J. D. ACLAND *ET AL.*: CASE OF RENAL AMYLOIDOSIS

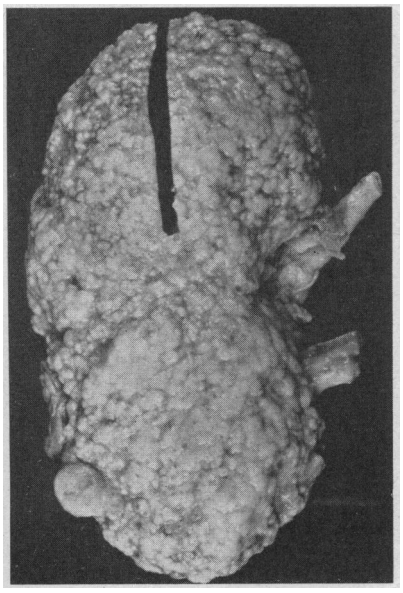

FIG. 1

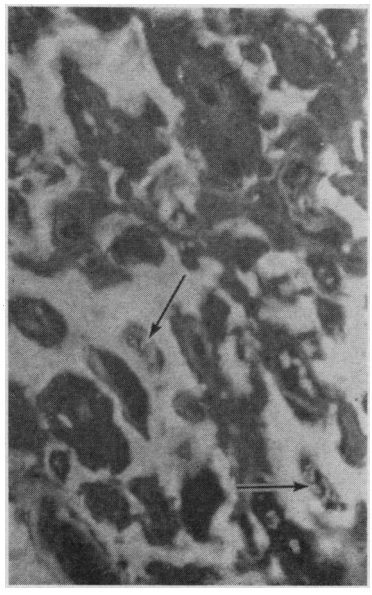

FIG. 2

FIG. 1.—Kidney showing coarse surface granularity. (×0.85.)

FIG. 2.—Section of kidney treated with thioflavine-T and photographed in ultraviolet light to demonstrate amyloid deposits (pale areas) surrounding disorganized tubules. Arrowed are two arterioles with amyloid deposits in their walls. (×450.)

E. I. KOHORN *ET AL.*: ULTRASONIC COMPOUND B-SCANNING

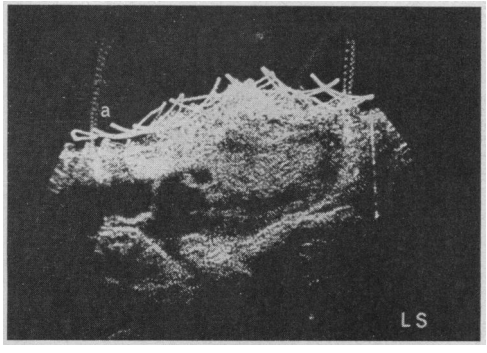

FIG. 1

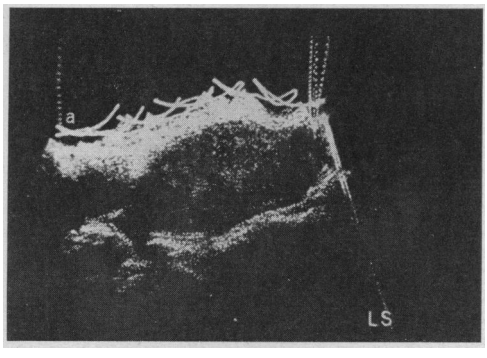

FIG. 2

FIGS. 1 and 2.—Hydatidiform mole. (a) Anterior abdominal wall at level symphysis. (LS) Longitudinal scan.

