CHAPTER IV.

TECHNIQUE AND GENERAL DIAGNOSIS.

INSPECTION.

Much may be learned by a careful inspection of all parts of the chest, but only in case the clothes are wholly removed. A good light is essential, and this does not always mean a *direct* light; for example, when examining the front of the chest it is often better to have the patient stand with his side to the window so that the light strikes obliquely across the chest, accenting every depression and making every pulsation a moving shadow. In searching for abnormal pulsations, this oblique light is especially important.

In examining the thorax we look for the following points:

1. The size.
2. The general shape and nutrition.
3. Local deformities or tumors.
4. The respiratory movements of the chest walls.
5. The respiratory movements of the diaphragm.
6. The normal cardiac movements.
7. Abnormal pulsations (arterial, venous, or capillary).
8. The peripheral vessels.
9. The color and condition of the skin and mucous membranes.
10. The presence or absence of glandular enlargement.

I. Size.

Small chests are seen in patients who have been long in bed from whatever cause; also in those who have suffered in infancy from rickets, adenoid growths in the naso-pharynx, or a combination of the two diseases. Abnormally large chests are seen chiefly in emphysema. Of course the chests of healthy individuals vary

a great deal in size at any given age, and I have been referring in the last sentences only to variations greater than those normally found.

II. Shape.

There are marked differences in shape between the child's and the adult's chest in health. A child's trunk, as compared with

Fig. 40.—Funnel Breast.

that of an adult, is far more nearly cylindrical; that is, the antero-posterior diameter is nearly as great as the lateral. The adult's chest is distinctly flattened from before backward, although individual variations in this respect are considerable, as Woods Hutchinson has shown.

In childhood the commonest pathological modifications are due

to adenoids or to rickets; in middle and later life to emphysema, phthisis, or old pleuritic disease

(*a*) *The Rachitic Chest*

The sternum generally projects (*"pigeon breast"*), but in some cases, especially when rickets is combined with adenoid hypertrophy, there may be a depression at the root of the sternum resulting in the condition known as *"funnel breast"* [1] (Figs. 40 and

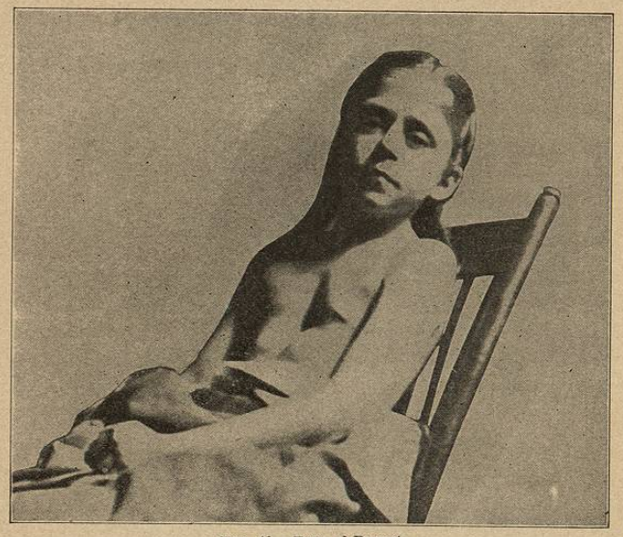

FIG. 41.—Funnel Breast.

41). The sides of the chest are compressed laterally and slope in to meet the sternum as the sides of a ship slope down to meet the keel (*pectus carinatum*) (Figs. 43 and 44). From the origin of the ensiform cartilage a depression or groove is to be seen running downward and outward to the axilla and corresponding nearly to the attachment of the diaphragm. This is sometimes spoken of as *"Harrison's groove."* The *lower margin of the ribs*

[1] In some cases this condition appears to be congenital.

in front often *flares out*, owing to the enlargement of the liver and spleen below and the pull of the diaphragm above. Along the line of the chondro-costal articulation there is to be felt, and sometimes

