Original Research Article

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A Study to Compare the Maternal and Fetal Outcome in Term Singleton Pregnancies Having AFI < 8CM to those having AFI 8.1-20 CM.

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Abstract

Background and Purpose: Over many decades, studies have been conducted in various parts of the world in an attempt to correlate the AFI with fetal and maternal outcome. Recent studies, however, have challenged the relationship between amniotic fluid volume and poor perinatal outcome, especially the relationship between oligohydramnios and poor outcome near term, but still a lot of questions remain unanswered. Through this study we plan to look in Indian scenario for maternal and fetal outcome to correlate the AFI. *Method:* The present study was conducted in Department of Obstetrics & Gynaecology, Batra Hospital & Medical Research Centre, and New Delhi from 1st November 2014 to 30th April 2016. A total number of 100 women were recruited in this study. The women were divided into two groups each of 50 i.e. Group I (Study group) had women with low amniotic fluid index (AFI ≤ 8) and Group II (Control group) had women with AFI (8.1cm -20cm). All subjects were evaluated on the basis of predesigned and pretested proforma with respect to history, clinical examination and ultrasonography. *Results*: Majority of the women i.e. 66% and 62% were less than 25 years of age in the study group and control group respectively. A vast majority of the women (40% and 48%) were primigravida. Labour had to be induced in 80% of the women in study group but only in 10% in control group and the difference was highly significant (p <0.001). The caesarean section rate was 52% in the study group as compared to 22% in the control group which was significant (p value= 0.0018). There was no statistical difference in the meconium staining of the liquor in the two groups. There was statistically significant difference (p <0.05) in the rate of fetal distress in the two groups (34% in group I and 12% in group II), thus indicating that oligohydroamnios is associated with high rate of intrapartum fetal heart rate abnormalities. 35% of the women with induced labour had fetal distress in study group and 20% of women with induced labour had fetal distress in control group (p= 0.50), Thus, induction of labour does not seem to be cause of increased rate of fetal distress. There was no neonatal death. Perinatal complication was found in only 10% of neonates in study group and 4% in control group and difference was not significant. *Interpretation:* The present study supports the association of low amniotic fluid index (<8cm) with higher rate of intrapartum fetal distressin Indian pregnant women. This study also supports the association of low amniotic fluid volume to higher rates of caesarean section but no association was found between amniotic fluid volume and incidence of meconium staining of liquor. The present study also didn't suggest any association of poor Apgar score at 5 min and neonatal complications with low amniotic fluid volume.

Keywords: Maternal and Fetal Outcome; Singleton Pregnancies.

Introduction

Amniotic fluid (AF) is clear fluid which surrounds fetus in amniotic cavity in the

mother's womb. Amniotic fluid is derived from both fetal urine and perfusion activity of the chorioamnion, however, in second and third trimesters, it is produced primarily by fetal urine [1]. Hippocrates was the first to attribute the development of amniotic fluid to fetal urine. Amniotic fluid at any time is the balance between production and consumption.

There is a large variation of the amniotic fluid volume with period of gestation. It increases rapidly in the first half of pregnancy with closecorrelation with fetal weight, reaching a mean of 60 ml at the end of first trimester. Amniotic fluid volume (AFV) increases from about 25 ml at 10 weeks to about 400 ml at 20 weeks and by 28 weeks of gestation, it reaches 800 ml which corresponds to an amniotic fluid index (AFI) of 14-15 cm, then it plateaus near term gestation and thereafter declines to about 400 ml at 42 weeks decreasing at a rate of 8% per week [2]. It reduces further to a mean of 250ml and 160 ml at 43 and 44 weeks respectively [3].

Amniotic fluid index is the ultrasonographical method of estimating and quantifying amniotic fluid volume. It is calculated by adding the depth in centimetres of largest vertical pocket in each of four equal quadrants. Some authors consider amniotic fluid index between 5-20 cm at term gestation as considered normal [4].

An amniotic fluid volume more than the two standard deviation below the mean for specific gestational age or volume reduced below the 5th percentile for particular gestational age would define oligohydramnios [5].

Based on this definition volume less than 300 ml at term would constitute oligohydramnios.

Phelan et al defined oligohydramnios as AFI less than or equal to 5 cm and borderline as AFI between 5 and 8 cm between 36- 42 weeks of geststion [4] or Single deepest pocket (SDP) of less than 2 cm [6].

Oligohydramnios complicates between 0.5%- 5 % of all pregnancies [7].

Amniotic fluid indices as described by Phelan et al in 1987 are:

AFV	AFI (cm)
Oligohydramnios	< 5
Borderline	5.1 – 8
Normal	8.1 – 20
Polyhydramnios	> 20

Conditions which are commonly associated with:

- Early onset oligohydramnios are chromosomal abnormalities, congenital anomalies, ruptured membranes, fetal demise, following amniocentesis or chorionic villous sampling. It is also associated with twin to twin transfusion and drugs like Prostaglandin synthetase inhibitors and Angiotensinogen converting enzyme inhibitors.
- Late onset oligohydroamnios is associated with conditions like placental insufficiency in hypertension, preeclampsia, diabetes, hypovolemia, abruption and after ruptured membranes.

