

ULTRASONIC MEASUREMENTS OF CHINESE FETAL ABDOMINAL AREAS IN THE THIRD TRIMESTER OF PREGNANCY

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SYNOPSIS

316 ultrasonic measurements were made on Chinese fetuses in utero between 27 and 39 weeks of gestation. Only Chinese patients with uncomplicated pregnancies and certain dates were selected. From these, the normal growth pattern of the fetal abdominal areas was plotted.

The use of this chart in the diagnosis of fetal growth retardation is discussed.

INTRODUCTION

Intrauterine growth retardation is an important clinical condition which is not readily detectable by simple abdominal palpation and assessment of fundal height and girth. Ultrasonic scans provide accurate biometric measurements of the fetus thereby allowing early detection of the problem. Of the various available parameters, the fetal abdominal area and circumference appear to be the most reliable single indices.

MATERIALS AND METHODS

The machine used was a Roche Superscan 50 Real-Time Linear Array Scanner with a 3.5 MHz transducer. This had a built in area measurement microprocessor which enabled direct area measurements to be made off the monitor screen without requiring photography or external calipers. The area programme was factory set and not adjustable.

The system velocity was set at 1600 m/sec and the caliper velocity (for thoracic and bi-parietal diameter measurements) at 1540 m/sec.

All the patients were Chinese women married to Chinese men. They were all booked between 6 to 10 weeks of gestation and their menstrual cycles were regular, with no oral contraceptive usage within the last three months. At the time of booking, all had clinical findings consistent with the period of gestation.

The technique of scanning followed that of Campbell(1) for the fetal abdominal circumference. The landmarks were the umbilical vein and the fetal stomach. At the correct level, the "frame-freeze" pedal was activated and the fetal abdominal area was directly measured off the monitor screen.

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With this machine it was possible to also measure the "Transverse Thoracic Diameter" and compare it with a built in standard based on Hansmann's chart(2). This is shown in Figs. 1, 2 and 3. Fig. 1 shows an area measurement taken at 22 weeks. The T.H.D. corresponds to the period of gestation. Fig. 2 shows an area measurement taken at 30 weeks with the corresponding T.H.D. consistent for the dates. Fig. 3 shows a case of "wrong dates" where there is a discrepancy between the area and the T.H.D.

In all the above it is the transverse thoracic diameter that is measured. The Germans distinguish between the transverse and sagittal thoracic diameters (Transversaler Rumpfdurchmesser and Sagittaler) and have compiled different normograms for these.

In making the measurements, care was taken to avoid the "Salami" effect (3), so that proper readings were obtained.

Some patients had two or three measurements taken at various gestation periods. The total number of patients was 162.

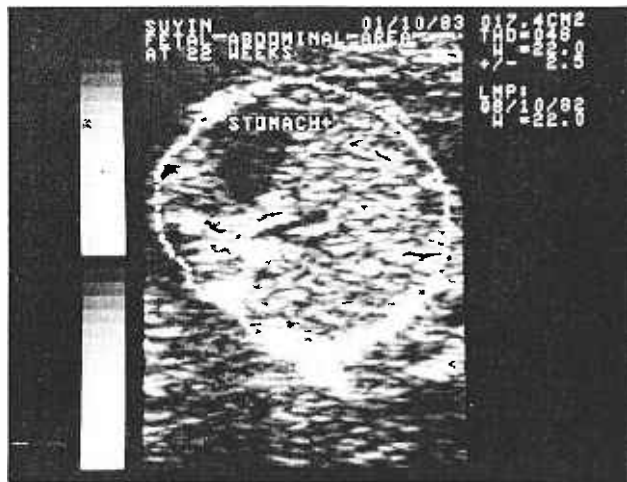


FIG. 1 ABDOMINAL AREA at 22 WEEKS. NOTE PROMINENT STOMACH OUTLINE.