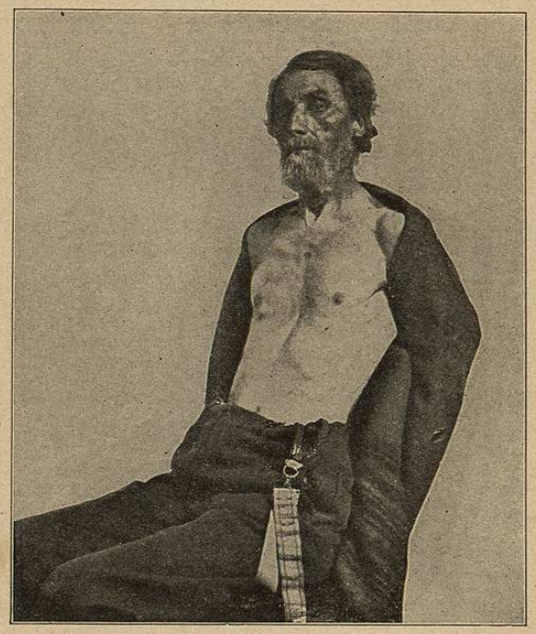

FIG. 42.—Acquired Depression at the Root of the Ensiform Cartilage. The patient is a shoemaker of seventy, who has all his life pressed against his breast bone the shoe on which he worked.

seen, a line of eminences or swellings, to which the name of *"rachitic rosary"* has been given.

(*b*) *The "Paralytic Thorax."*

Fig. 45 conveys a better idea of this form of chest than any description. The normal anteroposterior flattening is exaggerated so that such persons are often spoken of as *"flat-chested."* The clavicles are very prominent, owing to falling in of the tissues

above and below them; the shoulders are stooping, the scapulæ prominent, and the neck is generally long. The angle where the ribs meet at the ensiform cartilage, the so-called "*costal angle*," is in such cases very sharp. This type of chest has often been supposed to be characteristic of phthisis, but may be found in persons with perfectly healthy lungs. On the other hand, phthisis frequently

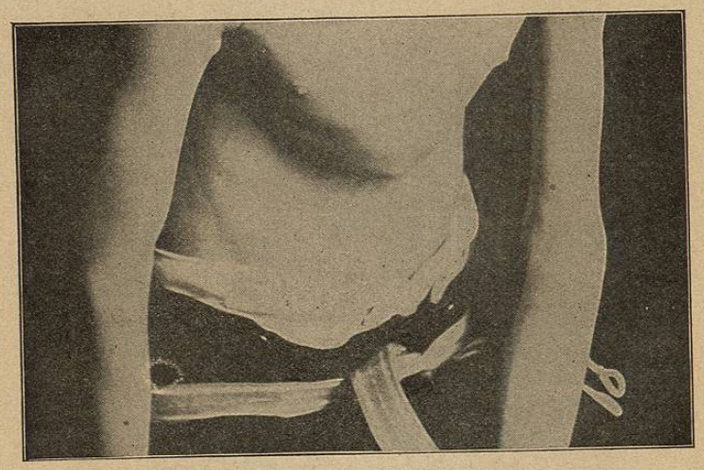

FIG. 43.—Pigeon Breast.

exists in persons with normally shaped chests or with abnormally deep chests (Woods Hutchinson). (See Fig. 162, page 310.)

(c) *The "Barrel Chest."*

Nothing is less like a barrel than the "*barrel chest.*" Its most striking characteristic is its greatly increased anteroposterior diameter, so that it approaches the form of the infant's chest. The costal angle is very obtuse, the shoulders are high, and the neck is short. The respiratory movements of the barrel chest will be spoken of later (see Figs. 46 and 47).

Nutrition of the Chest Walls.

Emaciation is readily appreciated by inspection. The ribs are unusually prominent, the scapulæ stand out, and the clavicles project. All this may be seen independently of any change in the

