

THE USE OF THE VAGINAL STETHOSCOPE IN THE EARLY DIAGNOSIS OF PREGNANCY*

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THE early diagnosis of pregnancy has received considerable attention from obstetricians and associated scientists in recent years. About a decade ago Abderhalden's¹ serodiagnosis was considered specific for a time but soon fell into disrepute even among its enthusiastic early sponsors.

Reuben Peterson² has advanced the roentgen ray in conjunction with pneumoperitoneum as the best evidence in early pregnancy. He depends on a characteristic change in the uterine shadow seen as early as the second and third month. Stein³ has shown that with pneumoperitoneum the fetal skeleton can be seen on the x-ray photograph as early as the fourth month. The sugar tolerance test has been brought forward by Milnor and Fennel,⁴ who have shown that the sugar tolerance is markedly decreased in the early months of pregnancy.

There are inherent weaknesses in all of these methods. The Abderhalden test was found to react positively in conditions others than pregnancy. Falls⁵ and others have shown that the blood ferments were increased during pregnancy as Alberhalden claimed, but were non-specific. The advisibility of subjecting the pregnant woman to the discomfort if not the danger of the transabdominal pneumoperitoneum and the expense incident to the operation and Roentgen ray pictures,

*Demonstrated before the Johnson County Medical Society on December 12, 1923. Received for publication, November 9, 1925.

limit its general use. The changes in the sugar tolerance are too frequently seen in other conditions than pregnancy to make its significance more than a presumptive sign of pregnancy.

It is therefore necessary to wait the positive signs of pregnancy as the criterion in a doubtful case. These positive signs, however, do not become available ordinarily until the eighteenth or twentieth week. Probably the best of the positive signs of pregnancy are the fetal heart tones. Sarwey⁶ has reported hearing these as early as the fourteenth week after prolonged auscultation through the abdominal wall in a very quiet room, although they are rarely heard before the twentieth week under ordinary circumstances, and oftentimes not until several weeks later in the presence of an unusually fat abdominal wall, hydramnios, or ascites.

It would seem desirable if some method could be devised to promote the hearing of the fetal heart tones before the eighteenth week, and at

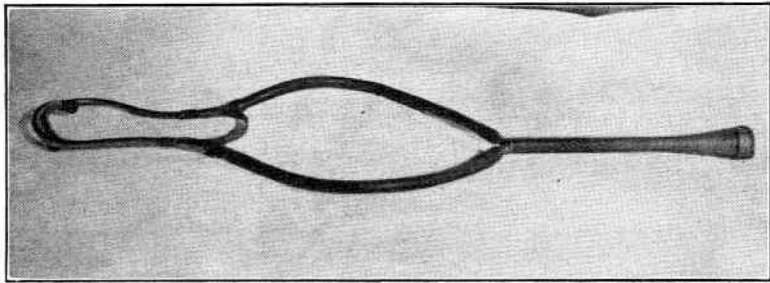


Fig. 1.—Vaginal stethoscope with ordinary stethoscope earpieces attached.

the same time to obviate the difficulties encountered when the above-mentioned conditions were present.

With this idea in mind we devised a stethoscope that could be applied over the lower uterine segment through the vagina. This was accomplished by making a long-handled stethoscope, the bell of which could be introduced into the vagina and the earpieces attached to the rubber tubes of an ordinary Shepherd stethoscope.

By using this instrument we have been able to diagnose pregnancy about the fourteenth to sixteenth week in twenty patients. At first, we found that the heart tones could not be heard except by accident when the stethoscope was first applied to the lower uterine segment. The instrument had to be adjusted to the various parts of the wall and often the auscultation had to be continued from ten to fifteen minutes. The probable reason for this is that the fetus at this stage of pregnancy is relatively small compared with the size of the amniotic cavity, and so freely movable that one had to wait until it floated over the lower uterine segment in such a way that the back approximated the uterine wall before the heart tones could be appreciated. Therefore, in order to facilitate this position of the fetus *in utero*, we placed

the patient in the Fowler position when the tones became audible in practically all cases.

When these conditions are fulfilled the heart tones come through strong and true and there is absolutely no question as to their identity in the mind of the observer. In addition one can often hear the dull thud of the fetal movements, which are characteristic of pregnancy even when the fetal heart tones cannot be heard.

Another use to which the vaginal stethoscope may be put is the auscultation of the lower uterine segment in patients with placenta previa. At or near term there is audible a uterine souffle on both sides of the midline in the lateral fornices in normal cases. However, this normal uterine souffle was decidedly increased in two patients with low implanted placenta in whom we could observe it even in the early months. Further study of this point is in progress.

