Results

This technique was attempted in 31 patients but failed in 11. In five failure occurred because the needle could not be placed accurately at the start of the procedure, most difficulty being experienced with a particularly high kidney lying under cover of the lower rib cage. These patients were in hospital for only one day; they returned later for a conventional operation. In six patients, despite the establishment of a nephrostomy track, the stone could not be removed. In four the stones were so embedded in the mucosa that they could not be dislodged with the stone-retrieving baskets initially available. These were all early cases, and we think that now, with further experience and our present equipment, such stones could be secured. In one of the two remaining cases the nephrostomy track was slightly circuitous and did not permit a straight endoscopic approach to the stone, while in the other a small perforation was made in the renal pelvis with the stone-grasping forceps and we thought it wise to abandon the procedure for fear of extravasation of the irrigating fluid. In all six patients the stones were removed conventionally at the same operative session as the attempted extraction.

Of the remaining 20 patients, all had their stones removed satisfactorily percutaneously.

Discussion

Obviously, removing small stones from the intrarenal collecting system in the manner described has considerable advantages over the conventional operation and is far less traumatic. Not only is long-term admission to hospital unnecessary but the morbidity of the whole procedure is small compared with that inflicted by the conventional loin incision.

So far we have used this method only for stones that are free within the renal pelvis or in major calices. With a flexible nephroscope that is being developed we should be able to extend our activities to the peripheral calices. It will be possible to turn the tip of this nephroscope through 130° and to negotiate the caliceal neck.

With more recent experience we are convinced that the failure to secure the stones down the established track in six cases would not have occurred with the newer instruments now available. In fact, only one failure has occurred in our last 16 patients.

Larger stones also present problems but with a new ultrasonic stone disintegrator (Messrs Richard Wolf Ltd), which may be passed down a pre-established nephrostomy track, the stone may be shattered and the fragments removed percutaneously. This method was satisfactorily performed in one of our patients, and we intend to use this new instrument extensively.

We are convinced that this form of endoscopic manipulation of intrarenal calculi will rapidly become established as the expected norm for the removal of most renal calculi and that the considerably more traumatic access operation presently used will become obsolete.

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Accuracy of early estimation of maturity at a district general hospital

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Abstract

The accuracy of routine sonar scanning of patients attending the antenatal clinic of a general hospital before the 19th week of pregnancy was calculated and compared with the potential accuracy of the techniques used. Out of 200 patients who went into labour spontaneously, 164 delivered within nine days of the sonar prediction, and 152 delivered within nine days of the date estimated from the menstrual history. The discrepancy between the mean of the expected date of delivery from the sonar examination and that derived from the menstrual history was 2.24 days. When the two estimations differed by a week or more the sonar estimation was more accurate, and all 44 patients in this group delivered by the sixth day after the sonar prediction.

These findings emphasise the need for those providing a similar service to review the accuracy of their own work.

Introduction

A sonar scan during the first half of pregnancy is an established feature of modern obstetric practice.¹ Though an early scan allows an opportunity to identify such problems as multiple or blighted pregnancy and adnexal mass, the primary objective of the "booking" scan is to estimate maturity. This information may be needed to interpret biochemical data and improve management of the later stages of pregnancy.

Gestational age may be calculated by measuring the crown-rump length of the fetus in the first trimester or the biparietal diameter later.²⁻⁵ The proved accuracy of these methods, however, may not always be reflected in the results obtained from the busy sonar room of a general hospital.

After a trial of maternal α -fetoprotein screening in King's Lynn⁶ the quality of obstetric sonar scanning was reviewed. While the estimation of fetal maturity was of considerable value, the accuracy was less than had been expected.

Patients and methods

A retrospective survey was carried out on two groups of consecutive patients, all of whom were delivered of a single live baby after going into labour spontaneously; were sure of the date of their last menstrual period, and had been examined by sonar before their 19th week of pregnancy as estimated by sonar examination. Two hundred patients were reviewed. One group of 98 patients had been examined with a

Nuclear Enterprises Disonograph NE 4102B B-scanner (group 1) and the other 102 patients with a Unirad EDP 1000 B-scanner (group 2) by one of two trained and experienced radiographers. Neither sonographer had been aware that a retrospective survey was to be undertaken.