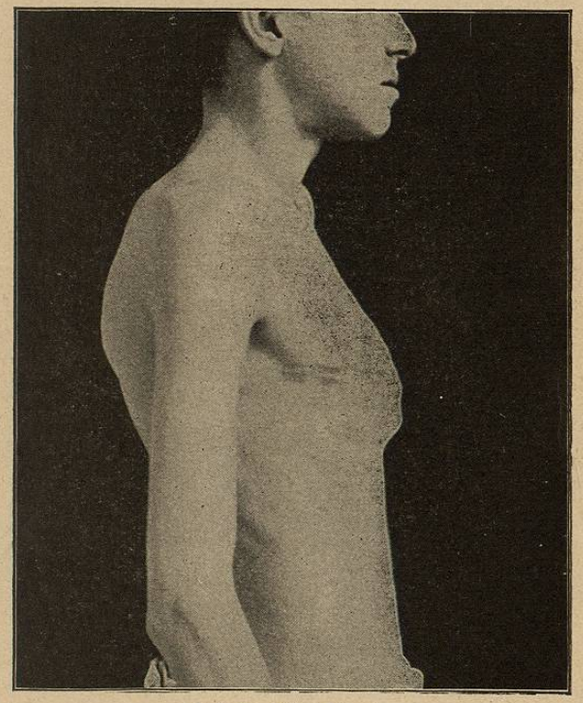

FIG. 44.—Pigeon Breast.

shape of the chest such as was described above under the title of Paralytic Thorax. Tuberculosis of the apices of the lungs may produce a marked falling in of the tissues above and below the clavicle independent of any emaciation of the chest itself.

III. Deformities.

The abnormalities just enumerated are symmetrical and affect the whole thorax. Under the head of Deformities, I shall consider chiefly such abnormalities as affect particular portions of the chest and not the thorax as a whole.

(*a*) *Spinal Curvatures and Twists.*[1]

A good view of the patient's *back* brings out best the lesser degrees of lateral curvature, which are not at all infrequent in persons who are not aware of them. Slight degrees of deformity are best seen by marking with a skin-pencil the position of the spinous processes (see Fig. 49). The more marked cases of lateral curvature, which are usually accompanied by a certain amount of *twisting*, give rise to considerable displacement of the thoracic organs and render unreliable the usual bony landmarks, with reference to which we judge of the position of the intrathoracic organs. By such deformities the apex of the heart may be pushed up into the fourth space or out into the axilla, or portions of the lungs may be compressed and made atelectatic. The bulging on the convex side of the curve may simulate an aneurismal tumor. Pott's disease of the spine should be looked for as a part of the routine inspection of the chest. It is sometimes better felt than seen.

(*b*) *Flattening of One Side of the Chest.*

In chronic phthisis, cirrhosis of the lung, or long- tanding pleuritic effusion, marked falling in of one side of the chest is often to be seen. This may be apparent in the upper and front portion, be-

[1] See also page 54. The lesions are referred to here only in relation to their effects on heart and lungs.

neath the clavicle, or in the axilla, or in both situations (see Figs. 45 and 51). The shrinkage of the affected side is made more obvi-

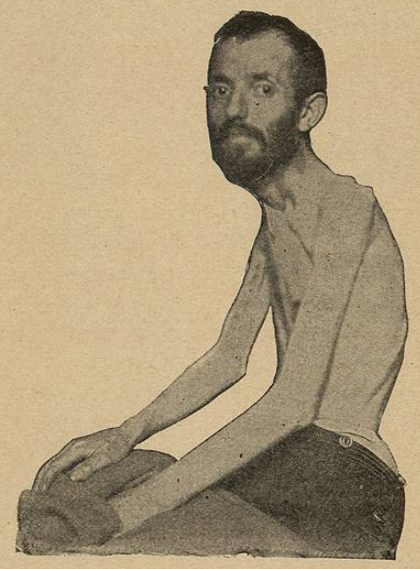

Fig. 45.—The Paralytic Thorax.

ous by contrast with the compensatory hypertrophy of the sound lung, which makes the sound side unusually full and prominent.

(*c*) *Prominence of One Side of the Chest.*

In pneumothorax or pleural effusions, and sometimes in malignant disease of the lung or pleura, there is a marked increase in the size of the affected side of the chest. Very rarely emphysema

may affect one lung predominantly. In pneumothorax or pleuritic effusion we usually see, in addition to the above enlargement of the affected side, a smoothing out of the intercostal depressions so that the surface of that side is much more uniform than the other side. Bulging of the interspaces from great pressure within the chest rarely occurs. I have never seen it.

