ULTRASONOGRAPHIC ASSESSMENT OF AMNIOTIC FLUID INDEX IN POST DATE PREGNANCIES

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ABSTRACT

Objective: To assess fetal outcome in postdate pregnancies (40 weeks and beyond) with women having amniotic fluid index (AFI) < 6 cm and between 6-15cm using greyscale ultrasound.
Study Design: Cross-sectional comparative study.
Place and Duration of Study: CMH Rawalpindi from 26 October 2006 to 09 May 2007.
Material and Methods: A total of 60 patients were studied. The antenatal fetal surveillance in these patients was based on ultrasound assessment of AFI after 40 weeks. An abnormal AFI was defined as less than 6 cm, between 6-8 cm as equivocal and more than or equal to 8 as normal. Patients were equally divided into two groups of 30 each based on AFI as group I having AFI <6 cm and group II with AFI of 6-15 cms. Delivery mode, fetal distress and early neonatal complications were main assessment parameters for the fetus.
Results: Rate of caesarean section (50%) in the women with AFI< 6 cm was found significantly higher than 17% rate of caesarean section of the women having AFI > 6 cm .Proportion of early neonatal complications was also significantly higher in the women with AFI< 6 cm.
Conclusion: AFI assessment by ultrasound is a reliable fetal surveillance test. It may allow the conservative approach till 42 weeks to reduce the caesarean section rate and neonatal complications.

Keywords: Amniotic fluid index (AFI), Fetal distress, Oligohydramnios, Post date pregnancy, Ultrasound.

INTRODUCTION

Assessment of amniotic fluid volume in association with a non-stress test is a commonly used method to monitor fetal well-being in low-risk pregnancies between 40 and 42 weeks gestation1[2,3]. Post term pregnancies are significantly associated with an increased incidence of adverse perinatal outcome with low amniotic fluid volume[4,5] component of antenatal testing for the at-risk pregnancy[1,6] marked effects on fetal and neonatal well being; both deficiency and excess are hazardous. Prenatal estimation of the volume of amniotic fluid, by physical examination alone is difficult and often inaccurate and non-reproducible[7] Ultrasound has emerged as primary imaging modality in estimation of Amniotic fluid index (AFI)[8] prolonged pregnancies of more than 42 weeks and increase in perinatal mortality and AFI morbidity[9] pregnancies can be monitored by estimation of AFV. The postdate pregnancies with adequate amniotic fluid volume has a significantly better perinatal outcome than the Assessment of amniotic fluid volume has become an important. As there is acknowledged relationshipbetween hence a postdate pregnancy is a high risk pregnancy. Postdate pregnancy without an adequate amniotic fluid volume[10]. Measurementof amniotic fluid index in low-risk pregnant women admitted for labor might identify patients with an increased risk of intrapartal fetal distress[9,11]. Appreciation of the importance of amniotic fluid volume as an indicator of fetal status is a relatively recent development[12,13]. Postdate pregnancyis a high risk pregancy because of high incidence of fetal morbidity and perinatal mortality. Thus the monitoring of postdate pregnancies should be based mainly on ultrasound assessment of amniotic fluid volume. Ultrasonographic assessment of amniotic fluid has important implications, because documentation of abnormalities of amniotic fluid volume may provide valuable in-formation to enhance fetal health assessment[13]. AFI is a reliable fetal surveillance test[10,12] ultrasonography can improve the fetal outcome.

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MATERIAL AND METHODS

This cross-sectional comparative study was conducted in radiology department of Combined Military Hospital (CMH) Rawalpindi from 26 October 2006 to 09 May

2007. A total number of 60 patients were included and divided into two groups of 30 each based on amniotic fluid index as Group Iwith AFI <6cm and Group II with AFI between 6-15 cm. All patients were selected on purposive (non probability) sampling technique using the following.

All patients of 18-35 years with gestational age equal to or > 40 weeks. (primigravida as well as multigravida), giving informed consent were included.

Non consenting patients, patients with placenta previa, patients with toxemia of pregnancy and previous two caesarean sections were excluded.

After seeking proper permission from concerned authorities and 'Hospital Ethical Committee' the study was started. All the 60 patients with postdate pregnancy were evaluatedwith four-quadrant AFI measurements twice weekly after 40 wks using a convex probe of 3.5 mhz of TOSHIBA MCM APLIO 50 ultrasound machine. They ere assessed by serial AFI until spontaneous labour supervened or an indication to expedite delivery came. All the data was collected by postgraduate trainee of radiology and counterchecked by the consultant radiologist.