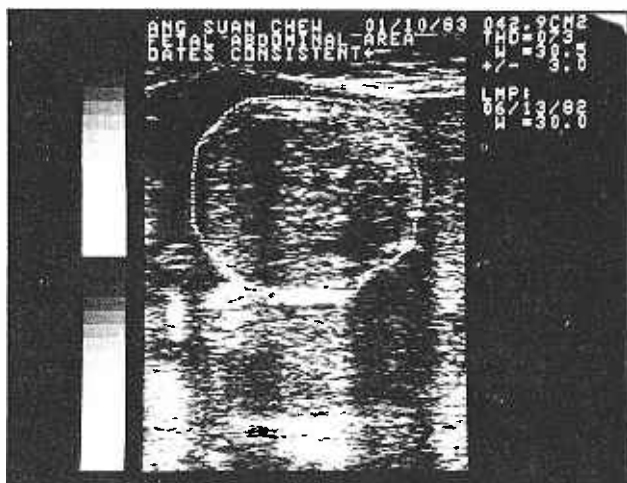


FIG. 2 ABDOMINAL AREA AT 30 WEEKS. DATES CONSISTENT.

RESULTS

The results are tabulated in Table 1.

There is an almost linear increase until 34 weeks when growth slows down. The small number of patients at the end of due to the fact that many delivered before measurements could be made.

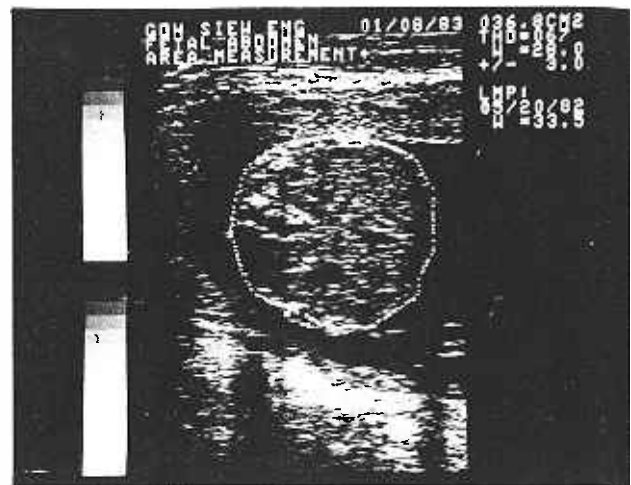


FIG. 3 ABDOMINAL AREA AT 33 WEEKS. WRONG DATES.

TABLE 1: FETAL ABDOMINAL AREA IN RELATION TO GESTATION

GESTATION (WEEKS)	n	MEAN	S.D.
27	25	34.4	3.5
28	24	37.7	3.2
29	22	42.7	4.4
30	30	47.4	4.7
31	30	51.5	5.4
32	30	55.9	5.7
33	25	58.8	5.8
34	28	61.2	4.8
35	27	64.2	5.3
36	28	66	7.3
37	22	68.8	5.8
38	15	71.6	5.6
39	10	72.4	7.5

DISCUSSION

Whether or not a fetus is growth retarded is of great concern to the obstetrician. Routine abdominal palpation can only detect 30% of cases of small for dates fetuses (4).

A suitable screening technique using a single measurement of the abdominal circumference was proposed by Campbell (1). The measurements were taken off Polaroid photographs using a map measurer. This increases the cost, and requires careful adjustment and compensation for any scale-factor errors.

With many modern Real-Time Scanners, area measurements can be made off the screen. In some machines, both area and circumference (also called "perimeter") can be measured.

Recently, it has been shown that area measurements are better correlated with fetal birthweight than circumference measurement (5 & 6)

It became recently obvious that a generalised standard for all fetuses was not universally applicable. Average birthweights vary with race, e.g.:-

- Russian Eskimoes 3481 gm.
- Chinese 3180 gm.(7)
- Ceylonese 2500 gm.(8)

For meaningful assessment, each ethnic group should therefore have its own normal growth chart.

Low birthweight infants have been divided into premature (short gestational period) and dysmature or "preterm" and "small for gestational age" infants. With wider use of ultrasound scanning and earlier antenatal booking, it would be possible to ascertain gestations ac-

curately by Crown Rump Length measurements or Biparietal Measurements (before 20 weeks). A second routine scan at between 32-35 weeks for the fetal abdominal area would pick out the small babies for intensive follow up and monitoring.

In a small series of complicated Chinese pregnancies, it was found that an abdominal area of over 60 square centimetres was associated with an infant at delivery of over 2500 gm. (Chew, unpublished data). It would appear that if other obstetric indications require urgent delivery, it may be considered once this level is reached. Further research is necessary to substantiate this.

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