Those patients presenting early enough had been examined by the method of Robinson and Fleming using the crown-rump length.² Measurements were made on the NE 4102B machine from the bistable oscilloscope display of the B-scan using the marker dots and on the EDP 1000 from the B-scan video display using omnidirectional markers. Gestational age of the remainder had been determined from the biparietal diameter.^{4,7} Measurements were made on the NE 4102B from the A-scan but on the EDP 1000 they had to be

group 2 the date of birth occurred between 36 days before and 12 days after the sonar estimation (mean -2.25). Because there was no significant difference in the results between the two groups ($t=1.42$; $0.2 > p > 0.1$) they were combined for comparison with the expected delivery date calculated from the last menstrual period.

Comparison of discrepancy between actual date of birth and dates predicted from sonar scan and time of last menstrual period (fig 2)—The actual date of birth occurred from 36 days before to 12 days after the date derived from the sonar estimation (mean -3.09), and between 34 days before and 31 days after the estimation derived from the time of the last menstrual period (mean -0.85). Estimating the date of birth from the sonar measurements proved significantly more

FIG 1—Discrepancies in each group between delivery dates predicted from sonar scans and actual dates of birth. (Discrepancies recorded in days: births before expected date recorded as negative values; those later than expected date recorded as positive values.)

taken from the B-scan video display. Both machines were calibrated to 1540 m/s and the conversion tables modified accordingly, and a 3.5 or 5.0 MHz medium focus probe was used. The operator was aware of the date of the last menstrual period at the time of examination.

The following data were recorded: date of the first day of the last menstrual period, from which was derived an expected date of birth; estimated maturity by sonar scanning, from which was calculated an expected date of birth; actual date of birth; and weight of the infant. The discrepancy between the expected date of birth as estimated from the sonar scan and the date of the last menstrual period and the actual date of birth was calculated in days and recorded as negative if the birth was before the expected date and positive if after the expected date.

Results

Comparison of discrepancy between delivery date predicted from sonar scan and actual date of birth in each group (fig 1)—In group 1 the actual date of birth occurred from 29 days before to 11 days after the expected delivery date calculated by sonar (mean -3.96). In

FIG 2—Discrepancies in groups 1 and 2 combined between actual dates of birth and dates predicted from times of last menstrual period and from sonar scans. (Discrepancies recorded in days: births before expected date recorded as negative values; those later than expected date recorded as positive values.)

accurate than relying on the patient's menstrual history ($t=2.52$; $p<0.02$). This difference was due mainly to patients who had overestimated the duration of pregnancy by one menstrual cycle. In such patients there would be an appreciable disagreement between the expected delivery date calculated by sonar and by last menstrual period. We therefore compared the accuracy of the two methods of estimating the date of delivery in those patients in whom there was such a discrepancy.

Comparison of discrepancy between actual date of birth and dates predicted from sonar scan and time of last menstrual period when such discrepancy exceeded seven days or more (fig 3)—There were 44 patients in this group. The actual date of birth occurred from 28 days before to six days after the expected delivery date calculated by sonar (mean -4.73) and between 21 days before and 31 days after that calculated from the time of the last menstrual period (mean $+2.64$). Analysis showed that when there was a difference of a week or more between the two estimates the sonar estimation was much more accurate ($t=3.38$; $p<0.01$). Most of the errors in the sonar estimations in this group were due to premature onset of labour. The mean birth weight of those born more than nine days before the date predicted by sonar was 2870 g compared with 3460 g for the remainder.

Discussion

By measuring the crown-rump length between the sixth and 14th week of menstrual age, Robinson and Fleming showed that fetal maturity could be estimated to within 4.7 days with a 95% probability.² Drumm used the same technique on 220 patients with a reliable menstrual history and found that 187 (85%) delivered within eight days and 205 (93%) within 10 days of the sonar estimation of the delivery date.³

Campbell concluded that measurements of fetal biparietal diameter obtained from the 20th to the 30th week of pregnancy could be used to estimate the correct duration of gestation to within nine days in 95% of cases.⁴ Davison *et al*, however, emphasised several potential sources of error in these techniques.⁸ Coles *et al*, who measured biparietal diameter at between 15 and 20 weeks, found that the duration of gestation could be derived to within 10.3 days in 95% of patients.⁹ Roberts *et al* evaluated the precision of sonar estimations of maturity by biparietal diameter in the first half of pregnancy and found that 68.6% delivered within seven days and 89.8% within 14 days of the estimate.¹⁰

FIG 3—Discrepancies between actual dates of birth and dates predicted from time of last menstrual period and from sonar scans in 44 patients from groups 1 and 2 combined in whom such discrepancy exceeded seven days or more. (Discrepancies recorded in days: births before expected date recorded as negative values; those later than expected date recorded as positive values.)

