

## CHAPTER VI.

### PERCUSSION.

#### I. TECHNIQUE.

THERE is no other method of physical examination which needs so much practice as percussion, and none that is so seldom thoroughly learned. Many physicians never succeed in acquiring a facility in the use of it sufficient to make them rely upon their results. Undoubtedly one of the greatest difficulties arises from the necessity of being at once active and passive—at once the percussor and the one who listens to the percussion. Students half unconsciously get to treat the percussion as an end in itself, and hammer away industriously without realizing that two-thirds of the attention must be given to listening, while the percussion itself should become semi-automatic.

It is undoubtedly an advantage to possess a musical ear, but this is by no means a necessity. Some of the most accurate percussors that I know possess absolutely no musical ear—no ear, that is, for pitch—and form their judgments in percussing upon the quality or intensity of the note, and upon the sense of resistance.

In this country practically all percussion is done with the fingers; in Germany instruments are still used to a considerable extent.

#### (a) *Mediate and Immediate Percussion.*

Percussion may be either "mediate" or "immediate," the latter term referring to blows struck directly upon the chest with the flat of the hand, or upon the clavicles with the tip of the second finger.

#### (b) *Methods.*

Mediate percussion (which is used ninety-nine hundredths of the time) is performed as follows:

The patient should either lie down or sit with his back against some support. The reason of this is that for good percussion one



FIG. 73.—Position of the Hands When Percussing the Right Apex.

needs to press very firmly with the middle finger of the left hand upon the surface of the chest, so firmly that if the patient is sitting upon a stool without support for his back, it will need considerable exertion upon his part to avoid losing his balance.

In percussing the front of the chest it is important to have the patient sitting or lying *in a symmetrical position*—that is, without any twist or tilting to one side. His head should point straight forward and *his muscles must be thoroughly relaxed*. Many patients, when stripped for examination, swell out their chests and

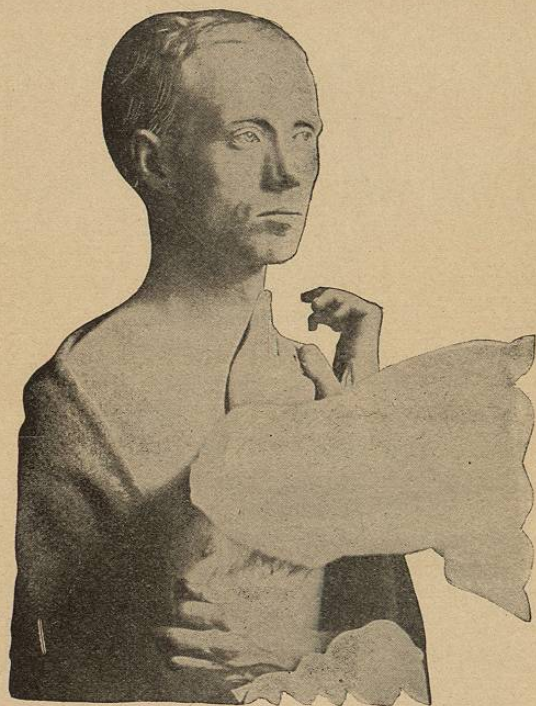


FIG. 74.—Position of the Hands When Percussing the Left Apex.

sit up with a military erectness. The muscular tension thus produced modifies the percussion note and causes an embarrassing multitude of muscle sounds which greatly disturb auscultation.

Having placed the patient in an easy and symmetrical position, our percussion should proceed according to the following rules:

(1) Always press as firmly as possible upon the surface of the

chest with the second finger of the left hand<sup>1</sup> on the dorsum of which the blow is to be struck. Raise the other fingers of the left hand from the chest so as not to interfere with its vibrations.

