Place of ultrasound and radiography in obstetrics

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Summary and conclusions

In the two years after an ultrasound service was introduced at this hospital obstetric referrals for abdominal radiography decreased by over 55%. Most of these were for estimation of fetal maturity. Out of 349 such patients subjected to radiography in 1976, 176 had already been examined by ultrasound; in only four did radiography appear to influence management.

We believe that if a satisfactory ultrasound scan is obtained before 30 weeks of gestation subsequent radiological estimation of fetal maturity is unjustified. Radiography may still be necessary, however, for diagnosing fetal abnormalities.

Introduction

Although diagnostic doses of radiation to the fetus have been greatly reduced over the past two decades, particularly since the introduction of rare-earth screens,¹⁻³ a small but significant risk to the fetus remains.^{4,5} The introduction of an ultrasound service would presumably reduce the number of requests for x-ray examinations, which are usually made to determine fetal maturity. We have observed such a change in our department.

The trend for high induction rates increases the need to know gestational age, and thus an increased demand for pre-delivery radiography might be expected. The use of amniocentesis for measuring the lecithin:sphingomyelin ratio, however, may have moderated or prevented this increase. It is generally accepted that an adequate ultrasonic measurement of the fetal biparietal diameter before 30 weeks' gestation permits calculation of the gestational age to an accuracy of within 8.4 days in 95% of patients.⁶ We therefore compared the results obtained in our unit with patients who had had both x-ray and early ultrasound examinations to determine whether the x-ray findings had contributed to their management.

Patients and methods

All patients were referred from the maternity department of this hospital. Radiography was performed in the hospital x-ray department, and ultrasound scans were carried out in the ultrasound section of the Clinical Research Centre, housed in the same building. The obstetric unit was opened in 1972 and the ultrasound section in late 1974. We ascertained the numbers of deliveries, requests for obstetric x-ray examinations (excluding pelvimetry), and obstetric ultrasound examinations that had been carried out during 1974-6. We then determined the proportion of mothers x-rayed each year, the indications for x-ray examination, and the influence of each examination on patient management.

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Results and comment

The table shows the increase in deliveries during the three years.

Numbers of deliveries and obstetric x-ray and ultrasound examinations carried out during 1974-6. Multiple ultrasound examinations carried out in some cases

Year:	1974	1975	1976
No of deliveries in each year	2592	2639	2913
No (%) of mothers subjected to radiography	689 (26.6)	473 (17.9)	349 (12.0)
No of ultrasound scans performed	69	1689	3434

The coincident fall in requests for x-ray examinations mirrored the increase in the number of ultrasound scans carried out and resulted in the rate of x-ray examinations falling from 26.6% of pregnancies in 1974 to 12.0% in 1976. Both these rates are within the range found by Carmichael and Berry⁷ in a review of British obstetric radiology practice. Many patients had multiple ultrasound examinations: the 3434 scans carried out in 1976 were performed on half of the patients delivered that year.

In 1976, 349 pregnant women were x-rayed; 176 (50.4%) had had one or more previous ultrasound scans. Although scans were performed for various reasons, a measurement of biparietal diameter was attempted in all cases and was successful in 173 (98%). In 20 of these cases the patients were first scanned after 30 weeks' gestation, and a satisfactory estimate of maturity was therefore obtained in 153. An estimate of maturity was made from the radiograph in 152 cases (86%) but was based on visualisation of the epiphyses in less than 70%.

Among the 176 patients who had both ultrasound and x-ray examinations during 1976 the reasons for x-ray examination were estimation of fetal maturity (130 cases), detection of any fetal abnormality (33), known twins (11), and determination of fetal position (2). Of the 130 who were x-rayed to determine fetal maturity, 123 had an ultrasound scan before 30 weeks, which had satisfactorily determined gestational age. The estimate of gestational age by both techniques agreed to within less than two weeks in 83 patients (67.5%). There was disagreement by more than two weeks in the remaining 40 patients (32.5%), who were studied further to determine which estimate had been accepted by the referring clinician. Case notes were available on only 33 of these patients. We found that the clinicians had regarded as incorrect or ignored the results of ultrasound scans in four cases, of x-ray examinations in 23, and of both examinations in six. Of the four patients whose ultrasound scans were ignored, three delivered spontaneously at 42-43 weeks' gestation as determined by ultrasound; all were at term according to the radiograph. One patient was induced six days after term by dates—that is, 39 weeks by x-ray and 37 weeks by ultrasound examinations. A 4000 g infant was delivered. Of the 23 patients whose x-ray findings were ignored, 15 were delivered electively, 13 within one week either side of the date of delivery estimated with ultrasound. The other eight delivered spontaneously, five within one week of the estimated date of delivery.