In our series of 200 patients only 164 delivered within nine days of the date predicted by sonar. Most of the errors occurred when the sonar estimation of fetal maturity at the time of examination was around 15 weeks (table I). By this time the measurement of crown-rump length had become less accurate because of fetal movement and reliance was placed on the biparietal diameter. The fetal head is visible about 12 weeks after conception (14 weeks after the last menstrual period), and the biparietal diameter may be measured with difficulty, but for reliable dating Sanders and Conrad recommend waiting until 17 weeks.¹¹

Although 152 of our patients delivered within nine days of the date calculated from the time of the last menstrual period compared with 164 who delivered within nine days of the date predicted by sonar, the estimation derived from the time of the last menstrual period was less accurate when the two estimates showed a discrepancy of a week or more (table II).

TABLE II—Prediction of date of delivery in patients in whom expected date estimated from time of last menstrual period and by sonar differed by seven days or more

Method of assessment of maturity	Prediction correct within nine days	Prediction incorrect beyond nine days	Total
Sonar	36 (82%)	8 (18%)	44
Last menstrual period	25 (57%)	19 (43%)	44

All 44 patients in this group had delivered by the sixth day after the date estimated by sonar while only 29 (66%) had delivered by the sixth day after the date calculated from the time of the last menstrual period (fig 3). Hence if there is a discrepancy of a week or more between two estimations, that obtained from the sonar scan should be used for the patient's management, though it is prudent to perform a second confirmatory scan early in the second half of the pregnancy.

Our results may have been affected by the selection of patients; among those who were sure of their dates were some whose cycles were irregular. Also some patients may have been excluded because the sonar scan indicated a maturity beyond the true gestation, and they were induced when apparently post mature. The mean delivery date predicted by sonar, however, was only 2.24 days less than that predicted from the date of the last menstrual period. The comparable figure from Roberts *et al*,¹⁰ who measured biparietal diameter after 15 weeks, was about half a week. Coles *et al*⁹ pointed out that the tables of biparietal diameter of Campbell and Newman⁷ had been derived from patients grouped according to the number of completed weeks of gestation and that the date of delivery predicted by sonar may be 3.5 days less than that predicted from the last menstrual period. After correcting for this they found a mean difference between the two methods of less than a day.

To minimise error in estimating gestational age, adequately trained staff should work in reasonable conditions with well designed, constructed, and maintained equipment and use carefully the correct conversion chart. Interestingly we found no significant difference in results between the two scanners. Perhaps the advantages of the newer EDP 1000 unit were

TABLE I—Accuracy of sonar prediction at various gestational ages

	Sonar maturity (weeks) at time of examination												All
	7	8	9	10	11	12	13	14	15	16	17	18	
No of patients	1	2	7	14	28	15	31	41	22	25	7	7	200
No (%) delivered within nine days of date predicted by sonar	1 (100)	2 (100)	7 (100)	13 (93)	25 (89)	15 (100)	25 (81)	33 (80)	15 (68)	18 (72)	4 (57)	6 (86)	164 (82)

balanced by the absence of A-scan delay and calipers. The practical implications of the high-resolution real-time scanners remain to be ascertained in comparable conditions.

Though our results are rather disappointing, they may not be unrepresentative of results obtained in routine scanning of patients attending the booking clinics of many general hospitals. If more accurate and reliable dating is to be obtained, it is desirable to obtain a first scan before the 12th week of menstrual age. Other hospitals undertaking similar work may be advised to review the accuracy of their own sonar estimations of gestational age.

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SHORT REPORTS

Plasmapheresis and a placebo procedure in autoerythrocyte sensitisation

Autoerythrocyte sensitisation was described in 1955 by Gardner and Diamond,¹ who concluded that the accompanying purpura was immunological in origin, the result of auto-sensitisation to erythrocyte stroma. Eighty-nine cases have since been reported, and the subject has recently been authoritatively reviewed by Ratnoff.² We report a case showing some of the features typical of this disease; the patient derived considerable symptomatic benefit from plasmapheresis, while sham apheresis was unsuccessful. This finding may be relevant in the pathogenesis of the disease.

