

pressing the pleximeter firmly down.—If the ascites be moderate in degree the dulness is always attended by the tympanitic intestinal sound.

The percussion-sound in ascites undergoes various *modifications* on *changing the attitude* of the body, as the fluid, in obedience to the laws of gravitation, subsides to the most dependent parts of the abdomen. On turning to the right side, accordingly, it sinks to the right, and to the left on turning to the left side, the sound invariably becoming dull at the deeper parts, and clear (tympanitic) in those which are for the time being uppermost and which are occupied by the movable mass of the intestines. Similarly the sound in the lower abdominal region, which in the upright position is rendered absolutely dull by the subsidence of the ascitic fluid to that part, clears considerably in the dorsal recumbent posture, as the effusion is then more equally diffused throughout the abdominal cavity. This modification of the percussion-sound with the varying attitude of the body is quite as positive an indication of the presence of free fluid in the abdomen as the sensation of fluctuation formerly described; it is a point therefore of high diagnostic importance, and one of which full advantage is always taken in the examination of cases of ascites. In doubtful cases, in which the effusion is limited to the deeper parts of the abdominal cavity, and is not abundant enough to yield the sensation of fluctuation, or to give rise to any very distinct muffling of the percussion-sound, a comparison of the sounds obtained in the flanks in the dorsal recumbent posture and in the right and left lateral positions is of itself generally sufficient to justify a positive diagnosis. It is only when the peritoneal effusion is unusually abundant that the percussion-sound of the uppermost side does not become quite clear, as the whole of the fluid does not then sink to the lowest part of the cavity. Nevertheless, even here the difference between the sounds is quite appreciable; it is obvious also that it is precisely in these extreme cases of ascites that this diagnostic aid is of least moment as a method of examination, the nature of the affection being evident enough from the other signs.

Percussion indicates also the level to which the effusion reaches in the abdominal cavity. Over the whole space taken up by the fluid, as far as its margin, the sound is dull; above

this point, in the region corresponding to the situation of the intestine, the sound is clear, while the transition from dulness to perfect resonance is marked by a zone in which the percussion-note is muffled.

In cases in which the effusion is excessive in amount it is sometimes found to be impossible, when the patient is in the erect posture, to determine with absolute accuracy the upper margin of the body of fluid, though it may usually be defined to within $\frac{1}{2}$ —1 ctm. of its actual limit; this is owing to the muffling effect which the great tension of the upper part of the abdominal wall has on the percussion-sound. This degree of precision, however, is not demanded, as it is of no great practical value in deciding the question whether the fluid should or should not be discharged by operative puncture; the most weighty consideration in this respect is the amount of pressure the fluid exercises on the diaphragm, and consequently the degree of dyspnoea there is present, or the possible danger of suffocation. The operation is always performed at the most dependent part of the abdomen.

Ascites may occur alone or may be associated with general œdema of the subcutaneous cellular tissue. Ascites unconnected with any other form of fluid effusion is observed in those diseases of the abdominal organs which give rise to engorgement of the portal circulation, particularly in diseases of the liver (cirrhosis) and in the different varieties of degeneration of the peritoneum,—cancer, and more rarely tuberculosis.—Ascites is also found accompanying general dropsy, whether the latter be dependent on congestion of the systemic veins, as in cardiac and pulmonary affections, or on diseases which lead to impoverishment of the blood in respect of albumen, such as nephritis, amyloid degeneration of the kidneys, &c. In all these conditions ascites is observed only after œdema has appeared in other parts of the body,—in heart diseases, for example, usually only when the dropsical effusion has reached as high as the thigh.—Ascites is also often complicated by œdema of the abdominal wall.—The possibility of *mistaking ovarian dropsy for ascites*, which was referred to when treating of palpation (see p. 339), arises only when the wall of the ovarian cyst is enormously distended with fluid, becoming so thin that it cannot be felt through the abdominal tissues, the tumour then giving over its whole surface a uniform feeling of fluctuation. These affections are distinguished from each other partly by the results of vaginal examination, by which means the cyst may be reached with the finger, and partly by percussing while the patient is placed in the various positions already described; in ascites the *percussion sound varies* with every change of attitude on the part of the patient, in *ovarian dropsy it does not*. Occasionally, however, the two conditions are combined,

the ascites arising either from some cause independent of the ovarian affection or from the pressure of the ovarian tumour on the portal vein. So long as the tumour is of moderate dimensions the existence side by side of both affections may almost always be demonstrated by palpation and percussion: the cyst may be defined by palpation, while the presence of the fluid around it is shown by the percussion-dulness to which it gives rise when the patient lies on her back, and by the change in the percussion-sound when she turns to one or other side.