Discussion

Owing to the wide use of oral contraceptives the proportion of patients with uncertain or incorrect dates of their last menstrual period is increasing. At the same time the number of patients in whom labour is induced near term is increasing for various reasons. The induction rate in our maternity unit was close to 30% during the study period. Before induction is performed it is advisable to review gestational age, confirming it if necessary. Many other clinical conditions also require action that must be related to knowledge of the gestational age. An ultrasound measurement of crown-rump length before 12 weeks or of

biparietal diameter between 12 and 30 weeks indicates maturity to within acceptable limits.⁶⁻⁸ Most clinical decisions concerning delivery must be made after 30 weeks, however, and if an ultrasound scan has not been performed then x-ray examination or amniocentesis is clearly justified. If results of a previous scan are available then the case for performing an x-ray examination is weaker.

The appreciable reduction in the proportion of patients x-rayed since the ultrasound service was introduced at our centre is probably at least partly attributable to the clinical acceptance of ultrasound measurements. The use of the lecithin: sphingomyelin ratio in assessing fetal lung maturity may also have contributed, but this necessitates amniocentesis, which is associated with appreciable morbidity⁹⁻¹² and mortality, Goodlin and Clewell having reported sudden fetal death and Kirshen and Benirschke fetal exsanguination after amniocentesis.^{13 14} In our series one fetal death occurred and two emergency caesarean sections were carried out for fetal distress immediately after amniocentesis to determine the lecithin: sphingomyelin ratio. All three patients had had anterior placentas detected by ultrasound, and the amniocenteses were not performed under ultrasound control. The most common reason for requesting x-ray examination was to estimate maturity, and in our series these estimates agreed with previous ultrasound estimates to within less than two weeks in two-thirds of cases. In the one-third in which there was disagreement the ultrasound measurements were relied on far more heavily than the estimates obtained by radiography. Of the 130 cases in which both examinations were carried out, in only four were the x-ray findings accorded greater clinical value. In three of these reliance on the ultrasound findings would have indicated induction about one week before spontaneous labour occurred and been unlikely to influence fetal outcome. We therefore think that a satisfactory ultrasonic measurement before 30 weeks' gestation—that is, a BPD less than 80 mm—obviates the need for subsequent estimation of maturity by x-ray examination.

If ultrasound is available x-ray examination is not justifiable for diagnosing twins or fetal position but is probably still justifiable for diagnosing fetal abnormalities. This and the value of routine radiography of twins, however, are the subjects of separate studies.

Routine ultrasound examination in early pregnancy already permits the diagnosis of twins, anencephaly, spina bifida, hydatidiform mole, etc. If a reduction in the exposure to x-rays of mother and fetus is considered to be an end in itself, perhaps this is a further indication for ultrasonic screening of all early pregnancies.

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High-density and low-density lipoproteins and prevalence of vascular disease in diabetes mellitus

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Summary and conclusions

The prevalence of vascular disease among 154 diabetic patients was analysed in relation to the serum concentrations of individual lipoproteins. Overall the presence of vascular disease (59 cases) was positively associated with serum cholesterol and low-density-lipoprotein cholesterol but negatively associated with high-density-

lipoprotein (HDL) cholesterol. The negative relation between HDL and vascular disease was not observed in all subgroups of diabetics. We conclude that there may be no overriding association between HDL and vascular disease in diabetics as proposed for some non-diabetic populations.

Introduction

Recent studies have suggested that high-density lipoprotein (HDL) may protect against coronary artery disease. Thus population surveys have shown inverse relations, independent of other risk factors, between HDL-cholesterol concentrations and the prevalence of coronary artery disease.¹⁻⁵ Furthermore, patients with ischaemic heart disease have significantly lower concentrations of HDL in serum than healthy people.⁶⁻¹⁰ Glomset¹¹ postulated that HDL exerts its protective effect by promoting cholesterol efflux from the arterial wall. Some support for this was provided when the apoproteins of HDL were found to enhance the efflux of cholesterol from aortic smooth-muscle cells in tissue culture.¹² Another possibility is

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