Case report

A 36-year-old woman presented in 1974 with a one-year history of recurrent large and painful spontaneous bruises that appeared on her arms, legs, fingers, and, occasionally, abdomen. They started as small, painful, black lumps, which spread over an area 10-20 cm in diameter and then faded over three to four days through a brown colour, sometimes leaving a residual small lump in the centre of the bruise. Apart from bruises she complained

of a wide range of symptoms including anorexia, lunchtime retching, heart-burn, constipation, diarrhoea, dysuria, frequency of micturition, and vaginal discharge. The table shows her full medical history and the reported incidence of each symptom in autoerythrocyte sensitisation.

On examination she had two bruises 15 cm in diameter over each upper arm but no other abnormal physical signs. A wide range of investigations gave normal or negative results. These included a full blood count, erythrocyte sedimentation rate, platelet count, clotting screen, urea and electrolyte concentrations, liver function tests, autoimmune screen, direct antiglobulin test, chest radiography, electrocardiography, faecal occult bloods, serological test for syphilis, urinary 5-hydroxyindoleacetic acid, cryoglobulins, and cold agglutinins. On three occasions slightly low concentrations of C3 (71.5 mg/100 ml, 54 mg/100 ml, and 74 mg/100 ml; normal range 81-150 mg/100 ml) and immune complexes of IgG class (5.2 µg/ml; normal 5 µg/ml) were detected. Barium meal, gastroscopy, sigmoidoscopy, and barium enema were normal.

Washed red-cell stroma 0.1 ml injected intradermally into the patient's back reproduced the bruises, but injections of her plasma or physiological saline did not. Autoerythrocyte sensitisation was diagnosed and vitamin C given as a placebo. She failed to attend several outpatient follow-ups and did not return until February 1978, when the bruises had begun to reappear.

Two litres of plasma were exchanged for 1.2 litres of plasma protein fraction using the Haemonetics 30 Celltrifuge. She showed an appreciable symptomatic improvement: bruises that were appearing every two days stopped but returned three weeks later. She therefore underwent plasma exchange every two weeks from May to August 1978. She defaulted from follow-up but was apparently free of bruises until June 1980, when she reappeared with the same symptoms as at presentation. Three further plasma exchanges produced the same response as before.

In May 1981 she returned with further bruises and was given sham apheresis using the IBM 2997 continuous flow cell separator, with which she was totally unfamiliar. Centrifuged red cells taken through the machine were combined with her plasma before being returned to her bloodstream. Meanwhile, the plasma protein fraction was dripped through a tangle of tubes into the collecting bag. She presented the next day with fresh large painful bruises. A week later authentic plasma exchange left her with relief lasting three weeks. We therefore concluded that sham apheresis was ineffective in controlling her symptoms, but authentic plasma exchange produced a considerable improvement in her symptoms on all occasions.

Comment

The pathogenesis of autoerythrocyte sensitisation is unknown. Many workers have suggested that the bruises are self-inflicted. Indeed, psychiatric disturbances are almost universal and dominate the clinical picture. The test of injecting red-cell stroma intradermally is positive only in 60% of patients. Other patients have developed the lesions when phosphatidylserine, histamine, histidine, tyramine, serotonin, tryptophan, trypsin, old tuberculin, autologous serum, platelets, and pregnanetriol were injected intradermally. Immune

Medical history of patient and reported incidence of each symptom in autoerythrocyte sensitisation

Age (years)	Diagnosis	Treatment	Reported incidence of symptoms (%)
4	Asthma	Various inhalers	10
22	Pregnancy	Caesarean section	
	Hyperemesis		
	Postnatal depression		62
24	Pregnancy	Caesarean section	
	Postnatal depression		
26	Backache	Symptomatic treatment	32
28	Recurrent sore throats	Tonsillectomy	
31	Overdose of quinalbarbitone sodium (Tuinal)	Symptomatic treatment	15
32	Abdominal pain	Normal appendix removed	50
33	Constipation	Symptomatic treatment	59
33	Menorrhagia	Hysterectomy	48
		Normal uterus and tubes	
36	Transient paraesthesiae	No treatment	66
38	Dysphagia	Investigation only	12
40	Diarrhoea	Investigation only	41
	Bleeding per rectum		65