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## Physical Signs in the Chest Part II

Professor John Crofton

### Abstract

In this section some of the causes of the common physical signs are listed.

### Mediastinal shift

Mediastinal shift to one or other side is detected by deviation of the trachea or of the heart. Naturally the trachea is more often deviated by abnormalities in the upper part of the chest, or occupying the whole of one side of the chest, and the heart by abnormalities in the lower part of the chest. If the heart is deviated to the left the apex beat will be deviated to that side. If there is no obvious cause of enlargement of the heart one can provisionally assume, depending on the later detection of consistent physical signs, that deviation is due to mediastinal shift. It is less easy to be sure of deviation to the right, especially if the abnormal physical signs are present in the right lower zone and dullness at the right base makes it impossible to detect the right border of the heart. Inward deviation of the apex beat, unless it is gross, might be due to the patient having a relatively small heart. In this case initial impressions may have to be confirmed by x-ray.

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# PHYSICAL SIGNS IN THE CHEST

## Part II

By PROFESSOR JOHN CROFTON

### THE SIGNIFICANCE OF PHYSICAL SIGNS IN THE CHEST

In this section some of the causes of the common physical signs are listed.

#### Mediastinal shift.

Mediastinal shift to one or other side is detected by deviation of the trachea or of the heart. Naturally the trachea is more often deviated by abnormalities in the upper part of the chest, or occupying the whole of one side of the chest, and the heart by abnormalities in the lower part of the chest. If the heart is deviated to the left the apex beat will be deviated to that side. If there is no obvious cause for enlargement of the heart one can provisionally assume, depending on the later detection of consistent physical signs, that the deviation is due to mediastinal shift. It is less easy to be sure of deviation to the right, especially if the abnormal physical signs are present in the right lower zone and dullness at the right base makes it impossible to detect the right border of the heart. Inward deviation of the apex beat, unless it is gross, might be due to the patient having a relatively small heart. In this case initial impressions may have to be confirmed by x-ray.

The mediastinum may be pushed or pulled to one side.

*Pulling of mediastinum to one side:* It will be concluded that the mediastinum is pulled to one side if the abnormal physical signs in the chest are found on the same side. The common causes, in order of frequency, are:

- (1) Collapse of the lung
- (2) Fibrosis of the lung

(3) *Old pleurisy or empyema:* This requires a little elaboration, as this cause is relatively unfamiliar. If a patient has a large effusion or empyema, sometimes gross thickening of the visceral pleura develops over the lung collapsed down by the fluid; this exudate may later organise, so that the lung is covered by a cuirass of thickened pleura. This cuirass prevents the lung re-expanding when the fluid is absorbed, so that the thoracic space can only be occupied by deviation of the mediastinum and pulling in of the chest wall. In these cases deviation of the trachea is accompanied not only by deviation of the mediastinum to the appropriate side but also by considerable flattening and immobility of the whole chest wall, the so-called "frozen chest".

*Pushing of the mediastinum to one side:* In this case the abnormal physical signs will be found on the side opposite to that to which the mediastinum is deviated. In order of frequency, the causes are:

- (1) Pleural effusion
- (2) Pneumothorax
- (3) A very large mass: This is relatively rare but the trachea is sometimes deviated by a tumour, cyst or aneurysm in the upper mediastinum or, very occasionally, in the upper lung.

#### Dullness to percussion.

Common causes are:

- (1) Consolidation of the lung
- (2) Pleural effusion
- (3) Collapse of the lung
- (4) Fibrosis of the lung

Less common causes are:

- (5) Thickened pleura

(6) *Raised diaphragm*: This may be due to an abscess or tumour in the liver or to subphrenic abscess. The liver dullness is often raised in obese people, but then both diaphragms are raised and there is relatively symmetrical dullness at both bases.

(7) *Tumour*: Tumours or masses in the lung are seldom large enough to give rise to dullness, except by blocking a bronchus and producing collapse, or by giving rise to pleural effusion or pleural invasion. Nevertheless, occasionally a large tumour may give rise to dullness. The relatively rare primary tumours of the pleura may also result in dullness to percussion.

#### **Bronchial breathing.**

Common causes are :

(1) *Consolidation* of the lung: Classically this occurs in lobar pneumonia, although signs of patchy consolidation may be found in bronchopneumonia. Fibrosis may sometimes be dense enough to cause bronchial breathing and actual consolidation may of course be due to a pulmonary infarct. In the latter it is commoner for there to be diminished breath sounds but classical signs of consolidation are sometimes found.

(2) A *thin layer of pleural fluid*, sufficient to cause collapse of the superficial alveoli but not of the bronchi so that the bronchial sounds are conducted to the surface. An early pleural effusion may simulate the classical physical signs of consolidation, with dullness and bronchial breathing at the base. At this stage the fluid is not sufficient to cause deviation of the mediastinum. Within 48 hours the fluid has usually increased sufficiently for there to be diminished breath sounds and diminished vocal fremitus at the base, the bronchial breathing may then be lost or be heard only over the upper and thinner part of the effusion in the midzone of the chest. The mediastinum may also have become deviated to the opposite side.