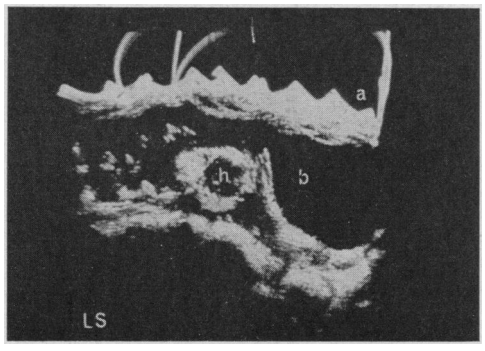

FIG. 3.—(a) Anterior abdominal wall at symphysis. (b) Bladder. (h) Foetal head. This patient presented with first trimester bleeding as a case of suspected hydatidiform mole.

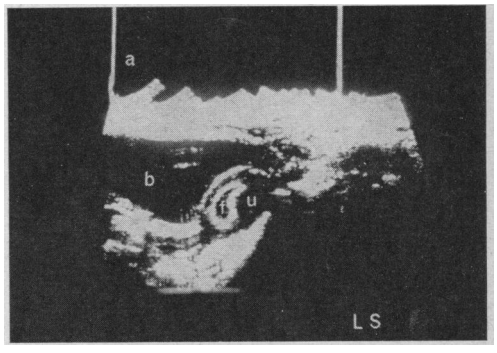

FIG. 4

FIG. 4.—Seven-week gestation. (a) Anterior abdominal wall at symphysis. (b) Bladder. (u) Uterus. (f) Foetus.

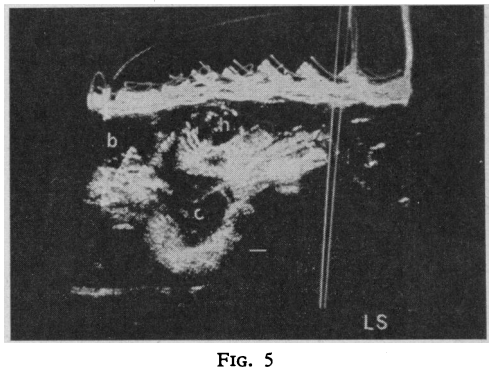

FIG. 5

FIG. 5.—Ovarian cyst in early pregnancy. (b) Bladder. (c) Ovarian cyst in pouch of Douglas. (h) Foetal head.