(2) Strike a quick, perpendicular, rebounding blow with the tip of the second finger<sup>2</sup> of the right hand upon the second finger of the left just behind the nail, imitating as far as possible with the right hand the action of a piano-hammer. The quicker the percussing

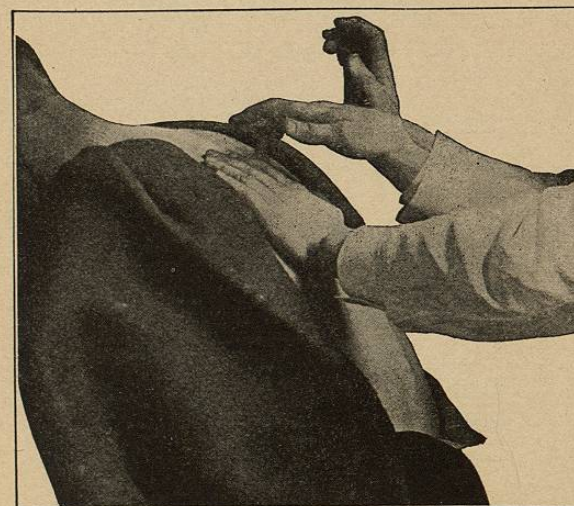


FIG. 75.—The Right Way to Percuss—i. e., From the Wrist.

finger gets away again after striking, the clearer will be the note obtained.

(3) Let all the blows struck in any one part of the chest be uniform in force.

<sup>1</sup> Left-handed percussors will, of course, keep the right hand upon the chest and strike with the left.

<sup>2</sup> When percussing the right apex I prefer to strike upon the thumb (see Figs. 73 and 74) as it is almost impossible when standing directly in front of the patient to fit any of the fingers comfortably into the right supraclavicular fossa.

(4) Strike from the wrist and not from the elbow (see Figs. 75 and 76). The wrist must be held perfectly loose.

(5) Keep the percussing finger bent at a right angle as in Fig. 77.

The force to be used in percussion depends upon the purpose

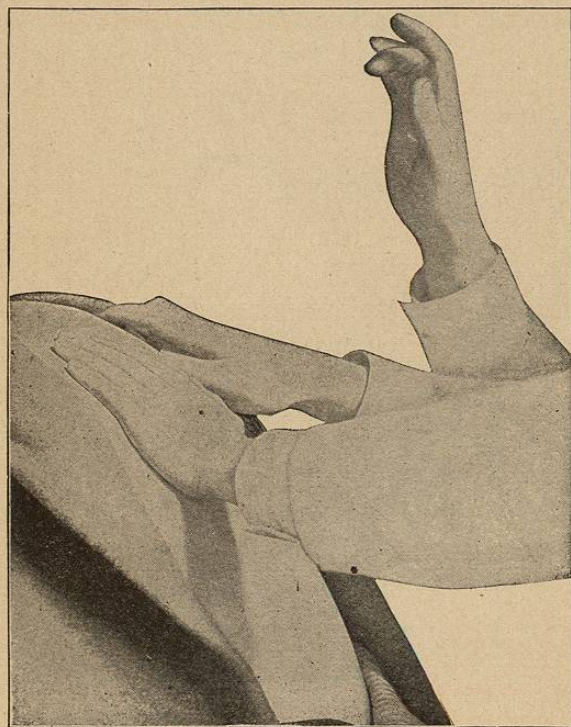


FIG. 76.—The Wrong Way to Percuss—i. e., From the Elbow.

for which the percussion is used—that is, upon what organ we are percussing—and also upon the thickness of the muscles covering that part of the chest. For example, it is necessary to percuss very strongly when examining the back of a muscular man, where an inch or two of muscle intervenes between the finger on which

we strike and the lung from which we desire to elicit a sound. Over the front of the chest and in the axillæ the muscular covering is much thinner, and hence a lighter blow suffices. In children or emaciated patients, or in any case in which the muscular development is slight, percussion should be as light as is sufficient to elicit a clear sound. Heavy percussion is sometimes necessary but always unsatisfactory, in that the sound which it elicits comes from a relatively large area of the chest and does not therefore give us infor-