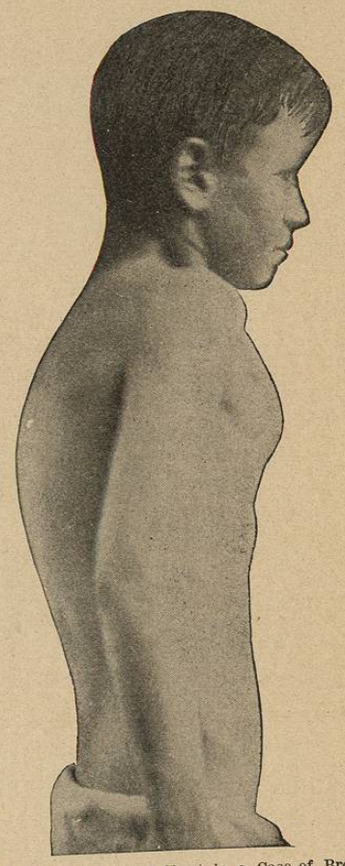

FIG. 46.—Barrel Chest in a Case of Bronchial Asthma (æt. 13).

(*d*) *Local Prominences.*

In nearly one-quarter of all healthy chests that part of the thoracic wall which overlies the heart (the so-called "precordial region") is abnormally prominent. The cause of this condition is much disputed. A similar prominence may be brought about in children, whose thoracic bones are very flexible (and occasionally in older patients), by the outward pressure of an enlarged heart or of an effusion in the pericardial sac. The prominences due to spinal curvature have been already mentioned. Less common causes of local prominence are:

1. *Aneurism* of the arch of the aorta.

2. *Tumor* of the chest wall (lipoma, sarcoma, gumma) or of the lung, mediastinum, or of the thoracic glands pressing their way outward.

3. "*Cold abscess*" (tuberculosis) of a rib or of the sternum.

4. *Empyema* perforating the chest wall, the so-called "empyema necessitatis."

IV. The Respiratory Movements.

(*a*) *Normal Respiration.*

During normal respiration, one sees the ribs move outward and upward with inspiration, and downward and inward with expiration. Possibly one catches some hint of the movements of the diaphragm at the epigastrium. In men, diaphragmatic breathing is more marked, while in women breathing is mostly of the "costal type"; that is, is done by the intercostal muscles. In certain diseases an exaggeration of the costal or of the diaphragmatic type of breathing may be seen. In emphysema, for example, and in some cases of asthma, the ribs move very little, and most of the work of respiration is performed by the diaphragm, whose pull upon the lower ribs can sometimes be distinctly seen during inspiration. On the other hand, when the movements of the diaphragm are impeded by the presence of fluid or a solid tumor, as in cirrhosis of the liver or leukæmia, the breathing has largely to be performed by the ribs, and becomes, as we say, costal in type (see below, p. 72).

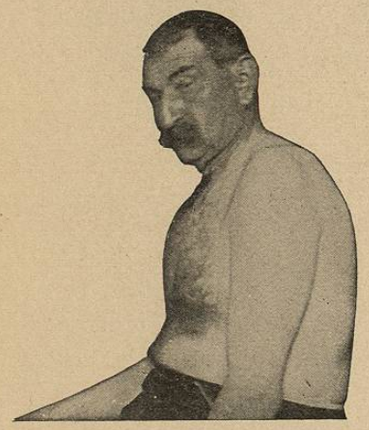

FIG. 47.—Barrel Chest. Chronic bronchitis and emphysema.

(*b*) *Anomalies of Expansion.*

If we watch the patient while he takes a full breath, we may notice certain variations from the normal type of respiratory move-

ments. We may see: (1) Diminished expansion of one side (as a whole, or at the apex). (2) Increased expansion of one side.

(1) If *diminished expansion* of one side is due to pleuritic effusion, pneumothorax, or solid tumor of the lung or pleura, the affected side is usually *distended* as well as *immobile*. When, on the other

FIG. 48.—Severe Lateral Curvature (Untreated).

FIG. 49.—Lateral Curvature Three Weeks After Correction.

hand, the lung is retracted or bound down by adhesions, as in phthisis, old pleurisy, occlusion of the bronchus, or from the pressure of an aneurism, we have immobility combined with a *retraction* of the affected side. In tuberculous disease at the apex of the lungs, we may see one side or both sides fail to expand at the top. Restriction of the motion of one side of the chest may also be due

pain or to pressure from below the diaphragm. An enlarged liver or spleen and tumors of the hepatic or splenic region may in this way prevent the normal expansion of one or the other side of the thorax.

