

Placental Localisation Using the Doppler Portable Ultrasonic Apparatus

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SUMMARY

Placental localisation was performed on 100 patients before Caesarean section, using a portable ultrasonic device. The instrument was found to be of value in the diagnosis of placenta praevia. It has a use in the unsophisticated unit where immediate, more refined and accurate techniques of placental localisation are not available.

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The BOC Fetal Pulse Detector (Fig. 1), used in this series, utilises the continuous wave Doppler principle,^{1,2} and its use has been described for fetal heart monitoring,² placental localisation,^{3,5} and for the detection of deep vein thrombosis.⁶

The following sounds are audible over the abdomen during the third trimester of pregnancy:

1. Fetal heart.
2. Placenta—two sounds can be distinguished: (a) a high-pitched sound synchronous with the fetal heart, similar to the cracking of a whip, and (b) a low-pitched continuous background murmur described as 'wind blowing through trees'. These sounds represent flow in the umbilical cord insertion and the intervillous space respectively.³

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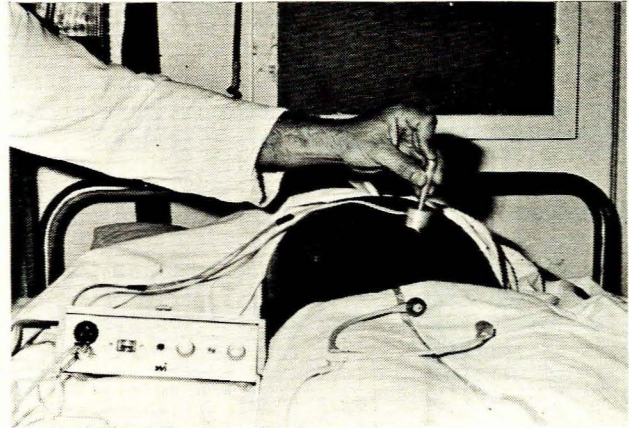


Fig. 1. The Doptone.

3. Uterine arterial blood flow—high-pitched blowing murmurs in the lower lateral uterine area synchronous with the maternal pulse.
4. Abdominal aorta—low-pitched, corresponding to the maternal pulse rate.
5. Umbilical cord flow—similar to the 'whiplash' sound of the placenta.
6. Fetal movements—of varying pitch and regularity.
7. A high-pitched crackling sound due to transducer movement on the skin surface.

PATIENTS AND METHODS

One hundred patients were selected at random before Caesarean section for placental localisation with the ultra-

sonic device described. Of these, 58 were in labour at the time of examination, while the remainder were patients awaiting elective repeat Caesarean section.

Tables I and II show the age distribution and parity of patients in the series and Table III shows the duration of pregnancy at the time of assessment.

TABLE I. AGE DISTRIBUTION

Age	No. of patients
<20 years	10
20 - 35 years	72
>35 years	18

TABLE II. PARITY

	No. of patients
Primipara	15
Multipara	79
Grand multipara	6

TABLE III. DURATION OF PREGNANCY

At time of assessment (weeks)	No. of patients
<35	5
35 - 37	23
38 - term	72

The patients were divided into two groups of 50. Both were examined in the same manner by one observer, utilising the headphones in the second group.

Procedure

All the patients (having micturated before assessment unless an indwelling catheter was present) were examined in the supine position. The entire abdominal wall was

freely coated with olive oil to secure acoustic coupling, and the transducer applied to the skin surface. Placental sounds were auscultated while the transducer was systematically scanned over the anterior and lateral aspects of the abdomen overlying the uterus, from the fundus to the symphysis pubis. The area over which placental sounds could be heard was mapped out and an attempt made to decide whether the site was anterior or posterior, utilising the unidirectional feature of the ultrasonic beam.

The placental site was diagrammatically recorded and then correlated with the site found at Caesarean section by different observers. The clarity of the sounds auscultated was recorded as being good, fair or poor.

RESULTS

The results are set out in Table IV.

