

Observations on Obstetrical Auscultation. By L. S. JOYNES,
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THE application of auscultation to obstetrical diagnosis and practice, must be considered one of the most important improvements which medical science has received during the present century. It has furnished us with a means of proving the existence of pregnancy, and of ascertaining the life, death, and suffering condition of the fœtus in utero, far preferable to any before known. It has also supplied us with an additional means of determining the presentation and position of the fœtus at the commencement of labour. The following observations will, it is hoped, contribute something towards a due appreciation of this mode of diagnosis, which has, of late years, attracted considerable attention. Into the generalities of obstetrical auscultation I do not propose to enter; they are, or should be, too well known to the profession at the present day, to require consideration.

Considerable difference of opinion prevails among different observers,

with respect to the utility of auscultation as a means of determining presentations and positions. M. Depaul, *chef de clinique* at the Hospital of the Faculty, in Paris, has given greater extension to this method than any other observer, and has made known the results of his investigations in an interesting thesis, presented to the Faculty some years since. His rules of diagnosis are founded on the two following leading principles, viz.:—

1. The sounds of the fœtal heart are transmitted to the ear with the greatest distinctness from the *dorsal* region of the fœtus, and particularly the left scapular region. The fœtus in utero, in fact, is compressed into a sort of ovoidal body, (by the folding up of the limbs in front,) corresponding to the shape of the cavity which contains it. The limbs, with a greater or less quantity of intervening liquor amnii, occupy the anterior segment; the trunk, the posterior segment of this ovoid. The heart being in the posterior half, and being there in relation with more solid conducting media than in front, its pulsations must, of course, be transmitted with greatest intensity from the dorsal region of the thorax.

2. The heart is nearest the cephalic extremity of the ovoid: its pulsations are conducted in every direction by the trunk; but necessarily to the greatest distance inferiorly, or towards the pelvic extremity of the ovoid.

Bearing in mind these principles, in order to determine the presentation, divide the uterus into two equal segments, by a line drawn horizontally across the middle of its axis. If the head, face or shoulder presents, the fœtal pulsations will be heard most distinctly *below* the line; if the breech, knees or feet, their maximum of intensity will be *above* this line. To distinguish a head or face from a shoulder, observe the direction in which the sounds are chiefly transmitted. If the shoulder be the presenting part, they will be transmitted most distinctly in a horizontal direction; if the vertex or face, the line of transmission will be vertical; that is, the sounds of the heart will be heard at a given distance above their maximum of intensity, with greater distinctness than at a corresponding distance laterally. I do not recollect that Dr. Depaul gives any stethoscopic signs, for distinguishing a presentation of the face from that of the vertex: such distinction must, in fact, be impossible, without the aid of an examination *per vaginam*.

To determine the position of the presenting part, suppose the uterus divided into two lateral halves, by a vertical line nearly coinciding with the median line of the body. Whenever the posterior region of the fœtus is towards the left side of the uterus, the fœtal pulsations will be heard to the left of the median line; when the back is towards the right side, they will be heard to the right of the median line. Thus we have the two fundamental positions. To ascertain the varieties of those positions, to distinguish an anterior from a posterior, (say the first of Baudelocque from the fifth,) is not so easy; generally, however, in the anterior position, the maximum of the cardiac sounds will be near the median line, while in the posterior, it will be more external, or towards the lumbar region.

Nothing can be simpler and more plausible than this system of M. De-

paul : it is apparently in such strict accordance with plain physical principles, as scarcely to require the test of experience for its establishment. M. Depaul, however, has adduced, in his thesis, a large number of cases in proof of its truth and general applicability. Dr. H. Van Arsdale, of New York, who has called the attention of the profession in this country to the uses of obstetrical auscultation, in a paper published in the *New York Journal of Medicine*, for September, 1843, sustains the views of M. Depaul. Professor Stolz, of Strasburg, I believe, also coincides with him in according a high degree of confidence to the results of auscultation, as applied to the diagnosis of presentations and positions. These views have not, however, received universal assent. Professor Moreau is quoted by MM. Barthe and Roger, in their treatise on auscultation, as maintaining the impossibility of arriving at an accurate diagnosis by the aid of auscultation alone. Professor Dubois admits the possibility of making out the presentations of the head and breech ; but thinks that the stethoscope does not enable us to distinguish their several positions. (*Dict. de Méd.*, art. "Grossesse.") M. Cazeaux, one of the most recent authorities, says, that when the maximum of the foetal pulsations is below the umbilicus, and on the left side, we may generally diagnosticate a first position of the vertex ; when on the right side, a second position ;* but it is next to impossible to say whether the position be anterior or posterior. We may suspect a breech presentation, when the maximum of the foetal pulsations is above or on the level of the umbilicus, but examination *per vaginam* is necessary to confirm the diagnosis. Lastly, it is utterly impossible, by auscultation alone, to detect a presentation of the shoulder.

