

AN IMPROVED HEAD STETHOSCOPE FOR THE HEARING AND COUNTING OF FETAL HEART TONES

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THE use of the head stethoscope for the hearing and counting of fetal heart tones dates back to March, 1917, when Hillis¹ published his description of the first instrument of this kind. The advantage claimed for this instrument was that the obstetrician could listen to the fetal heart tones repeatedly while wearing sterile gown and gloves without contaminating his hands by adjusting a stethoscope or being forced to rely on second hand information as to the rate and character of the fetal pulse obtained by an assistant.

Shortly after this instrument was devised it was modified by De Lee² slightly and an attachment was made for the clocks in the delivery rooms of the Chicago Lying-In Hospital which rang a bell every fifteen seconds loud enough so that it could be heard by the obstetrician when the head stethoscope was adjusted and the heart tones being counted.

In this way the rate of the heart tones could be accurately determined without observing a watch as is ordinarily done when taking the pulse.

There are several objections to this method of timing the fetal heart beat. First, the clocks are rather expensive and cannot therefore be installed in all delivery rooms. Secondly, they are mechanically imperfect and not infrequently get out of order. Thirdly, their use is somewhat restricted by other noises in the room and this is especially true when the patient is noisy in the second stage. Fourthly, it cannot be used in the patient's home or in the delivery room not provided with the special bell-ringing device.

Some of these objections can be obviated by calling in the services of a second party who counts the movements of the obstetrician's finger as he beats time while listening to the fetal heart for a quarter or a half minute. The information as to the fetal rate is then relayed to him.

Since undertaking the amplifying of the fetal heart tones by means of the microphonic stethoscope we have become interested as well in the improvement of the ordinary head stethoscope. It is obvious that even with successful amplifying instruments that relatively few delivery rooms will be equipped with this apparatus for some time to come.

Therefore, a transportable instrument that could be worn while operating, which would give the obstetrician accurate first hand information concerning the rate and quality of the fetal heart would be very desirable.

After some experimentation we have devised two types of instruments which we believe overcome the objectionable features of the ordinary head stethoscope mentioned above. In developing the first instrument we took a head stethoscope of the ordinary spring steel type and mounted a stop watch in the middle of the longitudinal band which fits over the crown of the head. At the posterior extremity of this band we mounted a small flash-light cell. We then placed a small flash-light bulb just posterior to the transmitter bell of the instrument so that it was just above the level of the eyes when the stethoscope was adjusted for use.

We then bored through the crystal of the stop watch and passed a fine copper wire connected with the above-mentioned battery through the hole in such a way that contact was made with the hand of the watch when running. In this way contact was made by the alternate ends of the hand of the watch every fifteen seconds. The contact closed the circuit and caused the flash-light to light up for about a second.

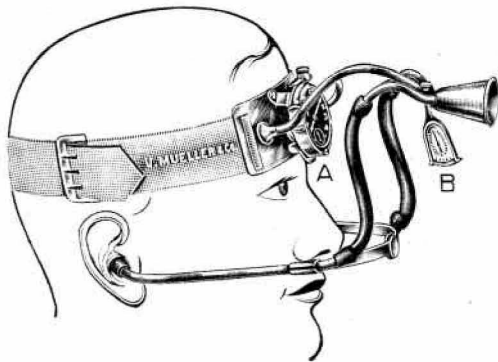


Fig. 1.—A, Watch; B, magnifying mirror.

Since a stop watch of the nonmagnetic type was used no difficulty was encountered in having a current flow through the watch.

The obstetrician has, therefore, merely to adjust his stethoscope, set the watch going, start counting with the first flash and stop with the second in order to get the rate for a quarter minute. The watch will run for several hours and the amount of current used is negligible.

The results obtained with this instrument have been perfectly satisfactory, but because of the complexity of the connections and the possibility of various parts getting out of order, a second instrument was devised.

The second type of instrument depends on an entirely different principle. We took an ordinary pocket watch with a sweep second hand and attached it by a special holding bracket to the head stethoscope so that it rested just above the root of the nose when the head stethoscope was adjusted for use. A magnifying mirror was then mounted on a ball and socket joint clamped to the horizontal bar that supports

the bell of the stethoscope. The mirror was so placed that by slight adjustment a perfect image of the watch dial was obtained without straining the eyes. We found by using the mirror in this manner that we doubled the focal distance and therefore increased the ability of the eye to accommodate comfortably. When the watch was placed in the position of the mirror it was found that this focal distance was too short for the average eye.

The image revealed in the mirror is of course reversed but this interferes in no way with the counting of quarter minutes, and with a little practice there is no difficulty in telling the time if allowance is made for the mirror image.

As an added advantage the watch has a luminous dial and hands so that the fetal heart tones can be counted by the use of this instrument in a darkened room if for any reason this is desirable.

The advantage of this instrument is its simplicity, as there is practically nothing about it that can get out of order. It provides the physician with accurate information as to the length of time consumed by any given maneuver or stage of labor. For example in a breech delivery, the physician can keep track of the time elapsing between the birth of the umbilicus and the completion of the second stage. During an operative delivery, manual dilatation of the cervix, the operator has constantly before him the time taken to dilate.

The advantages claimed for these instruments are:

1. They can be easily transported and used in the home and ordinary hospitals.
2. They can be used no matter how much noise there is in the room provided the fetal heart tones can be heard.
3. The obstetrician can get first hand information regarding the fetal heart rate.
4. With the second type of instrument the physician has constantly before him the accurate information as to the length of time consumed by any stage of labor or operative procedure.

REFERENCES

- (1) *Hillis, D. S.*: Jour. Am. Med. Assn., March 24, 1917. (2) *DeLee*: Am. Jour. Obstet., July 1, 1917. (3) *Falls, F. H. and Rockwood, A. C.*: Jour. Am. Med. Assn., Nov. 17, 1923, lxxxi, 1683.