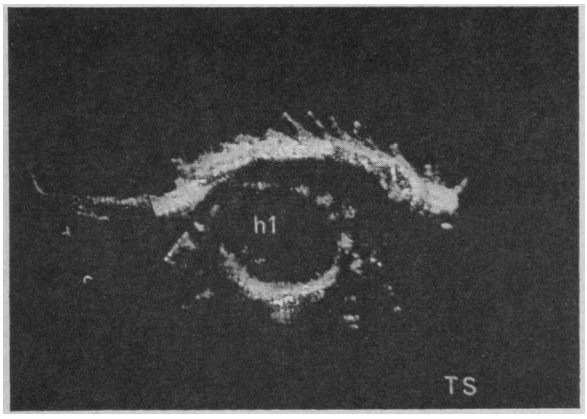

FIG. 6

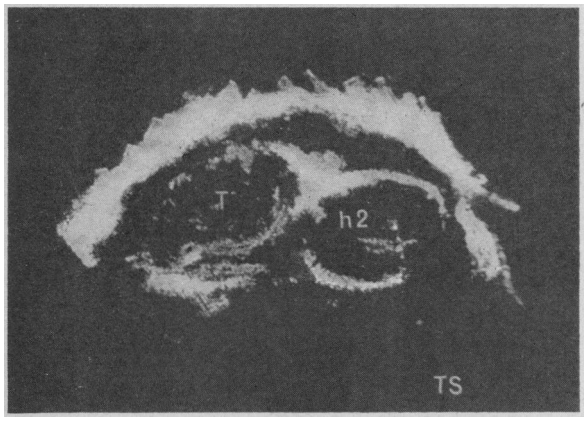

FIG. 7

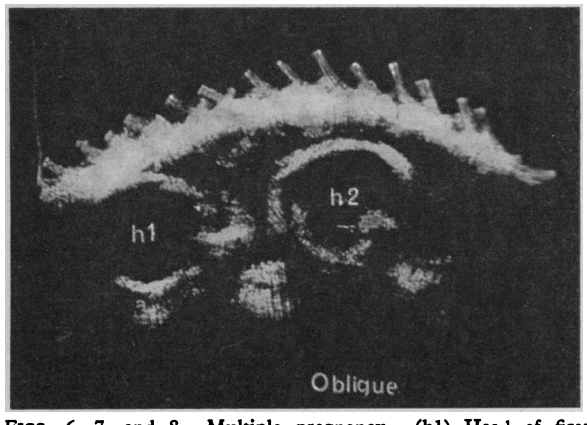

FIG. 8

FIGS. 6, 7, and 8.—Multiple pregnancy. (h1) Head of first foetus. (h2) Head of second foetus. (T) Thorax of first foetus alongside head of second foetus. (TS) Transverse scan.

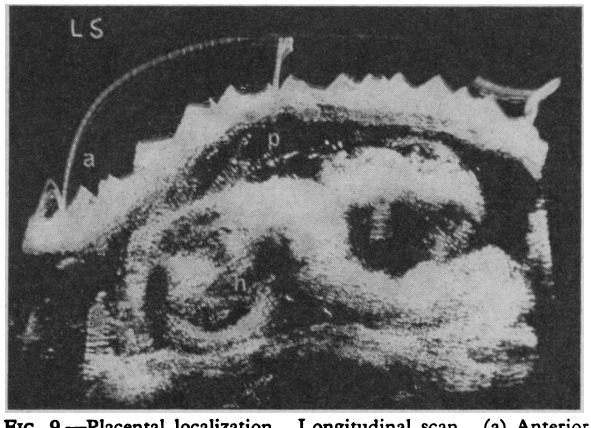

FIG. 9.—Placental localization. Longitudinal scan. (a) Anterior abdominal wall at symphysis pubis. (h) Foetal head. (p) Placenta.

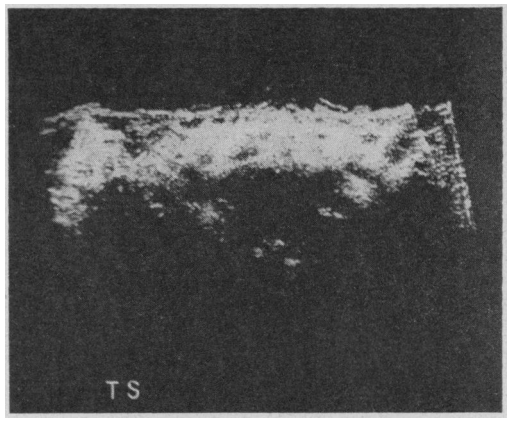

FIG. 10.—Fibroid. Sound does not penetrate through the tumour.

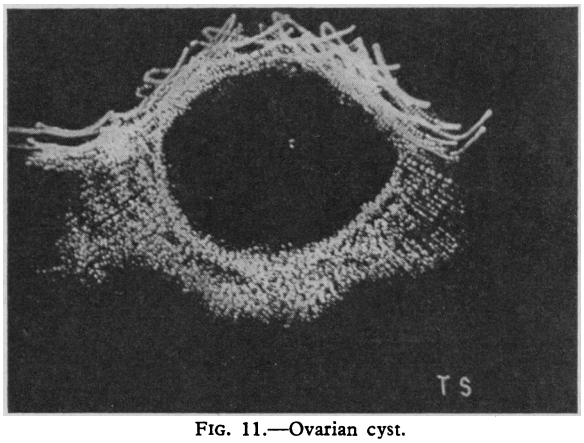

FIG. 11.—Ovarian cyst.