No practical accoucheur can underrate the importance of this method of diagnosis, if it should be found to merit all the confidence reposed in it by M. Depaul and others. It would not be interesting merely as a matter of scientific curiosity, but would often be appealed to in cases of difficulty, where the ordinary means of diagnosis fail us. When, for example, at the commencement of labour, it is impossible to reach the presenting part with the fingers, we are almost certain that some other part than the head presents, and it becomes a matter of importance to determine, if possible, at once, the particular nature of the presentation. In such a case, auscultation would afford us valuable assistance, supposing the method of M. Depaul to be well-founded. Unfortunately, there is too much reason to fear that this is not the case. Having enjoyed, while a resident pupil of the Dublin Lying-in Hospital, an advantageous opportunity for studying the subject of obstetric auscultation, I turned my attention particularly to this point, and became soon convinced, that the stethoscopic diagnosis of presentations and positions, was far from meriting all the confidence which the attractive expo-

* I use the terms, first and second position, here, in the sense adopted by Naegele, who includes, under the former, all cases in which the occiput is towards the left side of the superior strait ; and, under the latter, all cases in which the occiput is towards the right side.

sition of M. Depaul had led me to repose in it. I proceed to relate some cases which justify this conclusion.

CASE I.—The maximum of the foetal pulsations was in the left inferior region of the uterus, where they were heard with extraordinary distinctness. It was impossible, for a long time, to feel the presenting part: when the os uteri was fully dilated, it was found to be the face in Naegele's second position, (forehead to the right side.) Relying upon auscultation, the diagnosis would have been a presentation of the vertex in the first position, or, (with vastly less probability,) a presentation of the face in the same position, or, possibly, if the sounds of the heart had been found to be transmitted in a distinctly horizontal direction, a presentation of one of the shoulders. It being impossible to feel the presenting part, the first supposition was, of course, excluded. The result demonstrated the fallacy of one of M. Depaul's fundamental positions, viz., that the foetal pulsations are always transmitted with greatest distinctness from the back of the foetus. It seems to me easy to understand why the reverse should generally happen in face presentations. By the extension of the head, the heart is thrown into the anterior half of the foetal ovoid, and becomes much more accessible to the stethoscope in this direction than behind; the back of the foetus being separated from the adjacent segment of the uterus by a considerable layer of the liquor amnii. Of this, any one may readily satisfy himself, by a glance at an engraved representation of presentations of the face. M. Dubois, in the article before cited, maintains that this may be the case in other presentations; he states, in fact, in general terms, that it is an error to suppose that the foetal pulsations are always transmitted with greatest intensity from the back of the foetus.

CASE II.—The maximum of the foetal pulsations was, "very decidedly," above the umbilicus, and to the left side. A first position of the breech was, therefore, unhesitatingly diagnosed, and with the more confidence, as a round tumour was felt above the umbilicus, which was taken for the head of the child. It turned out to be a presentation of the vertex in Baude-locque's fifth position, the head being expelled with the forehead under the pubic arch.

This case goes far to invalidate the evidence of auscultation, even in those circumstances where it would seem, *à priori*, to be least fallible. It is easy to understand why, in such a posterior position of the head, the sounds of the foetal heart should have been less distinct than usual in the inferior segment of the uterus; but the very elevated position of the *maximum* must be explained by a circumstance which has not been sufficiently taken into account. The sounds of the foetal heart are transmitted with such distinctness along the spinal column, that they may be readily heard through the stethoscope applied upon any part of it, or even on the sacrum or nates. Of

this I have satisfied myself, by the examination of the newly-born child. In the case just related, the stethoscope being applied upon the nates of the fœtus, (which, doubtless, constituted the tumour felt above the umbilicus,) with the intervention only of the solid parietes of the abdomen and uterus, received the sounds with greater facility than below, where it was separated from the thorax of the child by much worse conducting media.

CASE III.—Presentation of the feet. The stethoscope was applied previously to the examination *per vaginam*; "but the heart was heard too low down to excite any suspicion of the nature of the presentation." The child was small, probably of the eighth month.

This case forms a striking contrast with the last. The low position of the maximum of the fœtal pulsations may be accounted for, *in part*, by the small size of the child.

