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Original Research Article

Evaluation of feto-maternal outcome using AFI and SDVP for amniotic fluid assessment; Which is a better method?

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ABSTRACT

Background: Abnormal amniotic fluid volume (AFV) may be the only or earliest sonographic sign of an obstetrical problem. There is no clear consensus on the best method to assess amniotic fluid adequacy. The AFI and the SDVP are the more commonly employed techniques for assessing adequacy of amniotic fluid. This study aimed to compare the maternal and foetal outcome when amniotic fluid was measured by these two methods.
Methods: Hundred pregnant women at >28 weeks gestation scheduled for test of biophysical score due to various risk factors were enrolled and divided in two groups of 50 each. In each group, amniotic fluid volume was determined by either calculating the Amniotic Fluid Index (AFI) or measuring the Single Deepest Vertical Pocket (SDVP). Oligohydramnios was declared at cut off of <5 for the former and <2cm for the later method respectively. Maternal and foetal outcomes were compared between the two groups.
Results: Diagnosis of oligohydramnios was 45/50 in group I and 23/50 in group II ($p<0.0001$). Induction of labour was done in 70.0% in group I and 18% in group II ($p<0.0001$). Non-reassuring foetal heart rate was seen in 36.0% in group I and 14.0% in group II ($p=0.011$). Rate of caesarean delivery was significantly higher in group I, 42.0% in comparison of 20.0% in group II ($p=0.017$). NICU admission were 32.0% in group I and 18.0% in group II ($p=0.106$).
Conclusions: SDVP is a better choice for determining amniotic fluid to avoid unnecessary interventions without any significant improvement in peripartum outcome measures.

Keywords: Amniotic fluid, Amniotic fluid index, Single deep vertical pocket

INTRODUCTION

Amniotic fluid provides a supportive environment for foetal development. It protects the foetus from trauma and infection through its dampening and bacteriostatic properties and fosters the development of the foetal musculoskeletal system. Amniotic fluid is maintained in a dynamic equilibrium; its volume is the sum of fluid from foetal urine and lung fluid flowing into and out of amniotic space due to foetal swallowing and intramembranous absorption.[1] Normally amniotic fluid volume increases to about 1 to 1.2 L by 38weeks of pregnancy and starts decreasing thereafter to only 200-300 mL by 43 weeks. Arbitrarily, more than 2 L of amniotic fluid at the time of delivery is considered excessive and is termed as polyhydramnios.[2] Amniotic Fluid Volume (AFV) is an important parameter in the assessment of foetal wellbeing. Oligohydramnios, a decrease in AFV, can occur as a result of multiple maternal, foetal or placental anomalies including intrauterine growth restriction, pre-eclampisa, utero-placental insufficiency and prolonged (post-term)

pregnancy. An abnormal AFV may be the earliest or only sonographic sign of an obstetrical problem.[3] Consequently, it is associated with increased foetal and neonatal morbidity and mortality. Many caregivers practice planned delivery by induction of labour or caesarean section after diagnosis of decreased amniotic fluid volume at term or earlier.[4] Therefore, the antenatal diagnosis of oligohydramnios is important in the management of pregnancy.

Ultrasonographic methods of assessment of amniotic fluid can be viewed as semi-quantitative. They perform best when identifying normal volumes but are poor when identifying an abnormal volume. In addition to differences in the methods for amniotic fluid assessment, various other factors play a confounding role in the accurate assessment of amniotic fluid by ultrasonography, which include experience of the operator, foetal position at the time of scan, the probability of a transient change in AFV and the different ultrasound diagnostic criteria of an abnormal AFV.

There is no clear consensus on the best method to assess amniotic fluid adequacy. Invasive methods such as indicator dilution techniques are the most accurate measures of AFV, but are impractical for clinical use. The Amniotic Fluid Index (AFI) and the Single Deepest Vertical Pocket (SDVP) are the more commonly employed techniques for assessing adequacy of amniotic fluid. In order to calculate AFI, the operator divides the uterine cavity into four quadrants. In each quadrant, the largest vertical diameter of a fluid pocket (not containing small foetal parts or loops of umbilical cord) is measured. The sum of these four measures provides a single value for the AFI. For calculating the SDVP, the vertical and transverse diameters of the largest pocket of amniotic fluid are measured and recorded, the depth of the pocket measured at a right angle to the uterine contour. On sonography, AFI >20cm or SDVP >8cm is taken as polyhydramnios. For identifying oligohydramnios, different arbitrary cutoff values have been estimated, ranging from AFI being less than 5 cm to 8 cm or SDVP<2.[5-10]

This study intended to compare these two methods for the assessment of amniotic fluid volume as per the outcome of the mother and foetus in pregnancies with oligohydramnios.

METHODS

This was a prospective cohort study, conducted at a tertiary care hospital in Delhi, India from 2014 to 2016. A total of 100 patients coming to the hospital for antenatal care who were scheduled for biophysical scoring due to different risk factors were enrolled in this study. The study had the approval of the hospital's ethics committee. All the selected patients were explained about the project and written informed consent was taken from them. Women with singleton pregnancy at >28 weeks of gestation with a live foetus, who needed assessment of foetal wellbeing were enrolled. Women with multiple pregnancy, Rh negative pregnancy and those with congenital malformations in the foetus were excluded from the study.