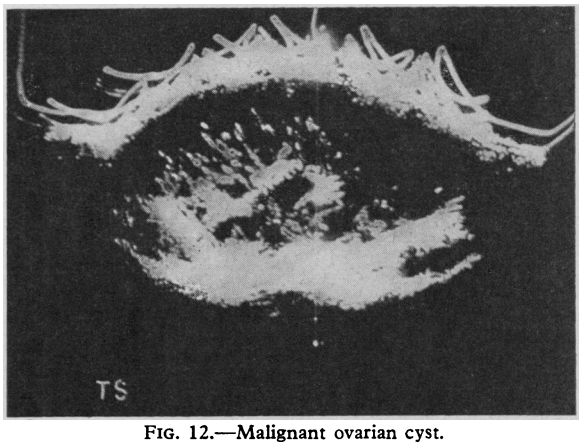

FIG. 12.—Malignant ovarian cyst.

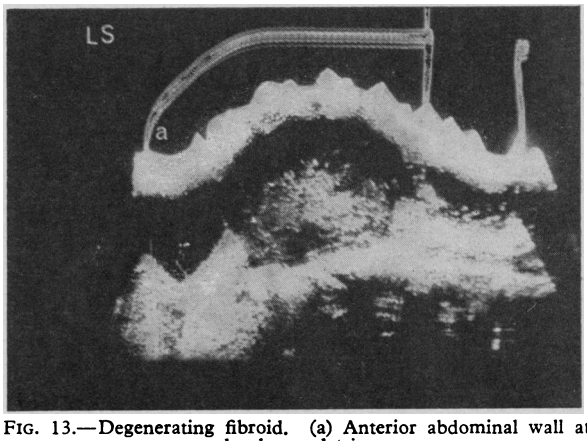

FIG. 13.—Degenerating fibroid. (a) Anterior abdominal wall at level symphysis.

HOSPITAL TOPICS

Ultrasonic Compound B-scanning as a Diagnostic Tool in Obstetrics and Gynaecology

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[WITH SPECIAL PLATE BETWEEN PAGES 82 AND 83]

Brit. med. J., 1968, 1, 112–113

Diagnostic ultrasound has placed a new method of investigation in the hand of the clinician, and it has found particular application in the field of obstetrics and gynaecology. The pregnant uterus and the relatively large structures often encountered in gynaecology are especially suitable for this type of study, and satisfactory results have been achieved more easily than with the head, the liver, and the kidneys. In view of this it is perhaps surprising that ultrasound is used as a clinical tool by very few centres.

During the past year a Diasonograph (Smith's Electronics Limited) has been in routine use at University College Hospital. It is the purpose of this paper to demonstrate the usefulness of this method of investigation so that other departments are encouraged to undertake similar work.

Principle

The name ultrasound is applied to sound waves of a frequency greater than 20,000 cycles per second. At these frequencies sound waves behave like light waves and can be directed as a beam. As with light they are reflected, refracted, and absorbed; but, unlike light, a medium is required for their transmission. Diagnostic ultrasound utilizes the reflected sound beam. The sound wave is reflected when it meets an interface with a material of a different specific acoustic impedance. This is the product of the density of the medium and the velocity of the sound in that medium. For scanning purposes pulsed ultrasound is used, the sound being generated and the echoes received by a ceramic crystal mounted in a probe. There is certain confusion at present in the names applied to the methods of displaying the reflected sound. Brown (1967) discusses this. A-scanning is the name given when the reflected wave is recorded as a vertical deflection on the horizontal time-base sweep of the cathode-ray tube. In B-scanning the echo is represented as a dot corresponding to the position of the echo, and the probe is moved in linear fashion along the surface, so that a cross-sectional representation of the subject results. By rocking the probe through an arc of 60 degrees as it progresses along the surface many more interfaces can be detected and a "compound sector scan" results. This is the most satisfactory form of scanning at present available for obstetrics and gynaecology. Only Donald's group in Glasgow (Donald *et al.*, 1958; MacVicar and Donald, 1963) and Taylor and Holmes's in Denver, Colorado (Taylor *et al.*, 1964), have developed satisfactory contact scanning systems for use in obstetrics and gynaecology. In these the probe is moved on the skin in a film of oil. Kossoff, in Australia (Garrett *et al.*, 1966), relies on a water-bath to obtain a satisfactory medium for the propagation of the sound wave. To place a bag of water on a recumbent patient, or to have a patient stand against such a bag, is cumbersome and inconvenient, and contact systems appear to be preferable for clinical use.

