Original Article

Manual Measurement Compared With Ultrasonographically Measured Fetal Liver Length

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ABSTRACT

Objective: To assess the reliability of sonographic measurement of liver length by comparing the measurement of fetal liver length obtained by ultrasonography with that obtained by manual measurement.
Material and Methods: 30 fetuses of 18 to 30 weeks of gestation diagnosed as cases of inevitable abortion were selected at the antenatal clinics. Liver length was measured sonographically and after abortion the fetuses were collected and their livers were dissected out for measurement of liver length. Both the sonographic and manually measured readings of liver length were compared.
Results: Insignificant difference was found between the manually measured fetal liver length and that measured sonographically at each gestational week of pregnancy.
Conclusion: Sonographically measured fetal liver length is accurate and can be used for monitoring fetal well being.
Keywords: Fetal liver length, Sonographic, manual measurements.

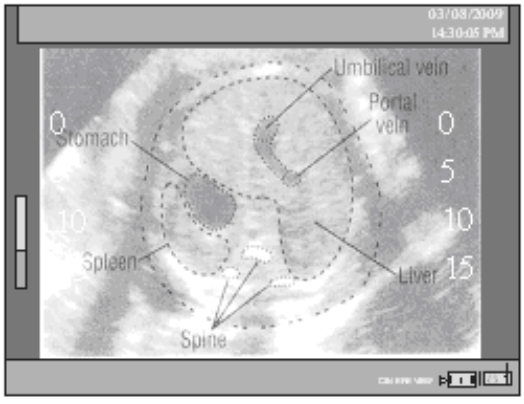
INTRODUCTION

Fetal biometry has been measured sonographically for the last four decades. The use of these measurements are crucial in modern practice of obstetrics for ascertaining the age of fetus, evaluation of fetal growth, the detection of congenital malformation, etc. Fetal abdominal circumference measurements are more predictive of fetal intrauterine growth retardation[1]. Fetal abdominal circumference is mainly affected by fetal liver size. Direct measurements of fetal liver size may help in the early detection of the fetus at risk of growth retardation. Many efforts have been made to assess fetal liver dimensions directly. Measurements of liver length have been performed in normal pregnancies[2] and in pregnancies complicated by abnormal fetal growth[3,4]. A linear relationship between fetal liver length and abdominal circumference has been established[2]. Fetal liver volume measurements by echo-planar magnetic resonance imaging (MRI) have been reported[4]. It was suggested that the measurement of fetal liver volume has the potential to contribute to early assessment of fetal growth[4]. Three-dimensional ultrasonography has been proposed for accurate determination of fetal organ volume[5]. The studies related to fetal liver measurements through sonography are widely available in medical literature [2,3,4,5,6,7] but no single study has been conducted on manual measurements of fetal liver. The present study was undertaken with an objective to compare the measurement of fetal liver length through sonography with manual procedures.

MATERIAL AND METHODS

Thirty (30) fetuses between 18 to 30 weeks of gestation diagnosed as cases of inevitable abortion at the antenatal clinics of Hayatabad Medical Complex and Hamza Surgical Hospital Peshawar were included in the study. Fetal liver length was measured ultrasonigraphically before abortion and then manual measurement of the fetal liver was done after dissecting the liver from the aborted fetuses.

Method of liver measurement through sonography: The liver fills the upper portion of fetal abdomen. It is homogenous in echogenecity. The fetal liver length was measured from the dome of right hemi-diaphragm to the caudal tip of right lobe. This was the long axis measurement. It was measured in millimeters. The recommended technique is first to identify the abdominal aorta in long axis and then move the transducer toward the right side of the fetus, the caudal tip of right lobe can usually be seen. Ordinarily the liver is visualized by transverse scan[7].



Ultrasonographic Measurement of Fetal Liver at 21 weeks of gestation

Method of manual measurement of liver: The liver was dissected out of the abdominal cavity. The liver length was measured manually between the upper convex margins and caudal tip of right lobe. It was measured in millimeters.

Manual measurement of fetal liver at 21 weeks of gestation.

RESULTS

Both sonographic and manual measurements of fetal Liver values from 18 to 30 weeks of gestation are shown in table. In the table at 18th week of gestation liver length is 23.0 mm while at 30th week of gestation it is 39.0 mm. The net increase observed in fetal liver length by both the sonographic and manual methods was 16mm.

Table shows comparison between sonographic and manual measurement of fetal liver length at different weeks of gestation, t-test was applied and P-value was deduced. On comparison of both methods of fetal liver length determination in different weeks of gestation showed a non-significant difference in P-value.

Table: Fetal Liver measurements through sonographic and manual methods in relation to gestational ages.

GA (Wks)	No of Cases	Sonographic measurement of liver length (mm)	Manual measurement of fetal liver length (mm)
18	5	23.0	23.0*
21	4	27.0	26.8*
24	6	32.0	32.0*
25	4	33.0	33.1*
27	4	36.0	35.8*
28	3	37.0	36.8*
30	4	39.0	39.0*

* Non-significant P value on comparison between sonographic and manual method.

DISCUSSION

Detection of fetal growth retardation is important because it caries a risk to the fetus. To date the best predictor of fetal growth retardation is the measurement of fetal abdominal circumference[1]. Fetal liver occupies most of the fetal abdomen. Changes in the liver size are likely to affect the abdominal circumference. In normal fetuses, glycogen reserves in the liver increase towards the end of gestation. However, growth-restricted fetuses have severely reduced hepatic glycogen stores because of fetal malnutrition[8]. Ultrasonic measurement of the fetal liver is a reliable indicator of fetal growth in the third trimester, as growth rates of the biparietal diameter and head circumference are blunt. Furthermore, consecutive measurements of fetal liver size enhance the detection of symmetrical, fetal growth[910]. Accurate assessment of liver size may contribute to the early detection of the intrauterine growth retardation[4,5,11,12,13,14].

Measurement of liver length at mid-pregnancy may be helpful in predicting affected fetuses of hemoglobin Bart's disease among pregnancies at risk. Normal liver length measurement is associated with a very low risk of the disease[15]. Measurement of fetal liver length in the diabetic pregnancy, as a parameter, is important for monitoring the effectiveness of treatment of the diabetic pregnancy[16]. Liver length measurement is a useful indicator of the degree of fetal anemia in isoimmunized pregnancies[17]. There is a strong relationship between AC and Fetal liver length in healthy pregnancies. Interobserver variability is minimal. Fetal liver length measurement in routine ultrasound examination may provide considerable information in many mortal obstetric conditions such as IUGR, maternal diabetes, macrosomic fetus, twin-to-twin transfusion and fetal anemia[18]. Estimation of fetal liver weight appears to be an accurate and reproducible method and may enhance sonographic assessment of fetal growth abnormalities and conditions with fetal liver involvement[19]. Fetal liver length increases in gestational diabetes mellitus. Mid trimester measurement of the fetal liver length can be used to diagnose macrosomia in patients having GDM[20].The findings from our study indicate that fetal liver length is worthy of further investigation as a measure for monitoring the effectiveness of treatment of the diabetic pregnancy. These studies emphasize the importance of measurement of fetal liver length and size as an indicator of fetal well being.

CONCLUSION

In the present study the reliability of measurement of fetal liver length by ultrasonography was assessed by comparing the measurement of fetal liver length

obtained by ultrasonography with that obtained by manual measurement. Statistical analysis shows insignificant difference between the two measurements. It is suggested that measurement of fetal liver length by ultrasonography is an accurate measurement of the fetal liver length and can be used for the assessment of intrauterine growth retardation, fetal anaemia and for the monitoring of diabetic pregnancies.

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