These women were divided into two equal groups of 50 each, arbitrarily. In the first group assessment of amniotic fluid volume was done by calculating Amniotic Fluid Index and in the second by Single Deepest Vertical Pocket on ultrasonogram. The cut off values were <5 and <2cm respectively. The two groups were then compared on the basis of rate of diagnosis of oligohydramnios and maternal and perinatal outcomes. Statistical analysis was performed by Chi-square test. Statistical significance was defined as probability value< 0.05.

RESULTS

Age of the patients ranged from 18 to 36 years in both groups with the average age being 22.79 years. The average age of patients in the group I was 23.10 ±.315 years and 22.48 ± 3.506 years in group II. The gestational age ranged from 28 to 43 weeks in two groups with average of 37.70 weeks. In group I, average gestational age was 37.56±3.15 weeks and in group II it was 37.84±2.881 weeks.

Table1: Frequency distribution table showing the relative presence of different risk factors in the study population.

Risk factors	Group I (n=50)	Group II (n=50)
Severe PIH	0	1 (2.0%)
Abruption	1 (2.0%)	0
Placenta praevia	0	1 (2.0%)
Chronic Hypertension	0	1 (2.0%)
Intra-uterine growth restriction	4 (8.0%)	6 (12.0%)
Congenital malformations	3 (6.0%)	2 (4.0%)
PIH	10 (20.0%)	11 (22.0%)
PIH+APH	1 (2.0%)	0
Post-datism	2 (4.0%)	0
Post-term pregnancy	2 (4.0%)	7 (14.0%)
Preterm premature rupture of membranes	1 (2.0%)	3 (6.0%)
Previous 1 caesarean	5 (10.0%)	3 (6.0%)
Previous 2 caesarean	1 (2.0%)	0
Premature rupture of membranes.	3 (6.0%)	1 (2.0%)
Decreased foetal movements	4 (8.0%)	5 (10.0%)
Severe anaemia	1 (2.0%)	2 (4.0%)

Number of patients diagnosed with oligohydramnios was 45 (90.0%) in group I and 23(46.0%) in group II. Diagnosis of oligohydramnios was significantly more in group I than in group II (p<0.0001). Labour was induced in 70.0% patients in group I as compared to 18% in group

II, which was statistically significant (p<0.0001). Non-reassuring foetal heart rate was seen in 18 patients (36.0%) in group I and 7 patients (14.0%) in group II. This difference was found to be statistically significant (p=0.011). Incidence of presence of meconium was 44.0% in group I and 28.0% in group II (p=0.096)). Rate of cesarean delivery was 42.0% in group I in comparison to 20.0% in group II. This difference was statistically significant (p=0.017). Sixteen neonates (32%) from group I and 9 (18.0%) from group II were admitted to NICU. The difference was not statistically significant (p= 0.10). Perinatal deaths were 4.0% (2/50) in group I and 2.0% (1/50) in group II (p=0.558). High risk factors present in the study population are shown in Table 1.

DISCUSSION

Various antepartum foetal surveillance tests have the aim of providing the obstetrician with a tool that guides intervention with the ultimate goal of preventing clear-cut adverse pregnancy outcomes. Both the biophysical profile and the modified BPP include the assessment of AFV as an integral part of testing because decreased AFV (oligohydramnios) is believed to indicate a foetal response to chronic stress.[2,11] The most common techniques used to assess whether the amniotic fluid is adequate are the AFI and the SDVP measurement.[12,13] According to these two methods, an AFI of 5 cm or less or the absence of a pocket measuring 2 x 1 cm is indicative of decreased AFV.

In our study, 90.0% patients were diagnosed to have oligohydramnios when measurement was done using AFI as opposed to 46.0% in group II, in which measurement was done by the single deepest vertical pocket method, similar to findings in other studies.[14-16] Understandably, significantly more patients underwent induction of labour in group I and there was an expected increase in number of caesarean deliveries in group I than in group II as elective induction of labour is known to be associated with increased incidence of caesarean section.[17]

However, there was not any statistically significant difference in APGAR score, NICU admissions, perinatal deaths and incidence of meconium stained liquor between the two groups. This implies that the AFI identifies a significantly greater number of women as having oligohydramnios versus the SDVP without much difference in perinatal morbidity and mortality. Normal ultrasonographic values for either AFI or SDVP, implying a normal amniotic fluid volume, are associated with a very low risk of labour complications.

It seems logical to recommend that only one method should be used for foetal assessment tests. According to the ACOG practice bulletin of 2014 also, the SDVP measurement, as opposed to AFI to diagnose oligohydramnios, decreases the rate of unnecessary interventions without increase in adverse perinatal outcomes.[18]

CONCLUSION

Our study draws the conclusion that the SDVP measurement appears to be the more appropriate method for assessing AFV during foetal surveillance as the use of the AFI increases the rate of diagnosis of oligohydramnios and consequently the rate of intervention in pregnancy without any significant improvement in peripartum morbidity.

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