The great advantage of ultrasonic scanning is that neither mother nor foetus is exposed to harmful irradiation, and that repeated examination is therefore possible. Furthermore, one is able to distinguish soft-tissue interfaces; radiology can only do this occasionally.

In this country equipment similar to that initially developed by Donald and Brown (Brown, 1960; Sunden, 1964) is used at present. The picture is recorded with a Polaroid camera. A slave oscilloscope gives an approximate idea of the scan to be obtained, and it is our opinion that a storage oscilloscope would be a great improvement and would lead to considerable saving in film.

The interpretation of the picture requires experience, and, as in other diagnostic disciplines such as radiology, it is essential that the clinical history and the physical signs are known. A scan of the relevant sector can otherwise easily be omitted. It is of interest that the pictures from Glasgow have the left of the patient on the right of the picture, those from Denver are the reverse, and those from Australia are upside down.

The dangers of pulsed ultrasound have been extensively investigated, and in the range of powers used no ill-effects have been recorded in any criterion. Sunden (1964), Murray G. Smyth (1966), and Kohorn *et al.* (1967) discuss these aspects. N. C. Smyth (personal communication, 1967) has said that the physical effect of the sound produced is less than if the patient hits the side of the bath with a spoon.

Technique and Results

It is now well known that compound B-scanning is the method of choice in the diagnosis of hydatidiform mole. Fig. 1 (Special Plate) shows a molar pregnancy and demonstrates the multiple reflections obtained from the numerous vesicles at "high gain." These echoes disappear—the uterus empties—when less sound is put in (Special Plate, Fig. 2). It is, however, not the diagnosis of hydatidiform mole that is so useful as the exclusion of that diagnosis in a patient who presents with repeated bleeding in early pregnancy, particularly if the uterus is larger or smaller than dates. This is a common problem. The patient is best examined with a fairly full bladder so that the uterus in the pelvis can be visualized through the bladder. Longitudinal scans are taken, first in the midline and then at 1-cm. intervals on either side of the midline until foetal echoes are received. When searching for the foetus in early pregnancy this method has been found speedier and the pictures easier to interpret than transverse scans. After the 12th week of gestation the demonstration of a foetal head becomes a speedy and simple matter (Special Plate, Fig. 3). By the use of the Doptone (Smith Kline Instrument Company) the foetal heart may be demonstrated and the viability of the pregnancy is then confirmed. We have found the combination of the Doptone with compound B-scanning a particularly useful technique and have

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usually been able to confirm the presence of the foetal heart after the 10th week. In pregnancies before the 12th week of gestation visualization of the foetus is more difficult, but with experience foetal echoes can be obtained as early as the seventh week (Special Plate, Fig. 4).

In cases of pelvic tumour associated with pregnancy the demonstration of the cystic nature of the swelling and the presence of foetal echoes can be a useful preoperative investigation (Special Plate, Fig. 5).

In later pregnancy the growth of the foetus can be followed. The size of the foetal head gives an indication of the age of the foetus. The absence of echoes from the foetal head, particularly in patients with hydramnios, will suggest anencephaly.

Ultrasound may also be used in suspected multiple pregnancy. We have used transverse scans at 3-cm. intervals. Figs. 6 and 7 (Special Plate) show one foetal head in the pelvis and the second head beside the transverse section of the thorax. An oblique scan is then taken to confirm the diagnosis (Special Plate, Fig. 8).

Placental scanning we are finding more difficult. Though it is usually possible to identify the placenta, particularly if it is anterior (Special Plate, Fig. 9), it is not so easy to determine whether the lower segment is involved.