All patients were lying comfortably in supine position on examination couch with their arms by the side of the body. The abdomen was exposed enough toconduct the ultrasound, keeping the privacy and ethnic obligations of the patients. Amniotic fluid index was taken as the sum of maximum vertical pockets of amniotic fluid in each of the 4 quadrants of uterus on ultrasonography; care was taken not toinclude segments of umbilical cord in the measurement. (Fig-1 a and b) Fig-1 a. (upper quadrant) Normal amniotic fluid index of 19.6. The color box is used to ensure an absence of intervening umbilical cord. Fig-1b. (lower quadrant).

An abnormal AFI was defined as less than or equal to 6cm (Fig-2a,b).The two groups were subsequently evaluated for delivery outcome, neonatalmortality and early neonatal complications by the help of obstetric department. The Mode of delivery (vaginal, caesarian section) and early neonatal complications (nocomplications, meconium stained liquor, meconium aspiration and neonatal death) were taken as the main outcome of study. Fig-2a. An amniotic fluid index of 4.2 cm, indicating oligohydramnios. The color box to the right of the image indicates the presence of umbilical cord.Fig- 2b. There is

Table-1: Group wise description of age and gestational age in two groups.

Patient parameter	Group I (AFI<6cms) n=30		Mean+SD	Group II (AFI 6-15 cms)n=30		Mean+SD
	Min	Max		Min	Max	
Age in years	20	34	28.43+3.997	19	31	29.73+3.610
Gestational age in weeks	40	42.0	40.563+0.4437	40	41.4	40.563+.4365

Table-2: Description of mode of delivery in 30 patients of each group.

Mode of delivery	Group I (AFI<6cms)	Group II (AFI 6-15 cms)
Vaginal	15 (50%)	12 (40%)
C-section	15 (50%)	18(60%)

p value 0.436

Table-3: Description of fetal outcome with early neonatal complications.

Neonatal complications	GroupI (AFI<6cms)	Group II (AFI 6-15 cms)
No complication	17 (57%)	28 (93%)
Meconium stained liqour	12 (40%)	2 (7%)
Meconium aspiration	1 (3%)	-

p- value 0.004.

a 2.5 cm (c) and 1.8 cm (a) pocket of fluid in the lower uterine quadrant.

The data was analyzed by using SPSS version10.0. Mean and Standard Deviation calculated for age; while frequency was calculated for mode of delivery (vaginal, caesarian section) and early neonatal complications (no complications, meconiumst-ained liquor, meconium aspiration and neonatal death). Chi- square test was applied to compare mode of delivery and early neonatal complications in group I and group II. A *p* value of <.05 was considered significant.

RESULTS

A total number of 60 patients were studied having gestational age equal to or more than 40 weeks divided into two equal groups, Group I with AFI equal to or less than 6cm, and group II with AFI between 6-15cm. they were assessed by serial AFI until spontaneous labour supervened or an indication to expedite delivery comes.No significant differences were identified between the two groups in regard to maternal age and gestational age table-1.

Increased rate of cesarean section was noticed in the group I. In group I 15 (50%), patients were delivered with caesarean section. in group II 5 (17%) patients were delivered with caesarean section. table-2. Data revealed significantly higher rate of caesarean section in group I (*p* value=0.006) table-2.

Rates of cesarean delivery for non-reassuring fetal testing were (50% versus 17%, *p*<0.006) analysis demonstrated that increase in emergency operations for fetal distress was seen in women with AFI 6 cm group compared with the AFI>6 cm. Early neonatal complications were significantly higher in the AFI 6 cm groupcompared with the AFI >6 cm. Significant correlation between the findings of AFI and final outcome was noted *p* value<0.004 (Table- 3).

The results of this study clearly showed that there is increased incidence of cesareanand early neonatal complications in patients with AFI of < 6 cms. Thus monitoring amniotic fluid index in post date pregnancies can serve as useful predictor of fetal outcome and neonatal complications.(AFI<6cms).