In the event of the diagnosis being still doubtful even after careful physical examination, the manner in which the disease has developed, the presence or absence of morbid changes in the other organs, and many other incidental signs which may have a bearing chiefly on the particular case in hand, serve to distinguish clearly enough between ascites and ovarian dropsy.

ENCYSTED PERITONEAL EFFUSIONS.

These are formed by the adhesion of neighbouring parts to each other from inflammation of their peritoneal envelope, and the inclusion of the inflammatory exudation within the space so shut in. Peritoneal effusion may be encysted at any point within the abdomen; this occurs relatively most often in the ileocæcal region, where it is caused either by inflammation of the cæcum and of the peritoneum, or by perforation of the *processus vermiformis*.

The percussion-sound at the parts at which the fluid is confined is dull or muffled, the intensity of the dulness, other things being equal, being dependent on the amount of the exudation. The sound undergoes *no* alteration on changing the attitude of the body, a point which distinguishes it at once from free peritoneal effusion; fluctuation is wanting also, or is only feebly appreciable over a very circumscribed area.

The differential diagnosis between encysted exudation and tumours, local affections which may present substantially the same signs to palpation and percussion, is based on a consideration of the further details of the clinical examination, the history of the case, the origin and course of the disease, &c.

PERCUSSION OF THE KIDNEYS.

It is practically impossible to delimit the kidneys with any degree of precision by means of percussion. This fact is explained by the anatomical relations of the organs. In the first place, those parts of the posterior abdominal wall which coincide

with the anatomical position of the kidneys, (the space included between the lower edge of the eleventh dorsal and the upper edge of the third lumbar vertebræ, according to Luschka), are covered by a thick layer of muscles, the *sacrospinalis* and *quadratus lumborum*, which of itself produces a very considerable muffling of the percussion-sound. Further, the kidneys in the greater part of their extent are in immediate relation with organs which give a dull sound to percussion: thus, the upper end of the right kidney is over-arched by the lower edge of the liver, the upper part of the left kidney borders on the spleen, the inner concave margins of both kidneys lie close to the transverse processes of the vertebræ,—all parts which are non-resonant to percussion. At only two points are the kidneys in contact with air-containing organs: they are in apposition with the colon along the lower half of their external convex border and at their lower ends, at which spot therefore the dull renal sound and the tympanitic note yielded by the colon may be sharply defined from each other. The capsule of fat in which the kidneys are embedded should also be mentioned as one of the factors which tend to increase the uncertainty which attends the delimitation of the organs by percussion. When this fatty envelope is well developed it may, according to the measurements of Pansch, be as thick below the kidneys as the kidneys themselves in their middle portion; in such cases therefore, which are far from being rare, the renal dulness extends further downwards than is in keeping with the position and size of the organs. In fact this dulness, notwithstanding that the lower end of the kidney comes generally only to within 3—5 ctm. of the crest of the ilium (Pansch), often reaches to very near this bone, where it is lost in the tympanitic note given by the colon.

From the foregoing account of the relations of the parts it will be obvious that at its upper and inner borders the kidney can not be delineated on the surface by means of percussion, that even at its lower end this can be accomplished only very imperfectly, and that the sole portion of the renal area that can be clearly marked off from the adjacent colon is its outer convex margin, from about the middle downwards, situated usually at 10 ctm. from the spinous processes of the corresponding lumbar vertebræ. At this point the dull renal sound is exchanged for the tympanitic note of the large intestine.

In very muscular subjects percussion of the kidneys yields absolutely no result which is of any practical diagnostic value; this applies also to the practice of percussion in those whose tissues are loaded with fat, or who suffer from extreme distension of the bowel, engorgement of the liver or spleen, ascites, &c. Bearing in mind the many difficulties with which the examination of the kidneys by percussion is surrounded, and the actual impossibility of determining the size of the organs with anything approaching precision, it will be readily understood why percussion should be so seldom resorted to as a means of diagnosis in renal diseases, and that its applicability should be limited almost exclusively to the rather rare cases of dislocated (movable, floating) kidney. In this condition the lumbar region on the side affected is sometimes clearer to percussion than the other; in two out of six cases of dislocation of the right kidney which I have observed, the sound over a somewhat extensive area in the right lumbar region was of dull tympanitic quality, while in the four remaining cases no difference whatever was discernible between the two sides. In none of the other diseases of the kidneys is percussion employed as a method of physical examination, as the indications it furnishes are not reliable. The most common of the diseases of the kidneys, the various forms of nephritis, are recognised with so much ease and certainty by the changes to which they give rise in the urine and by the occurrence of dropsy, that as a rule there is no necessity for falling back on percussion, and there is the less occasion for it as the kidney, when inflamed, undergoes no such degree of enlargement as is discoverable in this way. It is likewise impossible to demonstrate by percussion the contraction of the kidney which takes place in the third stage of nephritis. There remain, therefore, as objects to which percussion of the kidneys may be advantageously directed, only the larger kinds of renal tumours, such as those due to hydronephrosis. The sound in such cases is dull over a very wide area; even here, however, percussion is not indispensable, as the swelling may be distinctly felt with the hand through the abdominal wall.