Oligohydramnios has adverse effects on fetus. It can lead to:

- Congenital deformities- characterized by facial compression (loose skin folds, especially beneath the eyes, flattened and beaked nose, large, flat ears) and positional redundant skin especially when it is early onset oligohydroamnios. When this combination of abnormalities result from renal agenesis it is called Potter's syndrome [8].
- Pulmonary hypoplasia- Severe oligohydramnios from 16 weeks onwards appears to preclude further pulmonary development. In contrast, oligohydramnios after the second trimester is unlikely to result in pulmonary hypoplasia because the crucial canalicular phase of lung development (occurring between 16 and 25 weeks) has largely been completed by this stage. Thus, the prevalence of pulmonary hypoplasia with oligohydramnios depends on several factors like the gestation at onset, the severity, and the duration [9].
- Late onset oligohydramnios has increased incidence of meconium stained liquor, abnormal FHR tracing, low Apgar score, low birth weight, admission to NICU, birth asphyxia and cesarean section for fetal distress. There is increased maternal and fetal morbidity. Maternal morbidity increases due to increased incidence of cesarean section. The perinatal morbidity and mortality is high due to increased risk of caesarean deliveries for fetal distress, low APGAR scores and meconium aspiration syndrome [10]. The possible explanation of this could be due to umbilical cord compression, potential utero-placental insufficiency and the increased incidence of meconium stained amniotic fluid and oligohydramnios [11].

Consequently, following ultrasonographical diagnosis of oligohydramnios at term, delivery is routinely advocated even in otherwise uncomplicated pregnancies with an appropriate-for-gestational-age

fetus, irrespective of the presence of reassuring fetal evaluation and the absence of maternal disease [12].

Materials and Methods

Study Site

The study was conducted in the Department of Obstetrics and Gynaecology, Batra Hospital & Medical Research Centre, New Delhi.

Study Population

Women attending antenatal clinic and delivering from 1st November 2014 to 30th April 2016 at Batra Hospital & Medical Research Centre.

Study Design

A prospective comparative evaluation of 100 pregnant women (50 cases & 50 controls) with singleton pregnancies at Batra Hospital & Medical Research centre, New Delhi, a tertiary care teaching hospital in North India, over a period of 18 months was done.

Selection Criteria

Inclusion Criteria

All booked & unbooked pregnant women fulfilling following criteria were included in the study:

1. Singleton pregnancy
2. Cephalic presentation
3. Intact membranes
4. Sure about dates and/or a sonogram in first trimester of pregnancy
5. AFI measurement within preceding 1 week of delivery.

Women with AFI ≤ 8 cm were included in the study (case) group and women fulfilling inclusion and exclusion criteria and having normal AFI were included in control group.

Exclusion Criteria

Pregnancy associated with:

1. Previous history of unknown perinatal loss
2. Any congenital malformation in fetus
3. Antepartum haemorrhage
4. Medical disorder i.e. diabetes, cardiac disease, hypertension, pre eclampsia were excluded from the study.

Methodolgy

At the time of enrolment into the study, a detailed history regarding the woman's name, age, period of amenorrhoea, her menstrual cycles, obstetric history and any past history of medical disorder was taken. The expected date of delivery was confirmed from menstrual date or ultrasound in first trimester of pregnancy. A written informed consent was taken from all the subjects. This was followed by general physical, systemic and obstetric examination. The woman was subjected to the investigations- haemoglobin, blood grouping, HIV, STS, HBsAg, glucose challenge test, urine complete examination, TSH and ultrasound examination.An ultrasound examination was performed on all the subjects included in the study at POG 37-41 weeks. Phelan method was used for measurement of AFI. The uterus was divided by using the umbilicus and the linea nigra as reference points for the upper and lower halves and for the left and right halves, respectively. The ultrasound transducer was in a perpendicular plane to the patient table and in a sagittal plane to the woman herself, but was never angled to follow the curvature of maternal abdomen. The largest vertical pocket, free of fetal parts and loops of cord, in each quadrant is measured and added to give the AFI (in centimetres). At the time of delivery details of the baby i.e. weight of baby, Apgar score and meconium staining was noted. Any need of caesarean section and admission of baby to neonatal intensive care unit (NICU) or and neonatal complication was recorded.

The markers of adverse perinatal outcome were studied as primary and secondary outcome measures.

Primary outcome measures were:

- Caesarean section
- Intrapartum fetal distress
- Meconium stained amniotic fluid
- 5 minute APGAR score < 7
- Low birth weight (defined as birth weight less than 10th percentile for gestational age).

Secondary outcome measures were:

- Neonatal complications like neonatal hypoglycemia, neonatal seizure and neonatal admission

- Length of stay in NICU.

Statistical Analysis

Data was collected; compiled, analyzed and valid conclusions were drawn. Data collected during the study was tabulated in Microsoft excel.

