

PLACENTAL LOCALISATION USING ULTRASONIC FOETAL PULSE DETECTOR

by

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Most methods of placental localisation involve the use of X-rays or radio-active isotopes. It would be a definite advantage if ionising radiation could be avoided. Simple ultrasonic devices have now come into the market which could be used for placental localisation at the patient's bedside. In the present trials, the Sonicaid foetal pulse detector has been used.

Technical Details

A "transistorised crystal" held in a probe transmits ultrasonic sound of low intensity into the body tissues. The sound waves are reflected by interphases of different acoustic impedance perpendicular to the beam and then picked up by a receiver crystal in the probe. Any movement for example, of foetal heart or column of blood towards or away from the transmitted signal will cause it to be reflected with a shift of frequency, and this difference suitably filtered and amplified is converted into an audible signal heard through a loudspeaker or earphone.

The apparatus which is powered by rechargeable batteries is compact, weighs about 8-10 lbs., is readily portable and easily operated. Provision is made for connection to a tape recorder when a permanent record is required.

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Method of Localisation

This depends on identification of the various sounds one hears over the abdomen of a pregnant woman. These are—

1. Uterine vessels produce a single blowing sound synchronous with the maternal pulse.
2. The foetal heart sounds are identified as distinctive double sounds of gallop rhythm at the foetal heart rate.
3. The foetal vessels produce a single sound synchronous with the foetal heart.
4. The umbilical cord vessels give a similar sound of a higher pitch, its location varying as the cord tends to drift from the sonic beam.
5. The placental sounds are complex and are composed of an umbilical cord sound super-imposed on a low pitched modulating, blowing sound of varying intensity, a wind-like noise.

A certain amount of background interference is usual but is seldom distracting. The use of apparatus causes no inconvenience to the patient or any discomfort whatsoever and indeed most of the patients have been quite overjoyed to hear the baby's heart sounds. Olive oil is applied as an even film over the patient's abdomen to act as a "coupling" medium. The whole of the abdomen overlying the uterus is scanned with the probe (transducer) and the site of maximum "placental sound" is determined.

The probe is then moved concentrically away and the limits of the placenta mapped. Again, it is inferred that the placenta occupies an area 7.5 to 10 cm. in radius from the site of maximum placental sound. It seems very likely that this method of localisation identifies the area of cord insertion into the placenta, but may not allow us to determine the exact limits of the placenta. During the present series, an attempt was made to locate the placenta at the fundus, at the lower part of the upper uterine segment and in the lower uterine segment on a metric basis as well as to determine right or left sided lateral situations.

Indications for Placental Localisation

1. Antepartum haemorrhage
2. Investigation of unstable and transverse foetal lie near term.
3. Before performing amniocentesis
4. Ruling out hydatidiform mole
5. Detection of multiple pregnancy

Present study

The device was used on 94 patients, the clinical material being as under:

- (i) Patients with antepartum haemorrhage,
- (ii) Patients with unstable and transverse lie after 37 weeks,

(iii) Patients who were going to have a caesarean section,

(iv) Patients who were going to have a forceps delivery.

Confirmation of the placental site was obtained at caesarean section and by manual palpation immediately after vaginal delivery before separation of the placenta. Only in those cases wherein more than 75 per cent overlap between the area mapped out by the ultrasonic detector, and the area confirmed by palpation after delivery, was obtained, the Sonicaid localisation was considered correct.

Results

The results of placental localisation in 94 cases mapped out by the Sonicaid and the confirmation at delivery including a few cases of placenta-*praevia* are set out in the following Table:

Out of the 94 cases studied, in two cases the placenta could not be located. These were posterior low-lying placentae confirmed at caesarean section.

One placenta was mapped as fundal, was actually situated anteriorly in the lower part of the upper uterine segment. This placenta had an eccentric cord insertion at its upper end.

TABLE I
Results of Placental Localisation

Placental site determined by Sonicaid	No. of cases	Placenta <i>praevia</i>		Confirmation of placental site	
		Present	Excluded	Correct	Incorrect
Fundal	48	-	48	47	1
Lower part of upper uterine segment	40	1	39	39	1
Lower uterine segment	4	4	-	4	-
Undetermined placental site (inferred to be posterior)	2	2	-	2	-
Total	94	7	87	92	2

One case of placenta praevia was incorrectly diagnosed as the placenta was large, nearly 30 cm. in diameter, encroaching on the lower uterine segment, while the cord insertion was in the lower part of the upper uterine segment.

Impressions

Placental localisation using the foetal pulse detector seems to be a fairly reliable and handy method at our disposal. It is readily available when required and has the advantage of avoiding irradiation to the foetus and the mother. With experience and frequent use of the instrument, more familiarity with the various sounds heard over the pregnant abdomen can be obtained, resulting in greater accuracy of placental localisation. However, in the present trials, in the following cases the matter was subject to a false interpretation of the findings:

1. Eccentric insertion of the cord
2. Large placental site
3. Posteriorly situated placenta
4. Intrauterine death

5. Before 28 weeks of pregnancy, as the placental site increases in later weeks of pregnancy.

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