Less common causes are :

(3) *Collapse* of the lung, when this is not due to blocking of a main bronchus but of the smaller peripheral bronchi. The bronchial sounds may then be carried through the collapsed lung to the surface.

(4) *Pneumothorax*: It is much more common in pneumothorax for the breath sounds to be merely diminished but occasionally, as mentioned above, breathing of the cavernous or amphoric type may be heard.

(5) A large cavity in the lung: As already

mentioned, it is rare for a cavity to give rise of itself to abnormal physical signs, but if it is very large and very near the surface of the lung it may do so. If the cavity is exceptionally large the bronchial breathing may be relatively low-pitched and "cavernous"; if it is rather less large the breathing may be a little higher-pitched and of the amphoric type.

#### **Rhonchi.**

As already mentioned, the bronchi are narrower on expiration and therefore expiratory rhonchi are commoner than inspiratory, but rhonchi may be heard in both phases of respiration.

Generalised rhonchi are due to (1) *Bronchitis*  
(2) *Asthma*

Localised rhonchi are due to

(1) *Mucus* in a bronchus. It may be possible to displace the mucus by coughing, thus altering or abolishing the rhonchus.

(2) A tumour or other cause of localised bronchial stenosis.

#### **Crepitations.**

*Fine crepitations* may occur in

(1) *Pneumonia*: They are usual in bronchopneumonia and occur in the later stages of lobar pneumonia.

(2) *Tuberculosis*, either localised as in pulmonary tuberculosis, or generalised, as in the very late stages of miliary tuberculosis.

(3) *Collapse*, although in collapse there is often merely diminution in breath sounds, with no added sounds.

(4) *Bronchitis*: Commonly the crepitations are medium rather than fine. Fine crepitations suggest bronchiolitis or small areas of bronchopneumonia.

(5) *Pulmonary congestion* due to left-sided heart failure or to mitral stenosis. Crepitations are virtually always present in left-sided heart failure and common in mitral stenosis.

*Medium crepitations* occur in

(1) *Bronchitis*, particularly at the bases.

(2) *Fibrosis*, either localised fibrosis or generalised fibrosis. The crepitations often seem to have a "sticky" quality on auscultation. Sometimes the medium crepitations are an indication of accompanying bronchiectasis.

(3) Sometimes in *bronchiectasis* although in this condition the crepitations are usually coarse.

*Coarse crepitations.*

These are almost always due to bronchi-

cetasis, although they may sometimes occur in bronchitis.

### THE PHYSICAL SIGNS OF COMMON CHEST CONDITIONS

In this section will be listed not all the conceivable physical signs, as stated in textbooks, but the physical signs which are most frequently present and which are most helpful in making the diagnosis.

#### Consolidation.

- (1) *Diminished movement* of the affected side.
- (2) *Marked dullness* to percussion, although this will only be present in lobar consolidation and absent with patchy consolidation.
- (3) *Increased vocal fremitus*, sometimes useful in distinguishing from a thin layer of fluid.
- (4) *Bronchial breathing*.
- (5) *Aegophony and whispering pectoriloquy*.
- (6) In the early stages of consolidation there are usually no crepitations but *fine crepitations* may be present later.
- (7) A *pleural rub* is often present or the catching of the breath on inspiration may indicate the presence of dry pleurisy.

#### Collapse.

- (1) *Diminished movement*.
- (2) *Deviation* of the *mediastinum* to the same side.
- (3) *Dullness* to percussion.
- (4) Commonly *diminished breath sounds*, but sometimes, if the collapse is due to obstruction of the smaller bronchi and the larger bronchi remain open, *bronchial breathing*.
- (5) *Crepitations* may or may not be present.
- (6) *Aegophony and whispering pectoriloquy* if there is *bronchial breathing*.

#### Pleural effusion.

Pleural effusions, of course, may be of all sizes and may be difficult to detect if the effusion is very small.

- (1) *Diminished movement*.
- (2) *Deviation* of the *mediastinum* to the opposite side. This is only detectable when the effusion is relatively large.
- (3) *Stony dullness* to percussion.

(4) *Vocal fremitus* absent or decreased.

(5) *Breath sounds* diminished or, if the layer of fluid is a thin one, and quite commonly over the upper part of the effusion, *bronchial breathing*.

(6) If *bronchial breathing* is present, *aegophony* and *whispering pectoriloquy*.

On the whole the shape of the upper level of *dullness* in pleural effusion is not very helpful. Classically this rises into the axilla and is lower anteriorly but in practice this is not very helpful. *Stony dullness*, *absence of vocal fremitus* and *diminished or absent breath sounds* are the main diagnostic physical signs.

