

Comparison of Amniotic Fluid Index and Single Deepest Vertical Pool method for predicting fetal outcome

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ABSTRACT

Background & Objectives: The measurement of amniotic fluid volume (AFV) has been an important component of antenatal evaluation of fetal well being. The most commonly used methods are by amniotic fluid index technique (AFI) and single deepest pool method (SDVP). Both the methods employ ultrasound for AFV measurement. The objective of this study is to compare the usefulness of AFI and SDVP method in assessing amniotic fluid volume for predicting adverse perinatal outcome. **Materials & Methods:** This is a hospital based prospective comparative study. The patient whose amniotic fluid was measured by SDVP technique was study group and that by AFI was comparison group. Any case with high risk factor was excluded from the study. First case was decided by lottery and then alternately one case was kept in study group and the other in comparative group. If the women did not deliver within 1 week the measurements was retaken and the final values was used for analysis. AFI was estimated as described by Phelan and colleagues and SDVP as described by Manning. Data collection was started after the approval of Institution review board. This study was conducted at Patan Academy of Health Sciences. Duration of data collection was 3 months, Asadh –Bhadra, 2071. **Results:** A total of one hundred and fifty four cases which met the inclusion criteria were taken. Incidence of oligohydramnios by SDVP method was 10.4 % by SDVP technique and by AFI method it was 18.2 %. There was no statistical significant difference between the two groups in terms of rate of induction, mode of delivery, meconium staining of liquor, fetal heart rate tracings, APGAR score at 5 mins and admission to special care baby unit. **Conclusion:** In non-high risk pregnancy AFI technique detects slightly more number of oligohydramnios as compared to SDVP technique without apparently any difference in perinatal outcome.

Key words: Amniotic Fluid Index (AFI); Oligohydramnios; Single deepest Pool Method (SDVP)

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INTRODUCTION

Volume of amniotic fluid (AFV) is measured by ultrasound in two ways by SDVP method and by AFI technique. Diminished amniotic fluid is termed as oligohydramnios. It is arbitrarily defined as AFI <5 cm or SDVP < 2 cm. AFV influences the fetal outcome and interventions during pregnancy. Women with oligohydramnios had significantly increased 2.2 fold risk for caesarean delivery for fetal distress and 5.2 fold increased for a five minute APGAR score of less than seven, more

chances of cord compression, fetal heart rate decelerations and meconium stained liquor¹ There is no evidence suggesting that one method was superior to other in the prediction of adverse perinatal outcome.² Hence, this study tries to compare between the two commonly used ultrasonic method of amniotic fluid estimation for predicting fetal outcome.

MATERIALS AND METHODS

This is a hospital based prospective comparative

study done in PAHS, between Asadh –Bhadra 2071. Prior to data collection ethical clearance was taken from IRB. Women whose amniotic fluid volume was measured by using SDVP method was study group and by AFI was comparison group. All the cases meeting the inclusion criteria were selected for the study. First case was decided by lottery and then alternately one case was kept in study group and the other in comparative group. A total of 154 cases were taken with 77 in each group. Singleton pregnancy of > 37 weeks with cephalic presentation was included in this study. All the cases with associated hypertension, diabetes, and congenital anomaly, multiple pregnancies, previous caesarean delivery, fetal malpresentations and malpositions, premature rupture of membrane and antepartum haemorrhage were excluded from the study.

Amniotic Fluid Measurement

After informed consent was taken, the participant was placed in the supine position and the sonologist estimated AFV by AFI in one group and SDVP in other group. The AFI was estimated by the four quadrant method as described by Phelan and colleagues.³ For measuring SDVP the image of the deepest cord free pool pocket was frozen and measured along its maximum length in centimetres as described by Manning and colleagues.⁴ If the women did not deliver within one week the measurements was retaken and the final values were used for analysis. Oligohydramnios was defined by AFI of 5cm or less and SDVP of 2cm or less. Cardiotocography was performed in all the cases. Fetal distress was diagnosed when a CTG showed significant variable decelerations or persistent late decelerations in the fetal heart rate or prolonged bradycardia, or when the APGAR score

was less than seven at five minutes, or when there was meconium stained liquor.

Data Collection

Data collection was started after the approval of Institution review board. All the fellow doctors, nursing staff and other concerned persons were oriented regarding the protocol of the study. Data was collected 24 hours a day twice in a week and in rest of the days from 8 am to 5 pm by researcher himself. In the remaining hours he took the help from his colleague doctors and nursing staffs. Cases were enrolled from antenatal wards that fulfil the exclusion and inclusion criteria. Written informed consent was taken for enrolment of the cases. All these enrolled cases were followed up throughout their hospital stay. At the end a conclusion was drawn depending upon the findings of the study. Test of significance was done by Chi-square tests by using SPSS 16.