PERCUSSION OF THE BLADDER.

The bladder, when empty, does not rise above the pubes; when widely distended with urine, however, it projects upwards from

the pelvis into the abdomen and forms in the hypogastric region, provided the skin of the part be lax and soft, a pyriform elastic tumour which is readily detected by palpation.—The percussion-sound over a bladder tensely distended with urine is absolutely dull. All risk of confounding such a swelling with any other pathological condition is obviated by simply introducing a catheter into the bladder; if on account of the state of the parts (as from enormous hypertrophy of the prostate) it is found to be impossible to pass an instrument, the question whether the tumour is or is not the bladder,—a question of prime importance, having in view the fact that in such cases puncture of the bladder is sometimes called for—may be settled by a consideration of the history of the case, by the circumstance that for some time no urine, or but a very small quantity, has been passed, and by noting that the swelling, in contradistinction to that of ascites, retains the same dull percussion-sound in all the different attitudes that the patient assumes. The non-resonance to percussion distinguishes this condition at once from intestinal meteorism. It occasionally happens, though comparatively rarely, that a coil of intestine becomes fixed between the bladder and the abdominal wall; here the sound, on percussing gently, is of a tolerably clear tympanitic character, that obtained in answer to a more forcible stroke being of a dull tympanitic quality. The degree of distension of the bladder, if the upper end of the organ be not appreciable by inspection and palpation, is indicated by the upper boundary of the area of dulness.

PERCUSSION OF THE UTERUS.

*During pregnancy, or in cases of pathological enlargement, percussion of the uterus gives no information which cannot be elicited with much greater distinctness by palpation. The percussion-sound over the whole of the enlarged organ is absolutely dull. The womb, however, becomes accessible to percussion only when it has already become equally accessible to palpation, that is, when it rises out of the pelvis into the abdomen.

As a general rule the enlarged uterus lies immediately behind the abdominal wall, though in certain cases these parts are separated by coils of intestine, when the percussion-sound takes

on the same modifications as that of the bladder under similar circumstances.

The uterus after it has emerged from the pelvic cavity, and the bladder when it is fully distended with urine, both give a dull sound to percussion, and may possibly therefore, though this is highly improbable, be mistaken for each other; but the diagnosis presents no real difficulty as the vesical swelling rapidly disappears on passing a catheter and drawing off the retained urine, while the enlarged uterus gives to palpation a feeling of increased resistance which is quite distinctive.

AUSCULTATION OF THE ABDOMINAL ORGANS.

THE phenomena observed on auscultating the abdominal organs pertain, with the exception of the sound heard over the uterus in the later stages of pregnancy, almost exclusively to the digestive apparatus; they are constant in only a few isolated pathological conditions, and are as a rule merely accidental and irregular in occurrence, though at times they may also be produced at will. A *methodical* application of auscultation in the examination of the abdominal organs is thus scarcely practicable; it is employed as a means of diagnosis only occasionally, therefore, when dealing with affections which are known to present signs appreciable by auscultation. It is of importance, however, to be acquainted with the various sounds which originate in the gastro-intestinal canal, as certain of them reach the ear when auscultating the lower part of the thorax and the cardiac region, where they sometimes accompany and modify the respiratory murmur and the heart-sounds and murmurs in such a way as to prove perplexing to the inexperienced examiner, who is apt to consider them as sounds actually developed within the chest.

AUSCULTATION OF THE ŒSOPHAGUS.

This method of examination, recommended strongly by Hamburger as an aid to diagnosis in diseases of the œsophagus, is based on the circumstance that the act of deglutition, whether the substances swallowed be fluid or solid, is attended by the production of certain characteristic sounds in the upper part of the alimentary tract.

The cervical part of the œsophagus is best auscultated by placing the stethoscope on the left side of the neck, close to and behind the trachea, at any point between the hyoid bone and the supraclavicular fossa; murmurs arising in the thoracic portion are most readily recognised close to the left side of the spine, from the level of the last cervical to the eighth dorsal vertebra.

In normal conditions there is heard in the cervical portion of