Amniotic Fluid Index in High Risk Pregnancies and Pregnancy Outcome

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The study was undertaken to determine whether women with high risk pregnancies and amniotic fluid index (AFI) < 5 cm require operative delivery to prevent adverse perinatal out come. All women of high risk at > 37 weeks gestation with an amniotic fluid index < 5 cm were admitted to the hospital for follow up. Each patient was compared with the next patient at high risk seen with an amniotic fluid index >5cm and the same pregnancy complications. Case patients were also matched with control subjects for maternal age, parity and gestational age. The Apgar score was calculated at 5 minutes of birth. The new borns, with Apgar score < 6 at 5 minutes of birth were labeled as diseased and >6 labeled as healthy. 30% patient in low < 5 cm amniotic fluid index had IUGR on the contrary 10% patient in > 5 cm had IUGR. In low amniotic fluid group LSCS rate was 70%. In normal amniotic fluid index caesarean section rate 30%. Neonatal out come in < 5 cm amniotic fluid index 70% had low Apgar score. In normal amniotic fluid index poor Apgar score was 20% & 10% patient with low Apgar score required admission. Low AFI is a predictor of adverse out come for high risk term pregnancies.

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Key words: Amniotic fluid index, high risk term pregnancy

Introduction

Amniotic fluid is an important part of pregnancy sac and helps foetal development. It has number of important functions like development of musculoskeletal system by permitting foetal movement. Growth and development of gastrointestinal system by swallowing amniotic fluid. Amniotic fluid volume rises to a plateau between 22-39 weeks of gestation reaching upto 700-800 ml, which corresponds to an amniotic fluid index of 14-15 cm. Assessment of amniotic fluid volume by ultrasonography is more reliable.[1] During the last 30 years a wide range of tests have been introduced to determine foetal wellbeing including AFI. Oligohydramnios was defined as when AFI < 5 cm. It is calculated as the sum of deepest vertical dimension in each quadrant of uterus.[2] Previously amniotic fluid volume can be measured by dye-dilution techniques and direct quantification at the time of caesarean delivery, both methods are invasive, can not be used serially to evaluate high risk pregnancies.[3]

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Ultrasound techniques, the amniotic fluid index and single deepest pocket are currently available to detect oligohydramnios, to predict variable deceleration, risk for caesarean delivery for foetal distress and low Apgar scores.[4] A finding of diminished amniotic fluid index is generally perceived as a sign of placental in sufficiency.[5] There is a consistent association between low AFI and conditions like pregnancy induced hypertension, post dated pregnancy and IUGR resulting in poor foetal out come.[6] In fact, high risk patients with low amniotic fluid index need to deliver quickly. So, an assessment of amniotic fluid volume has become an important component of antenatal testing for the high risk pregnancy. The chronically stressed foetus is likely to have low amniotic fluid because of shunting of blood to brain and heart lead to decreased renal blood flow which subsequently leads to decreased urinary output. Because primary component of amniotic fluid in third trimester is foetal urine, ongoing chronic stress recognized as oligohydramnios.[7] Reduced liquor volume in labour may reduce the volume of intervillous space which may predispose to umbilical cord occlusion, both of which increase the risk of foetal hypoxia and will affect the Apgar score of baby at birth. Apgar score describes cardio – respiratory and neurological depression of newborn. So patients with low AFI < 5 cm should be admitted in the hospital. The aim of this study an AFI < 5 cm with high risk pregnancies is an appropriate threshold for pregnancy intervention to prevent adverse pregnancy out come.

