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Original Research Article

Perinatal outcome of term pregnancies with borderline amniotic fluid index: a prospective case control study

Devika V. Desai*, Nigamananda Mishra, Gayatri V. Savani

Department of Obstetrics and Gynecology, Bhabha Atomic Research Centre and Hospital, Mumbai, Maharashtra, India

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***Correspondence:**

Dr. Devika V. Desai,

E-mail: devikadesai1090@gmail.com

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ABSTRACT

Background: It has been since antiquity that the importance of amniotic fluid and fetal growth with perinatal outcome is being documented. But the lacunae lies in studying the relationship between borderline amniotic fluid and perinatal outcome. The following study was undertaken to provide recent data that would help predict perinatal outcome in borderline AFI pregnancies.

Methods: About 144 patients were considered in the study OPD/IPD patients in obstetrics and gynecology department in Bhabha Atomic Research Centre and Hospital, with about 72 cases with borderline amniotic fluid index (5-8 cm) and controls with amniotic fluid index ≥ 9 -25 cm. Patients were selected and subjected to history taking, examination, ultrasound test with doppler studies and perinatal outcome documented over a period of one year.

Results: The incidence of borderline AFI in my study was 16%. 58% were primigravidas. Meconium stained liquor was found in 18% cases compared to 7% controls. Low birth weight was found in 12.5% cases and 2.7% in controls. On applying statistical test analysis chi square test, it was found that borderline amniotic fluid index in relation to presence of meconium stained amniotic fluid and low birth weight, p value was found to be statistically significant (<0.05).

Conclusions: Borderline amniotic fluid and perinatal outcome had significant relationship in terms of meconium stained liquor and birth weight while rest had no significance. Thus, borderline amniotic fluid patients require vigilant fetal surveillance.

Keywords: Borderline amniotic fluid, Doppler studies, Low birth weight, Meconium stained liquor, Perinatal outcome

INTRODUCTION

Amniotic fluid index is a marker for antenatal and intrapartum fetal monitoring in high risk pregnancies, and helps in early recognition of fetal compromise.¹ Phelan et al proposed the concept of amniotic fluid index, range being 5-25 cm, measured by adding single deep quadrant in all four quadrants.² Borderline AFI is defined as between 5-8 cm.³ There have been studies since antiquity suggesting a strong relationship between oligohydramnios and polyhydramnios and documented in

literature. Borderline amniotic fluid index is the least studied in terms of antenatal fetal surveillance, doppler indices and perinatal outcome. Hence, the following study.

METHODS

The study was undertaken post appropriate scientific and ethical committee approval. Patients OPD/IPD coming to an urban hospital >37 weeks of gestation were selected post inclusion and exclusion criteria and subjected to

history taking, examination and ultrasound study including doppler indices. Sample size calculated according to prevalence of 5% was 72.⁴ Total 72 cases with patients who are term with borderline amniotic fluid, singleton pregnancy were selected while preterm gestation, premature rupture of membranes, multiple pregnancies, anomalous fetus and previous caesarean were excluded. Case record forms were filled post consent of patients. Perinatal outcome was studied in terms of mode of delivery, type of delivery, fetal birth weight, liquor volume, Apgar score, need for NICU admission and also any antenatal doppler changes present was documented.

Statistical analysis

Statistical analysis was done using software SPSS version 20.0. Demographic factors and clinical characteristics were summarized as counts (percentages) for categorical variables like age, parity, amniotic fluid index, type and mode of delivery, fetal birth weight, doppler changes and need for resuscitation and NICU admission. Chi square test was used to find any significant association between variables. A p value of less than 0.05 was considered significant.