RESULTS

During the study period of three months, a total of one hundred and fifty four cases of oligohydramnios which met the inclusion criteria were taken. Incidence of oligohydramnios by SDVP method was 10.4 % by SDVP technique and by AFI method it was 18.2 %. In the SDVP group 23 patients (29.9%) had induction of labor and in the AFI group 25(32.5%) patients had induction of labor (P-value = 0 .728). In the SDVP group 12 (15.6%) had fetal distress and in the AFI group 10 (13%) had fetal distress (P-value= 0.645). There were 6(7.8%) number of admissions in the SDVP group and 5(6.5 %) in the AFI group (P-value=0.754). There was meconium staining of liquor in 21(27.3%) patients in the SDVP group and 15 (19.5%) patients in the AFI group (P-

Table No. 1: Findings in the patients

| Variables | SDVP | AFI | p-value |
|--------------------------------------|-----------|-----------|---------|
| Incidence of oligohydramnios | 8(10.4%) | 14(18.2%) | 0.15 |
| Induction of labor | 23(29.9%) | 25(32.5%) | 0.728 |
| Fetal distress | 12(15.6%) | 10(13%) | 0.645 |
| Admission in special care baby unit | 6(7.8%) | 5(6.5%) | 0.754 |
| Meconium stained liquor | 21(27.3%) | 15(19.5%) | 0.253 |
| Abnormal CTG findings | 7(9.1%) | 10(13%) | 0.44 |
| Instrumental or caesarean delivery | 21(27.3%) | 19(24.7%) | 0.53 |
| APGAR score of less than 7 at 5 mins | 4(5.2%) | 2(2.6%) | 0.67 |

SDVP-single deepest vertical method, AFI- amniotic fluid index, CTG- cardiotocography

value=0.253). There were 7(9.1%) non-reactive CTG in the SDVP group and 10(13%) in the AFI group (p-value= 0.440). There were 21(27.3%) abnormal deliveries in the SDVP group and 19 (24.7%) in the AFI group (p-value =0.523). APGAR score at 5 min of less than seven was 5.2 % in the SDVP group and 2.6 % in the AFI group (p-value=0.677). (See table)

DISCUSSION

Amniotic fluid volume serves as an indicator of fetal well being. Decreased amniotic fluid volume is associated with fetal congenital anomalies, post maturity syndrome, IUGR, and increased perinatal morbidity and mortality. Amniotic fluid volume highly influences the fetal outcome. The evaluation of the amniotic fluid volume has been an integral component of the fetoplacental assessment.

In my study the incidence of oligohydramnios was 18.2% by AFI method and 10.4% by SDVP method. In the study by Moses et al¹² the incidence of oligohydramnios was 25% by AFI method and 8% by SDVP method. In another study by Chauhan et al¹³ the incidence of oligohydramnios was 17% by AFI method and 10% by SDVP method. These findings are similar to the present study. But the incidence of oligohydramnios in the study by Dasari et al¹⁴ was 34 % by AFI method and 59% by SDVP method and in the study by Miyamura et al,¹⁵ the incidence of oligohydramnios by SDVP method was 19% and by AFI was 30.5%. These studies measured AFV only in postdated pregnancies. So, incidence is higher in these studies. In the studies by Alfirevic et al,¹⁶ Myles et al³ and Morris et al,⁸ the incidence of oligohydramnios by AFI was between 7.9% to 10% and by SDVP was between 1.4%to 2.4%. The incidence of oligohydramnios was higher in the present study as compared to other studies, possibly due to more frequent amniotic fluid measurement, i.e. twice weekly after 40 weeks of gestation. In most of these studies the incidence of oligohydramnios is more in AFI group as compared to SDVP group which is also true in my study. The incidence of oligohydramnios by both methods is very high in the studies which has taken only post dated pregnancies.

Rate of induction of labor in SDVP group was 29.9% and in the AFI group was 32.5%. There is slightly more number of inductions in AFI group but it is not statistically significant as P-Value is 0.728. In the study by Chauhan et al¹³ the rate of

induction of labor in AFI group was 24 % and in the SDVP group was 21% but it was not statistically significant. In the study by Moses et al¹² the rate of induction of labour was 19 % in both SDVP and AFI group. In another study by Alfirevic et al¹⁶ the induction of labor was in 34.8% cases in AFI group and 30.8 % in SDVP group. This was statistically significant. Similarly, there was statistically significant increase in the rate of inductions in the AFI group as compared to SDVP group in the studies by Magann et al,¹⁷ Verrotti et al,⁹ Moore et al,¹⁸ and Dassari et al.¹⁴ And there was no significant difference in the rate of inductions in the other studies by Miyamura et al¹⁵ and Moses et al¹² including my study.