Methods

This prospective observational study was carried out in the obstetrics and Gynecology Department of Rajshahi Medical College Hospital. A total of 200 pregnant women were recruited from the inpatient department during the period of February 2008 to January 2009. Subjects were demographically matched and fulfilled the inclusion and exclusion criteria. Pregnant women with cephalic presentation with intact membrane with post dated pregnancies, pregnancy induced hypertension, chronic hypertension and IUGR were included in the study. Exclusion criteria were pregnant women with preterm rupture of membranes, congenital abnormalities of foetus, haemolytic disease of mother as these conditions lead to poor pregnancy out come at birth. Other than low AFI after appropriate consent, patient was assessed using a questionnaire that included demographic information, history of menstrual cycle, last menstrual period, parity and medical history. Information data were collected from the patients and from their antenatal booking cards. Hundred high risk patients at term with an AFI < 5 cm was included in the study followed by next hundred high risk pregnant patient with an AFI > 5 cm with same pregnancy complications. On admission, the same team of obstetrician monitored the mode of delivery in both groups. The following out comes were assessed, a) AFI < 5 cm were labeled as a predictor of poor out come at birth and b) he new born with Apgar score < 6 at 5 minutes were labeled as diseased. Out come in both groups were carefully recorded and analyzed.

Results

The demographics of patients, gestational age and parity are shown in Table 1. Low AFI group had more nullipara. The frequency of different risk in pregnancy included 50% pregnancy induced hypertension, 10% chronic hypertension,10% post dated pregnancy and 30% IUGR was found in low amniotic fluid index group. On other hand in AFI > 5 cm, 10% IUGR cases were found

Table I: Demographic comparison between AFI < 5 cm or > 5 cm n= 200

Characteristics	AFI < 5 cm n = 100	AFI > 5 cm n= 100
Maternal age year mean ±SD	28±5.4	30±6.2
Gestational age (week)	38.1 ±1.03	38.0 ± 0.9
Nullipara	150(75%)	50(25%)
Multtipara	50(25%)	150(75%)

Table II: Association of low amniotic fluid index and high risk pregnancy

Characteristics	AFI < 5 cm n-100	%	AFI < 5 cm n- 100	%
High risk Pregnancy	50	50	50	50
Chronic-hypertension	10	10	10	10
IUGR	30	30	10	10
Post dated preg	10	10	30	30

Table III: Relationship of AFI with mode of delivery (n = 200)

Characteristics	AFI <5 cm n-100	AFI >5cm n-100
Spontaneous labour	10%	40%
Induced labour	20%	30%
LSCS	70%	30%

As shown in Table III caesarean section were more in the groups with AFI < 5 cm when compared to control.

Table IV: Relationship of AFI and neonatal out come (n=200)

Characteristics	Low amniotic fluid index <5cm n- 100	Amniotic fluid index >5cm n- 100
Low birth weight <2.5 kg	60(60%)	40(40%)
Normal birth weight >2.5 kg	40(40%)	60(60%)
Poor Apgar score at 5 minute < 6	70(70%)	20(20%)
Normal of Apgar score at 5 minute > 6	30(30%)	80(80%)
Perinatal morbidity required admission	10(10%)	0%

As shown in table IV low birth weight in the study group was 60% as against the control group where it was 40%. There were 70% babies in the study group with Apgar score less than 6 against 20% in the control group. 10% baby in the study group required admission to NICU and there was no perinatal mortality in either group.

Discussion:

AFI provides a quantitative result that is proportional to actual volume. It is well established that oligohydramnios is associated with high risk of adverse perinatal out come. The study showed that patients with unfavourable maternal and or foetal conditions such as IUGR or hypertension usually have poor Apgar score at 5 minute of birth in 70% of cases. This study showed that oligohydramnios in high risk pregnancies lead to poor out come at birth than normal AFI with the same high risk condition. Similar results were found by Sadia Sultana et al also compared high risk women with AFI < 5 cm