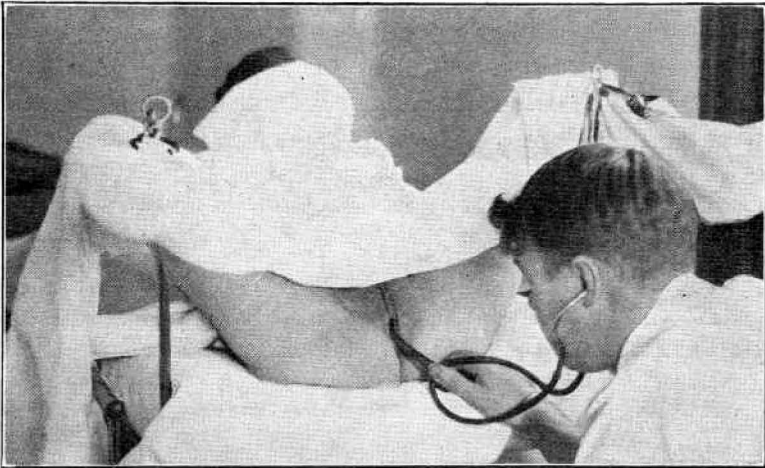


Fig. 2.—Counting fetal heart tones by means of vaginal stethoscope. The patient is in the semi-Fowler position.

The vaginal stethoscope is of practically no value for hearing heart tones after the twentieth week. The reason for this is that the uterus has risen so high into the abdomen at this stage of development and the fetus is so large that the distance of the heart from the lower uterine segment is too great whether a head or a breech presentation is present. Theoretically this instrument would be of value in confirming the diagnosis of a transverse presentation especially in a very stout abdomen if the tones were well heard vaginally at or near term. We have not as yet had an opportunity to study such a case.

Some idea of the physical difficulties involved in this study can be obtained from a consideration of the accompanying photograph of four fetal hearts removed from fetuses of varying maturity. The measurements of the hearts and the description of the size of the fetus is shown in Table I. Heart tones created and transmitted from Specimen I

(Fig. 3) are easily audible through the abdominal wall by using the ordinary stethoscope or even by the naked ear applied over the abdomen. This is a heart removed from a seven months' fetus. The next, Specimen II, is the heart of a four and one-half months' fetus and it is about this stage of the development of the fetus that we begin to expect to hear heart tones on auscultation in the usual way through the abdomen. Specimen III is from a fetus about sixteen weeks' development and tones from such a heart are usually not audible abdominally but can be heard well vaginally with this instrument. Specimens IV and V are fetal hearts too small to create sounds capable of being appreciated outside the uterus through any known device.

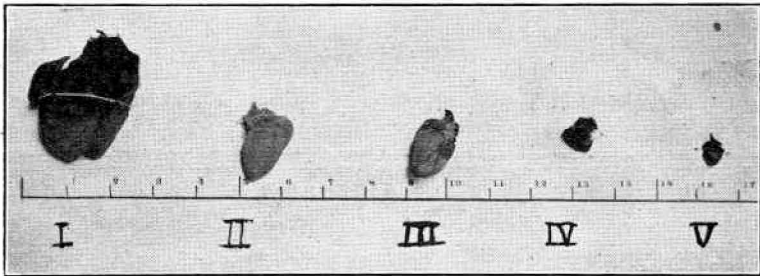


Fig. 3.—Fetal hearts from fetuses varying from 7 cm. to 17 cm. in length. The scale shows centimeters.

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TABLE I

PERIOD	LENGTH	SIZE OF HEART	WT. OF HEART
9 weeks	7 cm.	5 mm. x 6 mm.	
14 weeks	12.5 cm.	8 mm. x 9 mm.	0.550 grams
4 months	15 cm.	11 mm. x 17 mm.	0.600 grams
4½ months	17 cm.	13 mm. x 18 mm.	0.600 grams
7 months	34 cm.	2 cm. x 3½ cm.	5.100 grams
8 months	40 cm.	2 cm. x 4 cm.	12.000 grams

From a consideration of these factors it may be stated as a physical law that the audibility of the tones of a heart of a certain size producing a tone of a certain pitch and intensity will vary inversely as the distance between that heart and the stethoscope and as the density and thickness of the interposed structures.

The desirability of a positive diagnosis of pregnancy in the early months in certain patients is unquestioned. Among the important conditions to be differentiated are, fibroid uterus with or without pregnancy, hydatid mole, carneous mole, carcinoma of the body of the uterus, sarcoma of the uterine body, ovarian cysts, and ectopic pregnancy with hemocele. Many of these conditions present themselves for diagnosis at the time the pelvic tumor is about the size of a four months' pregnancy. The value of an absolute diagnosis by hearing and counting of the fetal heart tones by the vaginal stethoscope applied over the lower uterine segment is obvious. It will also be of use in affirming

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