DISCUSSION

Amniotic fluid is the watery liquid surrounding and cushioning a growing fetus within the amnion. It allows the fetus to move freely without the walls of the uterus being too tight against its body. Buoyancy is also provided[14] volume of amniotic fluid increases at the rate of 10 ml/wk from 8 weeks and at the rate of 60 ml/wk from 21 weeks on, followed by a decline by 33 weeks. The normal volume is 50 ml at 12 weeks, 400 ml at mid pregnancy and 1000 ml at term. The major contributors to amniotic fluid are the fetal urine and lung volume[14]. Measurement of the amniotic fluid volume is an important parameterpredicting perinatal outcome, and its predictive value increases if it is combined withother fetal well-being tests with different end points[15]can be done by either by Dye -dilution techniques[16,17] or by Direct quantification atthe time of Caesarean delivery[18] support and, when measured at the time of operative abdominal delivery, cannot be used serially to evaluate high-risk pregnancies. The limitations of direct amniotic fluid volume measurement led to theuse of ultrasound measurement for amniotic fluid volume estimation. Ultrasonography is the main modality for the measurement of amniotic fluid and evaluation of the fetus. There are at least 3 methods for measuring amniotic fluid[19].Single deepest pocket (SDP) technique. This technique identifies a pocket depth of 2-8 cm as normal, 1-2 cm as marginal, < 1 cm as decreased, and > 8 cm as increased[2]. The 2-diameter pocket (depth X width of the longest pocket[3]. TheAmniotic fluid index AFI. With the AFI method, the uterus is divided into 4 quadrants. The depths of the deepest vertical pool in the 4 quadrants are measured and added but both methods are invasive, require laboratory to give the index. Ultrasound estimation of amniotic fluid volume is a critical component of antenatal surveillance[20]. Fluid is one of the major indicators of fetal condition. The presence of normal amniotic fluid volume, either in association with a reactive nonstress

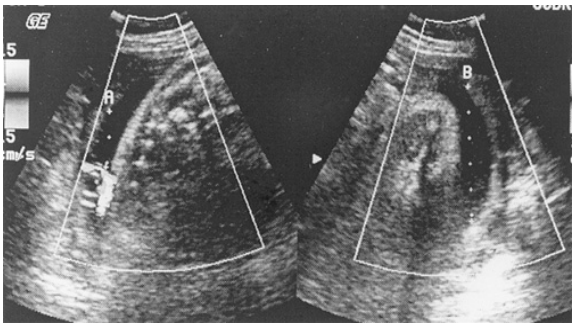
test or as acomponent of the biophysical profile is considered to reflect current fetal well being

and probable absence of chronic stress[20] indicates placental dysfunctionand in-sufficiency associated with post termpregnancy[21,22] should be delivered to reduce maternal and neonatal complications[23].

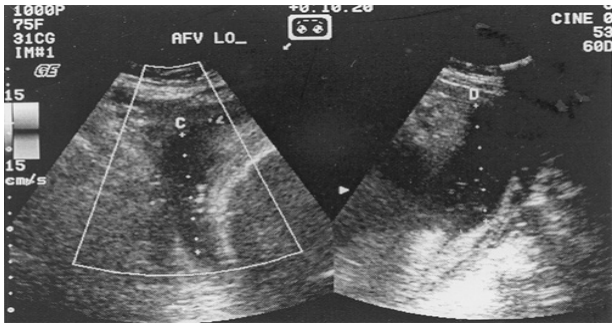
Oligohydramnios as defined by AFI <5 cm has been shown to be associated with birth asphyxia and caesarean section for fetal distress[24-27] failing placenta is compounded by possibility of umbilical cord compression during uterine contraction due to oligohydramnios[26,27]. AFI falls significantly beyond 40 weeks. So patients with low AFI.

In postdate pregnancies the high rate of labour induction, caesarean section, perinatal morbidity and mortality due to placental insufficiency might be reduced if the state of fetal health could be accurately defined andtime of delivery could be predicted with a safe margin[27] combination of amniotic fluid volume estimation and non stress test is shown to have a high predictive value of placental insufficiency[28] compromise, delivery should be considered[29].

In this study a total of 60 patients with postdate pregnancy divided into two equal groups underwent ultrasound examination which constitutes a fraction of totalpool of postdate pregnancies. As the AFI falls significantly beyond 40 weeks,therefore, biweekly AFI assessment was performed as recommended[28,30,31]. As no single fetal surveillance test is ideal, a study with no significant differences were identified between the two groups in regard to maternal age. Mean age in group I was 28.43 + 3.997and in group II was 29.73+3.610 respectively indicating insignificant difference in age of two groups (*p* value>0.05).