CASE IV.—The maximum of the fœtal pulsations was "so high in the abdomen as to leave no doubt of a breech presentation," it being at the same time impossible to reach the presentation with the finger. It was afterwards found to be a presentation of both hands. The shape of the uterus was peculiar, and might have served, perhaps, to correct the error of diagnosis. It did not rise so high as usual in the abdomen, but projected very far forward, and its upper surface was very broad and flattened: the motions of the fœtus were chiefly felt in the anterior projecting portion.

Presentations of this sort are always classed with those of the shoulder, and this case casts additional doubt upon the results of auscultation, in those cases where it has been generally considered as most certain, viz., in presentations of the breech. Comparing it with Case II., we are compelled to adopt M. Cazeaux's conclusion, that we can only *suspect* a presentation of the breech, when the fœtal pulsations are heard above, or on a level with the umbilicus.

CASE V.—Presentation of the elbow. Before the complete dilatation of the os uteri, it was impossible to determine, by vaginal examination, whether it was an elbow or a heel that presented. The question was, in a great measure, decided by the stethoscope, the fœtal pulsations being heard low down on the right side; but there was no particularity to be detected in the direction of the *transmission* of the sounds.

While this case proves the incontestable utility of auscultation, when assisted by other means of diagnosis, it also serves, as far as a single case can go, to invalidate another of M. Depaul's principles, viz., that the fœtal pulsations are always transmitted to the ear with greatest distinctness in the direction of the trunk of the fœtus, and that, consequently, in shoulder presentations, this line of transmission is horizontal. The first part of the proposition would, probably, be generally true, if the trunk of the fœtus

were always in contact with the antero-lateral parietes of the uterus, and thereby easily accessible to the stethoscope. But when it is posteriorly situated, and separated from the stethoscope by the intervention of a greater or less quantity of liquor amnii, and portions of the intestinal mass, the line of transmission of the pulsations must be far more obscure and difficult to be satisfactorily made out. Supposing, however, that it could always be easily ascertained, it scarcely follows, I conceive, that it should always be horizontal in shoulder presentations. It does not generally happen that the trunk, in such presentations, is placed in a strictly transverse direction; the head being in one iliac fossa, the superior portion of the trunk is at the superior strait; but the inferior and more considerable portion of it ascends towards the fundus of the uterus, being, more or less, bent laterally upon itself, so that the position of the fœtus is rather oblique than transverse.

Again, it not unfrequently happens that, in shoulder presentations, the head is near the symphysis pubis, and the trunk occupies a position nearly coinciding with the direction of the sacro-pubic diameter of the superior strait. In all such cases, the line of transmission of the fœtal pulsations should be rather vertical than horizontal.

CASE VI.—The maximum of the fœtal pulsations, when the os uteri was dilated to about the size of a half dollar, was *below* the umbilicus, and to the *left* of the median line. They were also heard above the umbilicus on the same side, but more feeble, and on the right side, low down. The head was plainly felt above the umbilicus on the left side. It was found, notwithstanding, that the breech presented, in the second position, the sacrum being very far forward, near the symphysis pubis.

Here we have a double error, affecting both the presentation and the position, for the stethoscope would have indicated a presentation of the vertex in the first position. It is evident that the fœtus occupied an inclined position in the uterus, the head and upper part of the trunk being on one side of the median line, the lower part on the opposite side: the low position of the heart was the necessary consequence of this obliquity. This fact suggests a source of fallacy which may, perhaps, be not unfrequently met with.

The preceding six cases included the majority of presentations of *living children* other than those of the vertex, which occurred while I was in the hospital, and in which the circumstances permitted a careful stethoscopic examination. It is proper to add that there were four cases of breech presentations, (to which I may add a fifth, observed elsewhere,) in which the maximum of the fœtal pulsations was found above or at the level of the umbilicus. I recollect no case of presentation of the vertex, with the *single* exception related above, (**CASE II.**) in which the maximum was not heard below the umbilicus.*

* It will be seen that instead of supposing the uterus divided into two *equal segments* by an imaginary horizontal line, as M. Depaul does, I have followed MM.