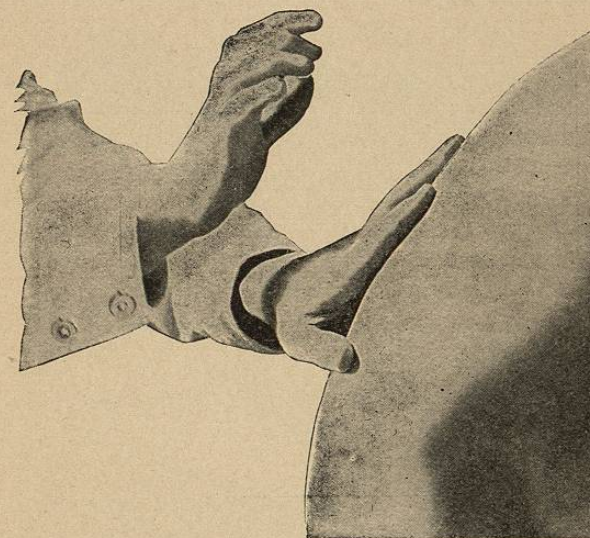


FIG. 77.—Proper Position of the Right Hand During Percussion.

mation about the condition of any sharply localized area. If a carpenter, in tapping the wall to find the position of the studs, strikes too hard, he will fail to find the beam, because the blow delivered over the spot behind which the beam is situated is so forcible as to bring out the resonance of the hollow parts around. It is the same with medical percussion. Heavy percussion is always inaccurate.<sup>1</sup> It may be necessary where the muscles are very thick, but its value

<sup>1</sup> See also below, page 136, the lung reflex.

is then proportionately diminished. On the other hand, it is possible to strike so lightly that no recognizable sound is elicited at all. The best percussion, therefore, is that which is just forcible enough to elicit a clear sound without setting a large area of chest wall in vibration.

The position of the patient above described applies to percussion of the front. When we desire to percuss the back, it is im-

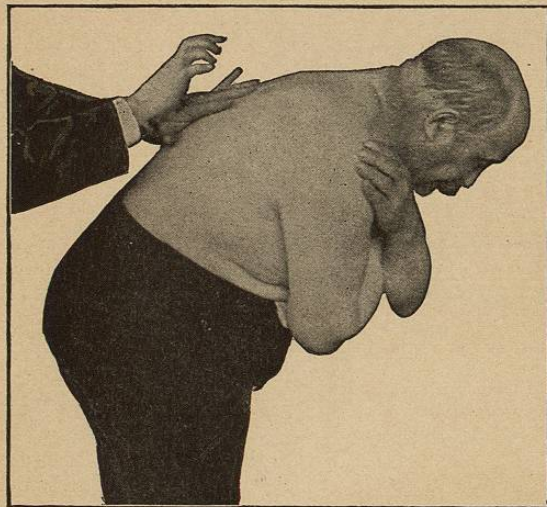


FIG. 78.—Proper Position of the Patient During Percussion of the Back.

portant to get the scapulæ out of the way as far as possible, since we cannot get an accurate idea of sounds transmitted through them. To accomplish this, we put the patient in the position shown in Fig. 78, the arms crossed upon the chest and each hand upon the opposite shoulder. The patient should be made to bend forward; otherwise the left hand of the percussor will be uncomfortably bent backward and his attention thereby distracted (see Fig. 79).

When the axillæ are to be percussed, the patient should put the hands upon the top of the head.

(b) *Auscultatory Percussion.*

If while percussing one auscults at the same time, letting the chest piece of the stethoscope rest upon the chest, or getting the patient or an assistant to hold it there, the sounds produced by percussion are greatly intensified, and changes in their volume, pitch, or quality are very readily appreciated. The blows must be



FIG. 79.—Wrong Position for Percussing the Back. The patient should be bent forward.

very lightly struck, either upon the chest itself or upon the finger used as a pleximeter in the ordinary way. Some observers use a short stroking or scratching touch upon the chest itself without employing any pleximeter.