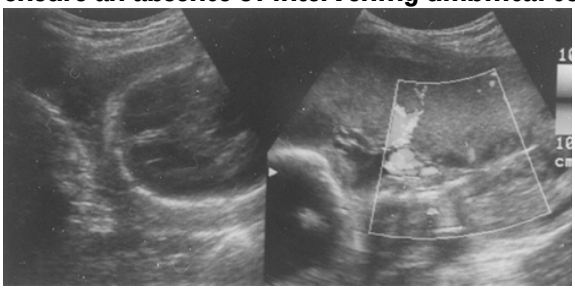


1a

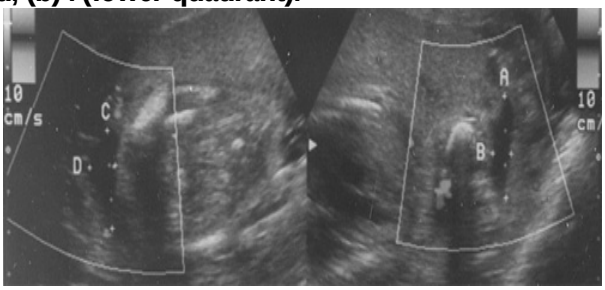


1b

Figure- 1a&b: (upper quadrant) Normal amniotic fluid index of 19.6. The color box is used to ensure an absence of intervening umbilical cord, (b) . (lower quadrant).



2a



2b

Figure-2a& b: An amniotic fluid index of 4.2 cm, indicating oligohydramnios. The color box to the right of the image indicates the presence of umbilical cord, (b) There is a 2.5 cm (c) and 1.8 cm (a) pocket of fluid in the lower uterine quadrant.

This is because the patients included in the study had maternal age between 18-35 years resulting in insignificant difference in maternal age of two groups. Meangestational age in group I was 40.563 + 0.4437 and in group II was 40.563 + 0.4365 respectively indicating insignificant difference in age of two groups (*p* value>0.05) this is contrary to literature mentioned in the west[31-34] probably because of smaller sample size. In our hospital women with AFI<6 cm have increased incidence of adverse perinatal outcome. The conclusions of this study are limited by the fact that very few patients were included in either group. The patients in whom induction of labour wasdone due to reduced AFI, had high incidence of non reactive CTG, fetal heart rate decelerations and meconium stained liquor (40%). Therefore, the caesarean sectionrate was high (50%). Furthermore, a single case of meconium aspiration syndrome (3%) was also seen in this group. These findings are similar to those in other studies[31-34]. In group was found in 2(7%)neonates. Both were low as compared to group I which is inaccordance with studies carried out in west and locally[4,9,10,11,12,17,35,36]. The findings in this study suggests that an AFI less than 6 cm in postdatepregnancies necessitates induction of labour and delivery with increased nursingurveillance, day time induction, careful monitoring in hospital operating personneland neonatal intensive care facilities which is according to international studies[37,38]. The results also suggest that AFI < 6cm is not a contraindication to vaginal delivery. AFI below 6 cm was shown to be associated with significantly increased risk of thick II, caesarean section rate was (17%), and meconium stained liquor meconium stained liquor. This is in accordance to a local study carried out by Hassan A[10].

Baron et al[26] sub sequent fetal distress necessitating caesarean delivery. In this study the limit of AFI was 6 cm which allowed a safety margin for induction and vaginal delivery. Antepartum oligohydramnios was associated with increased adverse perinatal outcome in our institution as measured by route of delivery, meconium passage, andneonatal death. The results in this study indicated that oligohydramnios is associated with increased perinatal morbidity, which is in accordance with other studies.

Because antepartum oligohydramnios was associated with abnormal and nonreactive fetal heart rate tracings, women with this finding warrant antepartum fetal surveillance and possibly delivery.

Although there is statistically significant association of low AFI with adverse fetal outcome, the sensitivity of an AFI <6 cm for prediction of morbidity is low asother pathophysiological mechanisms are also responsible for failing placental functions like intrapartum infections, cord entanglement etc, therefore, fetalsurveillance should be done by other means also like cardiotocography and biophysical profile[39-41].

CONCLUSION

The results of this study point to the importance of serial amniotic fluid indexmonitoring in postdate pregnancies especially in predicting the fetal outcome. Infuture, more work is needed to explore other parameters of fetal circulatory changes as indices of placentalinsufficiency in postdated pregnancies, thus hopefully helping clinicians to select patients for expectant management, particularly for patients who would like to avoid induction of labor or those with an unfavorable cervix.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by author.

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