In the present study the rate of fetal distress was 15.6% in SDVP group and 13% in AFI group. This was not statistically significant as the P-value was 0.645%. Similarly, non reactive CTG findings were present in 9.1% (n=7) in SDVP group and 13% (n=10) in AFI group. But it was also not statistically significant between the two groups as the P- Value calculated was 0.440. Similarly , the meconium staining of liquor was 27.3 % (n=21) in the SDVP group and 19.5% (n=15) in AFI group. This too was statistically non-significant. Similar findings were found in the study by Alfirevic et al,¹⁶ Chauhan et al,¹³ Magann et al¹⁷ and Moses et al.¹² In these studies there was no significant difference between the two group in the occurrence of fetal distress, abnormal CTG patterns and meconium staining of liquor between the groups. While in the study by Miyamura et al,¹⁵ Myles et al³ and Verrotti et al,⁹ the occurrence of abnormal CTG pattern , fetal distress and meconium staining of liquor was more in the SDVP group as compared to AFI group and this was statistically significant thus concluding that SDVP was better than AFI in predicting adverse fetal outcome. While in the study by Youssef et al,⁸ Fisher et al,⁴ and Morris et al,⁵ the occurrence of fetal distress, meconium staining of liquor and abnormal CTG pattern was significantly higher in the AFI group as compared to SDVP group. But in these studies the subject were post term pregnancy and thus the conclusion made from these studies was that in post term pregnancy AFI was better predictor of adverse fetal outcome as compared to SDVP technique.

Regarding mode of delivery in the present study, 22.1% (n=17) had caesarean delivery, 5.2% (n=4) had instrumental delivery and 72.7%(n=56) had normal vaginal delivery in the SDVP group. And in

the AFI group 23.4% (n=18) had caesarean delivery and 1.3 % (n=1) had instrumental delivery and 75.3% (n=58) had normal vaginal delivery. There was no statistical difference between the two groups in terms of caesarean delivery and instrumental delivery. Similar to the present study, there was no difference in the rate of caesarean delivery and the instrumental delivery between the two groups in the study by Alfirevic et al,¹⁶ Myles et al,³ Fisher et al,⁸ and Morris et al.⁵ And in the study by Magann et al,¹⁷ Youssef et al⁴ and Chauhan et al,¹³ there was higher incidence of caesarean section and instrumental delivery in the SDVP group as compared to the AFI group. But in the study by Miyamura et al¹⁵ and Moses et al¹² there was higher incidence of caesarean delivery and instrumental delivery in the AFI group as compared to the SDVP group. These studies showed variable results and superiority of one method over the other cannot be established.

Admission to the special care baby unit was 7.8% (n=6) in SDVP group and 6.5% (n=5) in the AFI group. This was also not statistically significant in between the groups. Similarly APGAR score at five minutes of less than seven was 5.2 % in SDVP group and 2.6 % in AFI group. This value is not statistically significant as p-value is 0.677. There were no neonatal mortality in the either group. There were no significant difference in the rate of admission to special care baby unit and lower APGAR score at five minutes in the either group in the studies by Alfirevic et al,¹⁶ Chauhan et al,¹³ Magann et al,¹⁹ Moses et al,¹² Verrotti et al,⁹ Moore et al,¹⁸ and Dassari et al,¹⁴ similar to this study.

Hence, from the present study we can interpret that there was more incidence of oligohydramnios in the AFI group as compared to SDVP group without difference in the rate of induction of labor, occurrence of fetal distress, admission to special care baby unit, nonreactive CTG pattern, meconium staining of liquor, APGAR score of less than seven at five minutes and mode of delivery.

CONCLUSION

From our study we conclude that in non-high risk pregnancy, AFI technique detects slightly more number of oligohydramnios as compared to SDVP technique without apparently any difference in perinatal outcome in terms of occurrence of fetal distress, abnormal CTG findings, mode of delivery, low APGAR score at five minutes and admission of neonates to special care baby unit.

LIMITATIONS OF THE STUDY

The sample size of our study was very small and the duration of the study was also only three months. And also more accurate result would have come if the outcome was measured only in oligohydramnios patients of the either group.

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