RESULTS

Study was undertaken to compare perinatal outcomes between patients with borderline amniotic fluid index with normal amniotic fluid index. Parameters studied were doppler changes in ultrasound, type of delivery, mode of delivery, fetal birth weight, apgar score and need for NICU admission or resuscitation. Out of total 72 cases majority were among age group of 26-30 years-around 52%. Among total 72 controls majority were

among age group of 20-25 years- around 37.5%. As per Table 1, majority of patients among borderline group were from AFI - 8 (51%) while majority of patients among control group were from AFI - 12-14 (45%).

Table 1: Distribution of AFI among cases and controls.

AFI	Cases
5	7 (9.7%)
6	9 (12.5%)
7	19 (26.4%)
8	37 (51.4%)
Grand total	72
AFI	Controls
9-11	21 (29.1%)
12-14	33 (45.9%)
15-17	13 (18%)
>18	5 (7.0%)
Grand total	72

Ultrasound done antenatally at term >37 weeks with doppler study stated-normal study in 87.5%, raised S/D ratio in 9.7 % followed by early prediastolic notching in bilateral uterine arteries seen in 1.4% and absent diastolic flow seen in 1.4% among borderline amniotic fluid index group. Around 45% among them, had to undergo caesarean section.

Similarly, among controls doppler studies stated-normal study in 93.1%, raised S/D ratio in 5.6 % followed by raised S/D with decreased PI values 1.4% among controls. Around 25% underwent caesarean section. Rest of the group had normal doppler studies.

Table 2: Results of various parameters among and cases and controls.

Parameters	Cases (no.) N =72	Percentage	Controls (no.) N =72	Percentage
Parity				
Primigravida	42	58.3%	41	56.9%
Multigravida	30	41.7%	31	43.1%
Type of delivery				
Induction of labor	34	47.2%	28	38.8%
Spontaneous	38	52.8%	44	61.1%
Mode of delivery				
Caesarean section	29	38%	20	27%
Normal vaginal delivery	43	62%	52	73%
Meconium stained liquor	13	18.1%	5	7%
Apgar score <7	3	4.2%	2	2.8%
Low birth weight	9	12.5%	2	2.7%

According to Table 2, it is evident that primigravida constituted the majority among both cases and controls. Cases underwent induction of labor more than controls by a small margin, while rest came in spontaneous labor. It

is clear that cases underwent caesarean section of around 38 percent as compared to controls of around 27%. Meconium stained liquor and low birth incidence was observed to be largely high as compared to controls.

Majority underwent LSCS in view of non-progress of labor (35.7 %) with others being failed induction (17.9%) and meconium stained liquor in 14.3% in cases while among controls around 45% underwent LSCS in view of non-progress of labor with others being fetal distress 25%, cephalopelvic disproportion in labor 10% and meconium stained liquor 5% among controls.

The following Table 3 depicts the rate of NICU admissions among cases and controls and respective indications. On applying statistical test analysis chi square test, as depicted in Table 4 it was found that borderline amniotic fluid index in relation to presence of meconium stained amniotic fluid and low birth weight, p value was found to be statistically significant. Chi square

test when applied for rest it was found to have no statistically significant relationship.

Table 3: NICU admission among cases and controls.

NICU admission	Cases (no.)	Controls (no.)
Hypoglycaemia	1	-
Perinatal asphyxia	2	-
LBW	1	-
RDS	1	-
Tachypnoea	-	1
Early onset sepsis	-	1
Total	5	2

Table 4: Test of significance applied.

Sr. No.	Parameter	Cases	Controls	p value	Significance	
1	Type of delivery	LSCS	29	20	0.1134	No
		Vaginal	43	52		
2	Doppler changes	Present	9	5	0.2605	No
		Absent	63	67		
3	Color of liquor	Clear	59	67	0.04382	Yes
		Meconium stained	13	5		
4	Birth weight	LBW	9	2	0.028	Yes
		Normal	63	70		
5	Apgar score	<7	3	2	0.6489	No
		>7	69	70		
6	NICU admission	Yes	5	3	0.46685	No
		No	67	69		

DISCUSSION

A prospective case control study was done over a span of 1 year consisting of women of any parity at term i.e. >37 weeks with singleton pregnancy in unscarred uterus. A total of 144 pregnancies were considered out of which 72 were cases with borderline amniotic fluid with 72 controls having normal amniotic fluid index.

