower lobe.



(a)



(b)

FIG. 3. (a) Several long horizontal densities are present at the left base. The upper horizontal line is crossed by a curved oblique line concavity facing the mediastinum. (b) The lower lobe is contracted and bronchiectatic. The inferior division of the lingular bronchus is displaced inwards and kinked. Its distal branches correspond to the horizontal and curved oblique lines of the plain film. The lingula is well aerated.

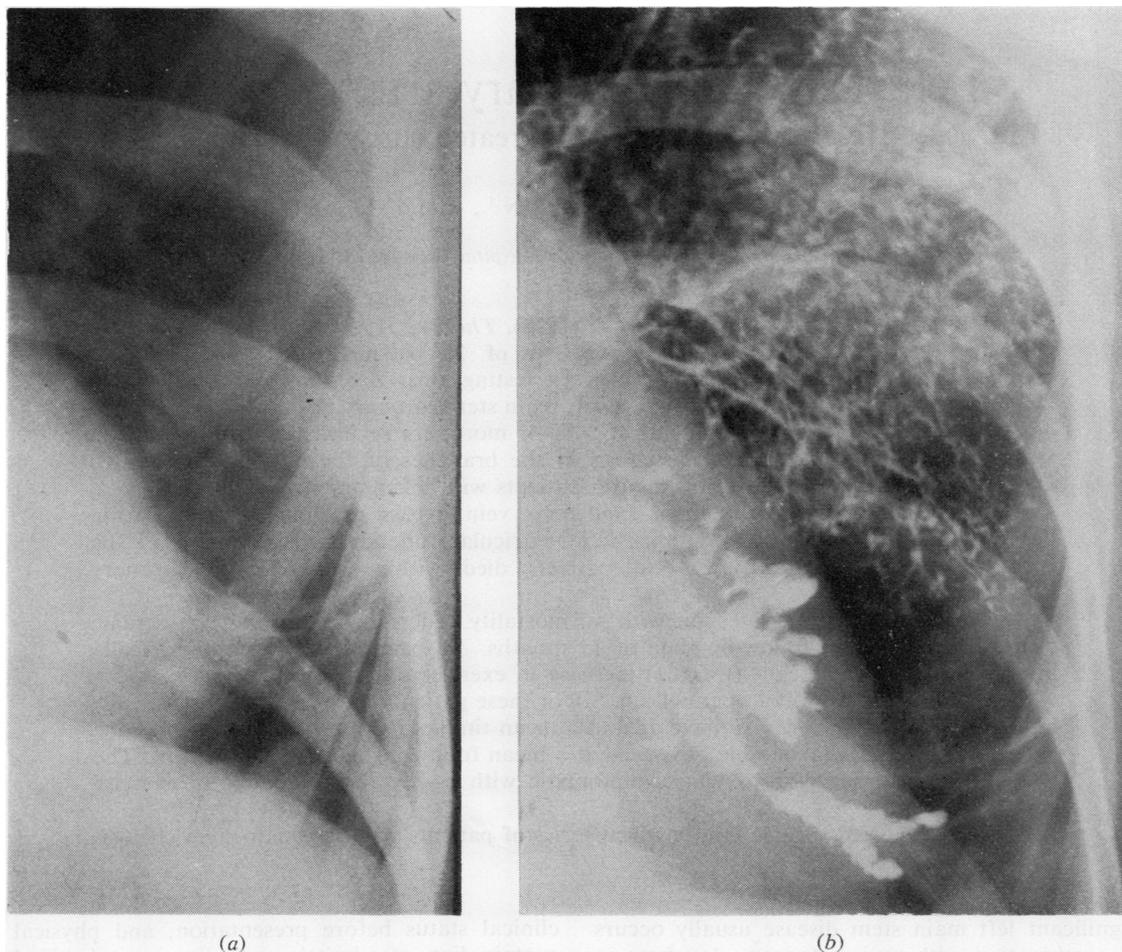


FIG. 4. (a) There is a group of horizontal curved lines at the left base concavity facing upwards. (b) The lower lobe is collapsed and fails to fill with contrast medium. The lingular bronchi are bronchiectatic but the lobe is only partially contracted. The curved lines are the unfilled subdivisions of the lingular bronchi.

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Requests for reprints to: Dr. B. Strickland, Department of X-ray Diagnosis, Brompton Hospital, London SW3.