The application of compound B-scanning to gynaecology is more limited. Bonney's dictum that the nature of a pelvic tumour can be diagnosed only at laparotomy has not yet been superseded. It is frequently possible to identify a fibroid (Special Plate, Fig. 10) or an ovarian cyst (Special Plate, Fig. 11) and to know that an ovarian cyst has solid areas in it (Special Plate, Fig. 12). Malignant ascites also has a characteristic appearance. Difficulty may, however, arise when degeneration occurs in a fibroid, since it may then transmit sound and have the appearance of a partly solid ovarian cyst (Special Plate, Fig. 13).

Conclusion

Diagnostic ultrasound can be a useful means of investigation in obstetrics and gynaecology. In early pregnancy it is the only means of demonstrating the foetus at present available. In later pregnancy the use of ultrasound may allow a diagnosis to be made without the patient being exposed to harmful irradiation. It is suggested that this means of investigation should be available on a regional basis.

Summary

Following the pioneer work of Donald in Glasgow, diagnostic ultrasound has been used to aid clinical diagnosis in obstetrics and gynaecology at University College Hospital. Patients have also been referred from neighbouring departments, thus establishing a regional service. Ultrasound is the method of choice in the diagnosis of hydatidiform mole. It has been found particularly useful to exclude hydatidiform mole and to demonstrate a foetus in patients complaining of bleeding in early pregnancy. The conceptus can usually be visualized from the seventh week, and after 12 weeks the foetal head can be seen. In later pregnancy ultrasound may be used to follow the growth of the foetus, to diagnose twins, and to suggest anencephaly in patients with hydramnios. The method is safe for both mother and foetus. In gynaecology ultrasound helps to differentiate between solid and cystic tumours.

We would like to thank Dr. C. J. Hodson for allowing us to use the Diasonograph and all the gynaecologists from our own and other hospitals who have referred patients to us.

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CONFERENCES AND MEETINGS

Educational Technology for Continuing Medical Education: B.M.A. Symposium

[FROM A SPECIAL CORRESPONDENT]

The British Medical Association (with the aid of Smith, Kline and French Ltd.) held a conference at the University of Sussex on 3–5 January to mark the inauguration of its Department of Audio-Visual Communication.[1] Dr. T. A. QUILLIAM, Chairman of the B.M.A. Film Committee, presided, and the guest of honour at the dinner was Sir BRYNMOR JONES, Vice-Chancellor of Hull University.

Background of Communication

Mr. M. W. MALIM, of the Life Offices' Association, said that man had faculties for communication which had been limited by early mechanical aids. Printing, although it provided a permanent record, forfeited intonation and gesture, and words lost their precision, especially when describing abstract concepts. Television returned to the classic formula of pictures and the spoken word, but at least in commercial advertising it was necessary to add words as ideograms (pictures) to secure memorability. The successful use of audiovisual techniques called for a combination of artistry and orchestration in order that the various facilities were used in the correct proportions.

Mr. F. M. SUTHERLAND (Librarian, B.M.A. Nuffield Library) said that growth and spread of scientific knowledge went hand in hand with developments in printing and publishing. The present explosion in science rendered traditional forms of communication inadequate, and people could no longer keep up with the literature. Various solutions had been suggested, such as MEDLARS, which itemized a quarter of a million articles a year by computer, but responsibility lay firmly with the reader. If medical students were taught proper appreciation of the literature there might be consumer demand for change. A plea for increased standards of comprehension among practising doctors was made in discussion by Professor C. C. BOOTH (Royal Postgraduate Medical School, London), who deplored the current pressures on research workers to write papers.

Dr. E. S. CLARKE (Wellcome Historical Medical Library, London) said that early medical art had been symbolic or conceptual, with little resort to first-hand observation. It was not until the introduction of perspective and proportion in the Renaissance, together with a renewed interest in anatomy, that art