#### Pneumothorax.

- (1) *Diminished movement*.
  - (2) *Deviation* of the *mediastinum* to the opposite side, only if the pneumothorax is large.
  - (3) *Percussion note* more resonant on that side than on the opposite side.
  - (4) *Diminution in breath sounds*, which is much the most common physical sign although, as mentioned above, *cavernous or amphoric breathing* may sometimes occur.
  - (5) *Pleural clicks*: These clicks are occasionally heard in a left-sided pneumothorax in the cardiac area and in time with the beating of the heart. They are usually due to the approximation and separation of the two layers of pleura lying over the heart when these are separated only by a very thin layer of air during systole and the two layers come together during diastole. As the heart contracts the two sticky layers of pleura separate with a click.
- Diminution in breath sounds* is the only consistent sign of pneumothorax. A spontaneous pneumothorax is usually suspected on the strength of the history. If diminution of breath sounds is found on one side, with a normal or hyper-resonant percussion note, pneumothorax should be suspected. Deviation of the mediastinum will only be found if the pneumothorax is large. Rather quaint physical signs, such as "the coin sound", have been described in pneumothorax but are archaic relics of the pre-x-ray period.

#### Hydropneumothorax.

In hydropneumothorax fluid is present as well as air. The classical signs of pneumothorax may be found in the upper part of the chest and those of effusion in the lower part of the chest, usually with a well-defined upper border of dullness for the effusion; the position of this

may vary with the patient's position. The classical physical sign of this condition is "Hippocratic succussion", or splash sound. The patient is asked to sit up and his whole chest is violently shaken. The splash may be then heard either with the ear against the chest wall or with the stethoscope. If the patient is at all ill, it is less traumatic to take an x-ray!

#### Fibrosis.

The physical signs of fibrosis depend very much on the extent of the condition. Often fibrosis may be obvious enough on an x-ray, though no relevant physical signs have been elicited. Fine fibrosis may, of course, not even be detectable on the x-ray. Gross fibrosis may be localised, for instance after old pulmonary tuberculosis, or generalised, as in such conditions as sarcoidosis or diffuse interstitial fibrosis.

Localised fibrosis may cause

- (1) Diminished movement.
- (2) Deviation of the mediastinum to the same side.
- (3) Bronchial breathing or diminished breath sounds.
- (4) Medium crepitations which are often "sticky".
- (5) If there is bronchial breathing there will be whispering pectoriloquy and aegophony.

Generalised fibrosis does not usually give rise to diminished movement, dullness or deviation of the mediastinum. It usually has to be diagnosed by x-ray, but there may be generalised medium crepitations.

#### Bronchitis.

(1) The chest may be barrel-shaped or sometimes long and thin. In a barrel-shaped chest the subcostal angle is widened.

(2) The accessory muscles of respiration may be used.

(3) Owing to the inflation of the lung, or the presence of emphysema, the cardiac and liver dullnesses may be diminished. The liver dullness may lie as low as the eighth rib or below. The liver may be several finger breadths palpable in the abdomen owing to the lowering of the diaphragm.

(4) Breath sounds may be diminished, particularly at the bases.

(5) There may be a wheeze audible with "the naked ear".

(6) Generalised rhonchi, most often expiratory, but frequently also inspiratory. Crepitations may be heard, particularly at the bases, and are usually medium in type.

#### Asthma.

(1) There may be signs of inflation of the chest of the same type as in chronic bronchitis.

(2) There may be audible wheeze.

(3) Classically there are expiratory rhonchi, although these may be inspiratory also. Sometimes, in severe asthma, there may be no rhonchi and the chest may be nearly "silent" with great diminution of breath sounds. There are usually no crepitations. However, in cardiac asthma crepitations are often present.

#### Bronchiectasis.

There may be various physical signs of accompanying underlying conditions, such as fibrosis or collapse. The classical physical sign of bronchiectasis is the presence of —

Coarse crepitations persistently present on different occasions in the same areas of the chest.

#### CONCLUSION.

It should be emphasised again that physical signs are only to be taken in conjunction with all the other evidence and, in any serious condition and indeed in almost any chest condition, to be supplemented by radiological investigation. Other investigations, of course, are often necessary. Nevertheless, physical signs are often a very important clue as to what is wrong with the patient. In general practice, and in hospital after hours, an x-ray may often not be available or may properly be deferred until the morning. Rhonchi and crepitations cannot be detected by x-rays and are important evidence about the condition of the underlying lung. Therefore the student is well advised to become practised in physical signs, maintaining at the same time a proper cynicism about his capacity. If one is doubtful whether something is present, it is usually wiser to assume that it is not! Do not be like one famous self-confident Chief who, as a house physician, used to infuriate his consultants by marking in ink on the x-ray the cavities which he was able to detect by physical signs but which the radiologist was unable to elicit by what the house physician considered an inferior technique!