with subjects who had similar diagnosis of pregnancy complications but AFI more than 5cm.[8] Other studies have reported 4,337 and 139 cases.[9,10] In the present study in high risk pregnancies and matching the control well, we found significance of low AFI in high risk pregnancies. In our study there were no perinatal deaths but incidence of perinatal morbidity 10% which required admission in NICU. JM Morris et al found no perinatal death and incidence of perinatal death and incidence of perinatal morbidity was 0.4%.[11] Further more, there were 60% babies born with low birth weight. This indicates that reduced amniotic fluid volume < 5 cm had a association with growth restriction. Rutherford et al showed that when amniotic fluid index < 5 cm, 36% pregnancies resulted in infants with intra uterine growth restriction.[12] Foetal urine contributes significantly to the volume of amniotic fluid index. oligohydramnios associated with intrauterine growth restriction is secondary to increased resistance of flow through renal artery due to hypoxemia. The current local practices relies on AFI estimation particularly in the management of prolonged pregnancy and IUGR.[13] The increase in caesarean section rate 5.6% in the low amniotic fluid index group as suggested by cook and sweet.[14] In our study caesarean delivery rate for foetal distress 70% and induced labour 20%. There was spontaneous labour 40% and induced labour 30% in the study group. This study showed that women with high risk pregnancies with an amniotic fluid index < 5 cm with series of intervention of (Caesarean section, induction of labour) which prevent adverse perinatal out come. In a properly selected population of women with high risk pregnancy after adequate counseling the low amniotic fluid index may increase the operative delivery rate. On the contrary, low amniotic fluid index can prevent the perinatal mortality and morbidity.

Conclusion

AFI is a predictor of adverse out come for high risk antepartum or intrapartum pregnant ladies. The early significant association between low AFI and early obstetrical intervention in high risk pregnant women lead to alert altitude of the obstetrician. So, amniotic fluid index in high risk patient a good predictor of aggressive antepartum and intrapartum management.

References

1. Ever HF et al. Comparability of the amniotic fluid index and single deepest pocket measurements in clinical practice. Aus and NJ J of obstet Gynecol 2003; 43: 75-77.
2. Brace RA et al. Normal amniotic fluid volume changes throughout pregnancy. Am J obstet Gynecol 1989; 161: 382 – 8.
3. Casey BM et al. Pregnancy out come after antepartum diagnosis of oligohydramnios at or beyond 34 weeks gestation. AM J obstet Gynecol 2000; 182: 902 -12.
4. Murray E et al. Assessment of foetal growth size and well being. A guide to effective care in pregnancy and child birth. 3rd ed. Oxford university press 2000; 80 – 92.

5. `Desai pan kay et al. Decrease of amniotic fluid index in low – risk pregnancy. Any significance? J obstet Gynecol Ind 2004; 54(5) 464 – 466.
6. Magann EF et al. Does an amniotic fluid index of < 5cm necessitate delivery in high risk pregnancies? A case control study. Am J obstet Gynecol 1999; 180: 1354-9.
7. Evere HF Magann et al. Oligohydramnios at term and pregnancy out come. Fetal and Maternal medicine Review 2001; 12(3): 209 – 227.
8. Sultana S et al. Low amniotic fluid index in high risk pregnancy and poor Apgar score at birth. J of college of physicians and surgeons pak 2008; 18(10): 630- 634.
9. William J et al. Re evaluation of the relationship between amniotic fluid vol and perinatal out come. Am J of obstet and Gynecol 2005 June; 192: 1803-09.
10. Michaely et al. Longitudinal measurement of amniotic fluid index in post term pregnancies and its association with foetal out come. Am J obstet Gynecol 1995 Jan; 172(1): 142-146.
11. Morris JM. The usefulness of ultrasound assessment of amniotic fluid in predicting adverse outcome in prolonged pregnancy: a prospective blinded observational study. B JOJ 2003; 110: 989- 994.
12. Rutherford SE et al. The four – quadrant assessment of amniotic fluid vol an adjunct to ante partum fetal heart rate testing. Obstet Gynecol 1987; 76:353 – 356.
13. Homan M et al. Foetal MRI of the urinary system. Eup J Radiol 2006; 52: 303-11.
14. Cook RJ et al. The number needed to treat: a clinically useful measure of treatment effect. B M J 1995; 310: 452 - 454.