FIG. 50.—Lateral Curvature Before Correction.

Occasionally a hemiplegia or a unilateral paralysis of the diaphragm results in diminished movement of one side of the chest.

(2) *Increased expansion* of one side of the chest is observed principally as a compensatory or vicarious overfunctioning of that side when the other side of the chest is thrown out of use by a large pleuritic effusion, by pneumothorax, long-standing pleurisy with contraction, or other causes.

(*c*) *Dyspnœa.*

This term is often used rather loosely to include: (1) Difficult breathing, whether rapid or slow. (2) Unusually deep breathing, whether difficult or not. (3) Rapid breathing.

True dyspnœa or difficult breathing is almost always rapid as well, and does not differ at all from the well-known phenomenon of being "out of breath" after a hard run or any violent exertion. Conceive these conditions as persisting over hours or days, and we have the phenomenon known as dyspnœa. The breathing is not only thick but labored; that is, performed with difficulty, and unusual muscles, not ordinarily called upon for respiration, come into play and are seen working above the clavicle and elsewhere. More or less distress is generally expressed in the face, and there is often a blueness of the lips or a dusky color throughout the face. The commonest causes of dysp-

nœa are the various forms of heart disease, pneumonia, large pleuritic effusion, emphysema, asthma, and phthisis.

Dyspnœa may affect especially *inspiration*, as, for example, when a foreign body lodges in the larynx, or in ordinary "croup." In such cases we speak of "*inspiratory dyspnœa*," distinguishing it from "*expiratory dyspnœa*" such as occurs in asthma and emphysema. In the latter condition the breath seems to enter the chest readily, but the difficulty is to get it out again. Expiration is greatly prolonged and often noisy.

Combined types also occur in which both respiratory acts are difficult.

Abnormally deep and full respiration, without any appearance of difficulty in the process, is sometimes seen near the fatal termination of cases of diabetes, the so-called *diabetic* dyspnœa.

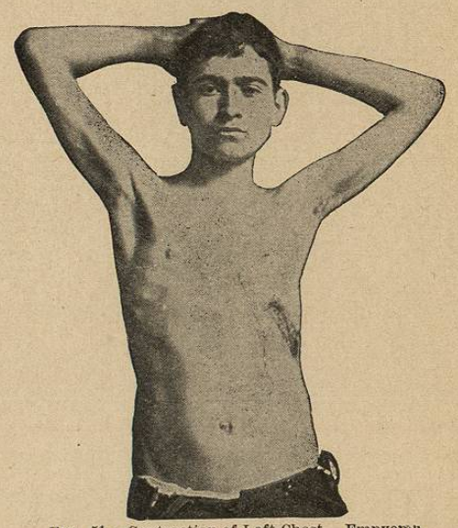

FIG. 51.—Contraction of Left Chest. Empyema.

Simple rapidity of breathing should be distinguished from dyspnœa of any type. In adults the normal rate of respiration is about 18 per minute. In children, it is considerably quicker and more irregular. It is not desirable to attempt here to enumerate all the causes which may lead to a quickening of the respiration. Among the commoner are muscular exertion, emotional disturbance, diseases of the heart and lungs, and fluid or solid accumulations below the diaphragm, which push up that muscle and cause it to encroach abnormally upon the thoracic cavity. Most of the infectious fevers are also apt to be accompanied by quickened breathing, especially but not exclusively when the fever is associated with a disease of the heart, lung, pleura, or pericardium.

Sucking-in of the interspaces in the lower axillary regions or below the clavicles may be seen in connection with dyspnœa whenever the lungs are prevented by some cause from properly expanding during inspiration. Negative pressure is thus produced within the chest, and the atmospheric pressure without pushes in the more elastic parts of the thorax. This phenomenon is seen in collapse or atelectasis of a portion or the whole of a lung, such as may occur in obstruction at the glottis (in which case both sides are equally retracted) or from occlusion of a bronchus. In the latter event, the sucking-in of the interspaces during inspiration occurs only on the affected side.[1]