From the cases related, however, we may infer that auscultation can, at best, only lead us to a *probable* diagnosis, and that it is liable to fallacy even in those cases where its indications are most certain; that is, where the maximum of the double of the fœtal heart is above or at the level of the umbilicus; for we have one case of presentation of the vertex, another of the hands, in which the maximum was so situated. With respect to the class of cases in which the maximum is in the inferior segment of the uterus, we are in such generally authorized to diagnosticate a presentation of the vertex, but only because such presentations are vastly more frequent than those of the face or trunk: in order to decide with certainty upon the existence of the latter, we must resort to external palpation and vaginal examination. If the face be found to present, in determining its position by auscultation, we must, I apprehend, reverse the rule followed in other presentations, and conclude that the *chin* is towards the point where the maximum of the fœtal pulsations is heard. Even in other presentations, *CASE VI.*, shows that we cannot always determine the fundamental position, (that is, whether the occiput or sacrum is towards the left or right sides of the superior strait,) by auscultation. As to deciding whether the position be anterior or posterior, that is, whether the occiput, &c., be in relation with the acetabulum or the sacro-iliac symphysis, great difficulty will often be experienced. In the former case, however, the maximum of the fœtal will generally be found nearer the median line, just above Poupart's ligament. In presentations of the shoulder, where the position is doubtful, auscultation will doubtless enable us to determine it with much certainty, the head being necessarily on the side where the heart is heard most distinctly. But it is evidently impossible to determine by auscultation which shoulder presents.

It will be perceived that these conclusions coincide almost exactly with those above quoted from M. Cazeaux.

Although, therefore, auscultation does not by itself enable us to arrive at a certain diagnosis of presentations and positions, yet, when combined with other means of exploration, and in cases where those offer doubtful results, it is capable of affording us most important aid. In a case like the fifth above related, for example, its utility is apparent. Also, where we are in doubt whether the face or the breech be the presenting part, the stethoscope will enable us to decide the question with a great degree of certainty. Palpation of the abdomen will sometimes enable us to correct its indications in cases

Dubois and Cazeaux in placing this line at the level of the umbilicus, which is rather above the position assigned to it by M. Depaul. The diagnosis between presentations of the head and those of the breech is thereby rendered more certain than it would be if M. Depaul's rule were strictly followed. In the posterior positions of the vertex, it would be often very difficult to decide whether the maximum of the fœtal pulsations was above or below a line crossing the uterus in the *middle* of its long diameter, because, as we proceed posteriorly towards the lumbar region with the stethoscope in search of the maximum, we are obliged likewise to *ascend*.

where the examination *per vaginam* is unavailable, as where the doubt is between a presentation of the shoulder and that of the face; in the former case it is often possible to feel the head in one or other of the iliac fossæ.*

It has been pretended that the position of the child may be determined by the placental or uterine souffle, the anterior surface being towards the region where this is heard. (*Hohl*, quoted by *Velpeau*.) No one, who has had any considerable experience in obstetrical auscultation, will allow the least weight to this pretension. It is sufficient to remark that the souffle is very often heard in two different and diametrically opposite points. *M. Depaul* has also abundantly proved that there is no necessary or constant relation between the situation of the souffle and the point of insertion of the placenta.

A much more important application of the stethoscope is to the determination of the life or death of the fœtus in utero. Some difference of opinion prevails as to the degree of certainty which auscultation possesses in relation to this all-important matter. It is the opinion of some that the absence of the fœtal pulsations is no proof of the child's death. *MM. Barthe* and *Roger* admit that the position may be such as to render them inaudible; and *M. Stolz* holds that this is the case in all posterior positions, unless some part of the trunk of the fœtus be in contact with the lateral segment of the uterus, and thereby accessible to the stethoscope. *M. Cazeaux*, on the contrary, is of opinion, that although the posterior position of the fœtus, the presence of an excess of the amniotic fluid, the interposition of portions of the intestines between the uterus and abdominal parietes, and the presence of ascites, may render the fœtal pulsations more or less indistinct, they can never render them inaudible; and he states, that in from seven to eight hundred pregnant women auscultated by him at the Hospital of the Faculty, he never met with one in whom he failed, after the 6th month, to recognize the sounds of the fœtal heart when the child was really living. *M. Dubois* is

* I may be here allowed to mention a most curious case which, so far as I am informed, has few parallels on record. It was a presentation of the breech in the first position: it was impossible for several hours to reach the presenting part with the finger, but the nature of the case was rendered absolutely certain by auscultation and palpation of the abdomen. The fœtal heart was heard over almost the whole of the left side of the abdomen, but the maximum was evidently above the umbilicus. The head of the fœtus was distinctly felt through the abdominal parietes, and the sutures and fontanelles were plainly distinguishable to the touch. The sagittal suture was directed transversely; the anterior fontanel, whose four angles were easily recognized, was near the median line, and the posterior, equally distinct with the former, was towards the left side. It was a fifth child of uncommon size.