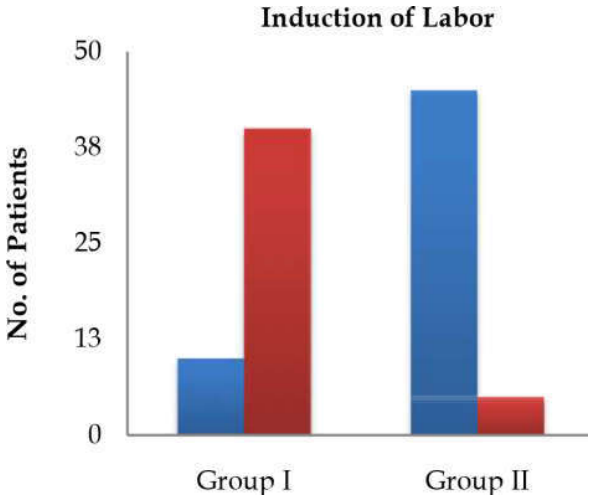
Statistical analysis was done using statistical software SPSS version 21.0

For all quantitative variables mean, median and standard deviations were calculated. Means were compared using Student's t-test for two groups. All qualitative variables were described as frequency or proportions which were compared using Chi square or Fisher's test, if applicable.

p value<0.05 is taken as significant.

Results and Discussion

1. Majority of the women i.e. 66% and 62% were less than 25 years of age in the study group and control group respectively. Mean age in group I was 24.16±3.52 years and in group II it was 24.7±3.24 years and were comparable (p value >0.05; not significant).
2. A vast majority of the women (40% and 48%) were primigravida in the study group and control group respectively.
3. Most of the women were from the urban background (60% in the group I and 52% in the group II) and were unbooked (56% in group I and 54% in group II).
4. Majority of the women were educated and only 10% of the patients were illiterate in both the groups.
5. 54% of the women in group I and 62% of the women in group II were delivered between 39-40 weeks. Mean gestation age in group I was 38.89±1.19 weeks and 39.06±1.03 weeks in group II and was comparable.
6. Labour had to be induced in 80% of the women in study group but only in 10% in control group and the difference was highly significant (p <0.001).
7. Vaginal delivery was the most common mode of the delivery (60%) in the control group. The caesarean section rate was 52% in the study group as compared to 22% in the control group which was significant (p value= 0.0018).
8. There was no statistical difference in the meconium staining of the liquor in the two groups (18% in group I and 14% in group II). P=0.58.
9. There was statistically significant difference (p <0.05) in the rate of fetal distress in the two groups (34% in group I and 12% in group II), thus indicating that oligohydroamnios is associated with high rate of intrapartum fetal heart rate abnormalities.
10. 35% of the women with induced labour had fetal distress in study group and 20% of women with induced labour had fetal distress in control group. There is no statistically significant difference between the two groups (p= 0.50). Thus, induction of labour does not seem to be cause of increased rate of fetal distress.
11. At 5 minutes, the Apgar score of <7 was found in only 4 neonates in group I and in 2 neonate in group II and the difference was not significant; p= 0.399
12. Majority of the delivered neonates had birth weight >2.5kgs i.e. 60% in group I and 70% in group II. Low birth weights neonates < 2.5kgs were not significantly higher (p= 0.30) in study group as compared to control group.
13. 6% neonates in study group and 4% neonates in control group were admitted to nursery and difference was not significant (p=0.64).
14. There was no neonatal death. Perinatal complication was found in only 10% of neonates in study group and 4% in control group and difference was not significant.



Graph 1:

Table 1: Induction of labor in two groups

Labor	Group I (Study)	Group II (Control)
Spontaneous	10(20%)	45(90%)
Induced	40(80%)	5(10%)
	(chi-sq test)c2 = 49.49; p< 0.05-highly significant	

Table 2: Association of fetal distress with mode of delivery and character of liquor in both the groups

Group	No. of Patients with Fetal Distress	Mode of Delivery in Patients having Fetal Distress			Character of Liquor in Patients with Fetal Distress	
		LSCS	Vaginal	Instrumental	MSL	Clear
Study (I)	17	7	8	2	3	14
Control (II)	6	3	3	0	2	4

Conclusions

The present study supports the association of low amniotic fluid index (<8cm) with higher rate of intrapartum fetal distress. The higher rate of intrapartum fetal distress may be due to earlier detection by abnormal fetal heart rate patterns during intense monitoring, thus leading to the prompt operative delivery of the fetus.

The study also supports the association of low amniotic fluid volume to higher rates of caesarean section.

In the present study, no association was found between amniotic fluid volume and incidence of meconium staining of liquor.

The present study also didn't suggest any association of poor Apgar score at 5 min and neonatal complications with low amniotic fluid volume.

Recommendations

- Amniotic fluid volume should be routinely measured in all antenatal patients near term as this study supports that AFI affects maternal and fetal outcomes.
- Patients with severe oligohydramnios should be closely monitored and delivered at well equipped centres.
- Standard management protocols need to be laid down for management of severe oligohydramnios so that swift & timely action can be taken, thus leading to improved maternal and fetal outcome.
- Adequate preventive measures can be taken in form of maternal hydration and bed rest to prevent further worsening of the condition.
- Large randomized control trials are needed to generalize the result of our study and derive a casual relationship between low amniotic fluid index and maternal and fetal outcomes.

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