This method is used especially in attempting to map out the borders of the heart and in marking the outlines of the stomach. In the hands of skilled observers it often yields valuable results,

but one source of error must be especially guarded against. *The line along which we percuss, when approaching an organ whose borders we desire to mark out, must neither approach the chest piece of the stethoscope nor recede from it.* In other words, the line along which we percuss must always describe a segment of a circle whose centre is the chest piece of the stethoscope (see Fig. 80). If we percuss, as we ordinarily do, in straight lines toward or away from the border of an organ, our results are wholly unreliable since every straight line must bring the point percussed either closer to

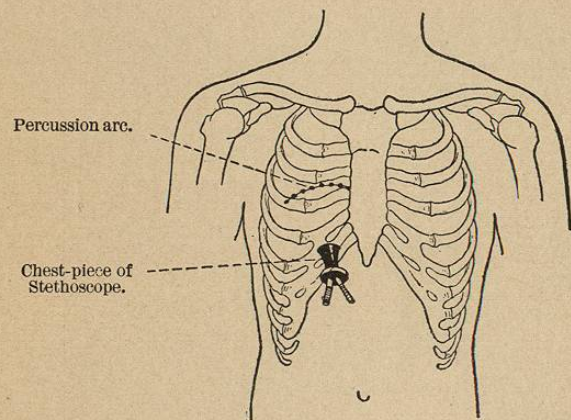


FIG. 80.—Auscultatory Percussion, Showing the Arc along which such Percussion should be made.

the stethoscope or farther from it, and the intensity and quality of the sounds conducted through the instrument to our ears vary directly with its distance from the point percussed.

It will be readily seen that the usefulness of auscultatory percussion is limited by this source of error, and that considerable practice is necessary before one can get the best results from this method. Nevertheless it has, I believe, a place, though not a very important one, among serviceable methods of physical examination.

(c) *Palpatory Percussion.*

Some German observers use a method of percussion in which attention is fixed directly or primarily on the amount of resistance offered by the tissues over which percussion is made. Even in ordinary percussion the amount of resistance is always noted by experienced percussors, but the element in sound is usually the main object of attention. Palpatory percussion is rather a series of short *pushes* against various points on the chest wall, but some

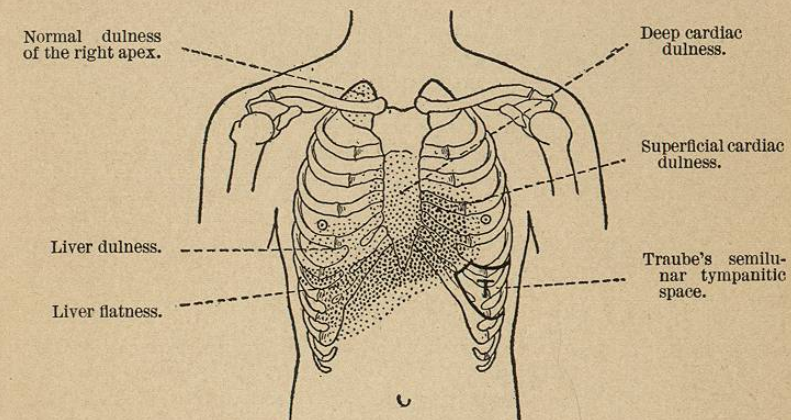


FIG. 81.—Percussion Outlines in the Normal Chest.

sound is elicited and probably enters into the rather complex judgment which follows.

In this country palpatory percussion is but little employed.

II. PERCUSSION RESONANCE OF THE NORMAL CHEST.

The note obtained by percussing the normal chest varies a great deal in different areas. In Fig. 81, the parts shaded darkest are those that normally give least sound when percussed in the manner described above, while from the lightest areas the loudest and clearest sound may be elicited.