M. Velpeau, while treating of the posterior obliquity of the uterus, relates a case in which the head, instead of occupying the superior strait, projected over the symphysis pubis almost to the vulva, thereby so distending and thinning the anterior segment of the uterus and the abdominal muscles as to render the sutures and fontanelles quite distinct to the touch. The elder *Hamilton*, also, I believe, mentions a somewhat similar case, in which the sutures and fontanelles were so easily distinguishable as to cause him to apprehend that a rupture of the uterus had occurred.

convinced that these sounds can "scarcely ever" be inaudible in the latter months of pregnancy. M. Hohl states in general terms that they can *always* be heard when the child is living.

I am convinced that the cases are extremely rare in which an attentive examination will not enable us to detect the pulsations of the fœtus when it is living, and that no possible position of the child can render them inaudible without the concurrence of other unfavourable circumstances. During my residence in the Lying-in Hospital more than five hundred women were delivered: auscultation was practised by the other resident pupils and myself in every case where circumstances allowed it to be done. I have no means of determining the precise number thus examined, but I have no doubt that it amounted to three-fourths of the whole number. Out of this number but a single case occurred which was calculated to throw the slightest doubt upon the results of auscultation as applied to the determination of the life and death of the fœtus. A woman, whose abdomen was much distended by an excessive quantity of amniotic fluid, was auscultated by two of the resident pupils at the commencement of labour, and the fœtal pulsations were indistinctly heard in the right inferior segment of the uterus. Some time afterwards, shortly before delivery, auscultation was again practised, but, it being impossible to detect the sounds of the heart, it was concluded that the child was dead: it was born alive, however, but died after a few feeble cries and inspirations. The presentation was natural. It may be interesting to state that the autopsy revealed an inflammation of the right pleura and peritoneum, with a copious fibro-gelatinous effusion, and extensive adhesions of the intestines. It is obvious that the child was dying at the moment of the second examination, which circumstance, together with the presence of an unusual quantity of the liquor amnii, accounted for the sounds of the heart not being audible.

Dr. Montgomery relates a case in which pregnancy was complicated with ascites, and in which the most careful and repeated examinations failed to detect the sounds of the fœtal heart. (*Cyclopædia of Pract. Med.*, art. "Pregnancy.") The pregnancy, however, was no further advanced than the seventh month.* While it would be erroneous, therefore, to maintain that the fœtal pulsations may *always* be heard after the sixth month, when the child is living, we may, making full allowance for all unfavourable circumstances, establish the following law as admitting of no exception: *In uncomplicated pregnancy, at the full time, it is always possible to hear the sounds of the fœtal heart when the fœtus is alive and healthy.*

The superiority of auscultation over all other means of ascertaining the death of the child during labour is immeasurable. Those formerly relied upon, such as the cessation of the active movements of the fœtus, the fœtor of the vaginal discharges, the detachment of the epidermis under pressure,

* Might not M. Nauche's idea of auscultation *per vaginam*, by means of his microscope, be usefully applied in doubtful cases of this sort?

the state of the umbilical cord, and the discharge of the meconium, are either uncertain or often unavailable in the circumstances in which their evidence is most urgently required. Auscultation, on the contrary, is applicable under all circumstances, and always with equal certainty. It makes known not only the death of the fœtus, but the precise moment of its death; it likewise enables us to recognize disturbances of the circulation, (such as slowness, feebleness, irregularity, and intermittence of the pulsations of the heart,) which indicate a suffering condition of the fœtus, and would terminate fatally were not timely assistance rendered. We are thereby furnished with the most important and practical indications as to the moment of interference, and the particular method of delivery. This consideration is sufficient to entitle auscultation to the studious attention of the accoucheur, and to prove that he who neglects it wilfully deprives himself of one of the most important aids in practice which science has placed at his disposal.

The uterine souffle has been relied on by some writers as a means of determining the life or death of the child. Its indications are as uncertain here as in most other cases where it has been proposed as a means of diagnosis. I have the notes of three cases in which the souffle was heard, (in one case "loud and extensive,") notwithstanding the children were, in all, not only dead, but putrid. Besides, even when the child is living, it is frequently absent at intervals. The same fallacy attends the souffle in the diagnosis of twin pregnancy, to which it has been applied by MM. Stolz and Hohl. It follows, from the observations of M. Depsul, that it is more frequently heard at two opposite points, even in single pregnancies, than at a single point. Nor do the fœtal pulsations enable us, in all cases, to determine the existence of double pregnancy. Although it is often easy to ascertain the existence of two hearts, beating with different degrees of velocity, the relative position of the children is occasionally such that the sounds proceeding from the one so mask and confuse those proceeding from the other, which is more posteriorly situated, as to render it impossible to distinguish them. It should also be remembered that it now and then happens, where there is but one fœtus, that the sounds of the heart are propagated so remotely and with such distinctness, as to render it a matter of no small difficulty to determine whether they originate from one or from two centres.