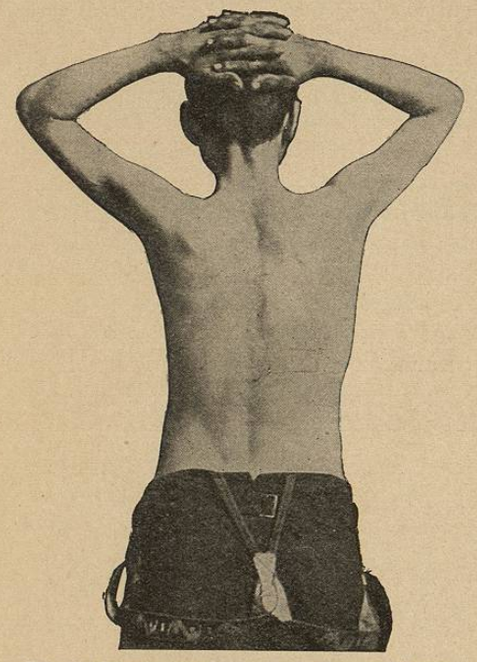

FIG. 52.—Prominence of Right Side. Pleural Effusion.

[1] Slight retraction of the lower interspaces in the axilla during inspiration is often seen in health. In disease this phenomenon is greatly exaggerated.

V. Changes in the Respiratory Rhythm.

(*a*) *Asthmatic Breathing.*

In asthma the normal rhythm is reversed and the expiration becomes longer, instead of shorter, than inspiration. Inspiration may be represented only by a short gasp, while expiration becomes a prolonged wheeze lasting several times as long as inspiration. Dyspnœa is usually very marked. In emphysema we get very much the same type of breathing so far as rhythm is concerned, but the dyspnœa is not usually so extreme and the auxiliary muscles of respiration are not so apt to be called into use. In many cases of emphysema one sees the thorax move all as one piece, "*en cuirasse*," owing to a senile fixation of the bones of the thorax from ossification of the cartilaginous portions. In hereditary syphilis or phthisis this fixation may occur in youth or early middle age.

(*b*) *Cheyne-Stokes Breathing.*

An anomaly of respiratory rhythm in which short, recurrent paroxysms of dyspnœa are preceded and followed by periods in which no respiration occurs (apnœa). If we represent the normal respiratory movement by an up-and-down line, as seen in Fig. 53,

Fig. 53.—Diagram to Represent Normal Breathing-Rhythm.

the Cheyne-Stokes type of breathing would appear as in Fig. 54. The period of apnœa may last from one to ten seconds; then short, shallow respirations begin and increase rapidly, both in volume and in rate, until a maximum of marked dyspnœa is reached, when a diminution in the rate and depth of the act begins, and the patient gradually returns to the apnœic state. The length of the whole paroxysm may be from 30 to 70 seconds. During the apnœic period the patient is apt to drop asleep for a few seconds and the pupils may become contracted. When the paroxysm of dyspnœa

is at its height, he is apt to cough and shift his position restlessly, or in case the whole phenomenon occurs during sleep he moves uneasily in his sleep at this period. Modified types of the phenomenon also occur, in which there is a rhythmic increase and decrease in the depth and rapidity of respiration but without any intervening period of apnœa. This type of breathing is most often seen in severe cases of cardiac, renal, or cerebral disease. It is generally more marked at night and may occur only at that time. In children it appears sometimes to be physiological during sleep. As a

Fig. 54.—Cheyne-Stokes Respiration.

rule, it is a sign of grave prognostic significance, but patients have been known to recover completely after weeks or even months of Cheyne-Stokes breathing.

(*c*) *Restrained or "Catchy" Breathing.*

When the patient has a "stitch in the side," due to dry pleurisy, intercostal neuralgia, or to other causes, the inspiration may be suddenly interrupted in the middle, owing to a seizure of pain which makes the patient stop breathing as quickly as he can. The same conditions may produce very shallow breathing as the patient tries to avoid the pain which a full inspiration will cause. This type of restrained breathing is often seen in pleurisy and pneumonia, and in the latter disease expiration is often accompanied by a little moan or grunt of discomfort.

(*d*) *Shallow and irregular breathing* is often seen in states of profound unconsciousness from any cause, such as apoplexy or poisoning. A few deep respirations may be followed by a number of shallow and irregular ones. When death is imminent in any disease, the respiration may become very irregular and gasping, and it is apt to be accompanied by a peculiar nodding movement of the