TABLE IV. RESULTS

	No. of placenta praeviae	Correctly localised	False positive	False negative
First	50	4	2	2
Second	50	5	4	1
Total	9	6	3	3

Of the 9 cases of placenta praevia, 6 were diagnosed before Caesarean section. The correlation was found to be better in the second group of the series. In 2 of the patients with false negative results, the placenta was felt to be situated below the level of the umbilicus but not to extend into the lower segment. In one of these, a fundal placenta was localised and found to be placenta praevia at Caesarean section—she presented with an antepartum haemorrhage at 34 weeks' pregnancy and clarity of sound was poor.

Table V shows the correlation between clarity and accuracy of localisation. Correlation was found to be good in 79% and poor in 21% of patients. Of the 5 patients with gestational age of less than 35 weeks, 4 showed poor correlation. In 62% of cases, localisation was correct in terms of anterior or posterior situation, but was more accurate in the second group of 50 (76%).

TABLE V. CORRELATION BETWEEN CLARITY AND ACCURACY OF LOCALISATION

No. of patients	Clarity (subjective)	Correlation (% correct)
47	Good	84
35	Fair	83
18	Poor	70

Table VI shows the clinical features of some of the patients in whom localisation was poor.

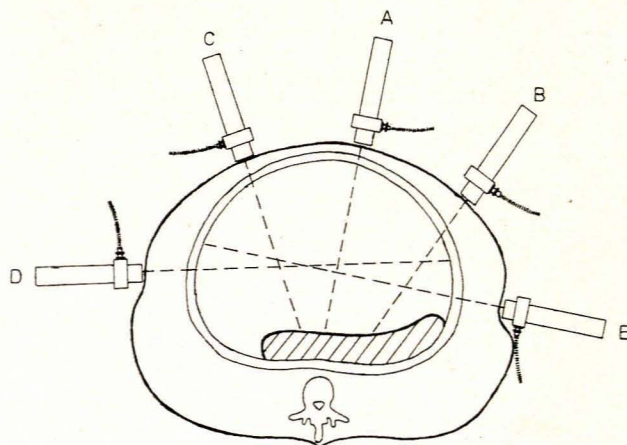


Fig. 2. Placental sounds heard from points A, B and C tend to suggest a posteriorly-situated placenta, if not heard from points D and E.

TABLE VI. CLINICAL FEATURES

No. of patients	Pathology
2	Retroplacental clots ++
2	Pre-eclamptic toxæmia
1	Placental infarction
1	Chronic renal disease
1	Breech at 34 weeks' gestation presenting with antepartum hæmorrhage.

DISCUSSION

Placental localisation with a portable ultrasonic device is not as accurate as other well-documented techniques such as Sonar compound scanning,^{8,9} retrograde placentography,¹⁰ portable scintillation detection,⁵ photoscanning with radio-isotopes,¹⁰⁻¹² or thermoplacentography.¹³

However, the procedure is easily and quickly conducted at the bedside, and has no harmful effects. The results are not altogether disappointing, comparing favourably with those of others.^{3,4} If the situation permits, patients can be sent for further placental site studies once placenta prævia is suspected.

The disadvantages associated with the procedure warrant discussion. In our series, it was found that the placental area delineated with the Doppler was smaller than the actual placental size. This possibly accounts for the false negative finding in 2 patients. The localisation accuracy in terms of whether the placenta was in an anterior, posterior or posterolateral, etc. position, was moderate.

Placental pathology, whether infarction or abruption, is likely to reduce blood flow through the placenta and thus minimise both sound and the area over which it can be heard.

CONCLUSION

Out of 100 placental localisations performed, using the Doppler portable ultrasound device, the placental site was correctly diagnosed in 79% of cases; and of 9 cases of placenta prævia, 6 were correctly localised. The accuracy of placental localisation increased with experience and was also found to be better when the headphones were used. The false negative rate was significant. Placental pathology and early gestation were found to make localisation more difficult.

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