(a) The sound elicited in the latter areas is known as normal or "vesicular" resonance, and is due to the presence of a normal amount of air in the vesicles of the lung underneath. If this air-containing lung is replaced by a fluid or solid medium, as in pleuritic effusion or pneumonia, it is much more difficult to elicit a sound, and such sound as is produced is short, high pitched, and has a feeble carrying power when compared with the sound elicited from the normal lung. This short, feeble, high-pitched sound is known technically as a "dull" or "flat" sound, flatness designating the extreme of the qualities that characterize dullness. Over the parts shaded dark in Fig. 81, we normally get a dull or flat tone, the darkest portions being flat and the others dull. The heavy shadow on the right corresponds to the position occupied by the liver, or rather by that part of it which is in immediate contact with the chest wall. The upper portion of the liver is overlapped by the right lung (see Fig. 81), and hence at this point we get a certain amount of resonance on percussion, although the tone is not so clear as that to be obtained higher up. Below the sixth rib we find true flatness near the sternum and for a few inches to the right of this point. As we go toward the axilla, the line of lung resonance slopes down, as is seen in Fig. 82. In the back resonance extends to the ninth or tenth ribs.

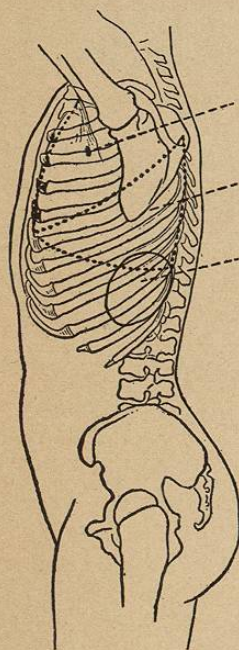


FIG. 82.—Position of the Left Lung in the Axilla.

the line of lung resonance slopes down, as is seen in Fig. 82. In the back resonance extends to the ninth or tenth ribs.

#### Normal Dull Areas.

(b) On the left side, the main dull area corresponds to the heart, which at this point approaches the chest wall, and over the portion shaded darkest is uncovered by the lung. The part here

lightly shaded corresponds to that portion of the heart which is overlapped by the margin of the right and left lungs.

Over the portion of the heart not overlapped by the lung (see Fig. 81, p. 127) the percussion note is nearly flat to light percussion, and very dull even when strongly percussed. This little quadrangular area is known as the "superficial cardiac space," and the dullness corresponding to it is referred to as the "superficial" cardiac dullness, while the dullness corresponding to the outlines of the heart itself beneath the overlapping lung margins is called the "deep" cardiac dullness.

When the heart becomes enlarged, both of these areas, the deep and the superficial, are enlarged, the former corresponding to the increased size of the heart itself, while the superficial cardiac space is extended because the margins of the lungs are pushed aside and a larger piece of the heart wall comes in contact with the chest wall. Accordingly, either the superficial or the deep dullness may be mapped out as a means of estimating the size of the heart. Each method has its advantages and its advocates. The superficial dullness is easier to map out, but varies not only with the size of the heart, but with the degree to which the lungs are distended with air, or adherent to the pericardium or chest wall. What we are percussing is in fact the borders of the lungs at this point.

On the other hand, the deep cardiac dullness is much more satisfactory as a means of estimating the size of the heart but much more difficult to map out. It needs a trained ear and long practice to percuss out correctly the borders of the heart itself, especially the right and the upper borders, since here we have to percuss over the sternum where differences of resonance are very deceptive and difficult to perceive.

It is a disputed point whether light or forcible percussion should be used when we attempt to map out the deep cardiac dullness. Heavy percussion is believed by its advocates to penetrate through the overlapping lung margins and bring out the note corresponding to the heart beneath, a note which, they say, is missed altogether by light percussion. On the other hand, those who employ light percussion contend that heavy percussion sets in vibration so large