Ultrasound doppler parameters and perinatal outcomes were compared. Ultrasound parameters was done on OPD/IPD basis after 37 weeks of gestation along with doppler indices and compared the perinatal outcomes in terms of type of delivery, mode of delivery, fetal birth weight, Apgar score, need of intensive care unit management and resuscitation.

Age group

Our study included maximum patients between age group of 26-30 years. Ray et al had 73% among age group 20-29 years, whereas Tajinder et al had age group of 21-25 years as maximum number around 66%, and Mahapatrol et al had 85% belonging to age group 20-29 years.⁵⁻⁷

Parity

This study included primigravida's as maximum patients in both cases and controls. Similarly, Mahapatrol et al had primigravida's as majority.⁷ Jayathi Nath et al on the contrary had multigravidas as most common group around 64%.⁸

Borderline amniotic fluid and its incidence

In this study, we have considered borderline AFI as 5-8 cm. However, Baron et al and Kwon et al also defined borderline oligohydramnios as amniotic fluid index of 5.1-8 cm whereas, Gumus et al have described borderline as AFI of 5.1 cm to 10 cm.^{4,9,10} Magann EF et al conducted a meta-analysis in the year 2011 and stated the incidence of borderline oligohydramnios (AFI 5.1-8 cm) as 6% to 44% with overall incidence being 12%.¹¹ In this study, over a duration of one year incidence of borderline amniotic fluid was found to be 16%. Literature has stated that with advancing gestational age patients with borderline amniotic fluid index around 16% will have oligohydramnios.¹² The morbidities associated with oligohydramnios has already been known to us.

Doppler changes

There was an increased incidence by five fold in adverse perinatal outcome in patients with associated doppler changes in borderline amniotic fluid index patients in study by Kwon et al.⁴ Gaikwad et al found a rate of doppler changes in borderline AFI group as 15%.¹³ Doppler indices studies done suggest that MCA/UA PI indexes a very sensitive and specific index for predicting fetal outcome. Decreased diastolic flow or reversal of 'a' wave flow has poorer outcome.¹⁴

Type of delivery

Jamal et al had found the incidence of caesarean section in borderline amniotic fluid index group around 26% more than the control group of normal amniotic fluid around 11 % whereas in this study rate was 38% in case group with around 27% in control group.¹⁵ Patel et al reported the rate of caesarean section to be around 40% and Blaras et al as 44% in women with borderline oligohydramnios which was higher as compared to this study.^{16,17} In this study, the rate of caesarean section done for fetal distress in borderline amniotic fluid group was 4% as compared to 30% in control group. On the contrary, it was around 58% in study by Patel et al, Ulker et al reported that the rate of caesarean section for fetal distress as 44% in women with borderline amniotic fluid and it was significantly higher than among women with normal liquor volume.^{16,18} Similarly, Kwon et al, also found that caesarean delivery for fetal distress was more

common in borderline AFI group.⁴ Similarly, Mahapatrol et al observed an incidence of 29% LSCS rate, 2% instrumental vaginal delivery and 66% vaginal delivery.⁷

Meconium stained liquor

Meconium stained liquor is a known complication in oligohydramnios and in itself has morbidities in perinatal period. In this study, there was increased incidence of meconium stained liquor around 18% as compared to control group 5%. Studies by Baron et al and Kwon observed no any significant difference in the incidence of meconium staining of liquor between women with borderline oligohydramnios and women with normal amniotic fluid volume.^{4,9} Giri et al, conducted a similar case control study for a duration of one year considering singleton term pregnancies around 165 with borderline AFI and compared the perinatal outcomes with normal AFI. It was found that there was increase in the incidence of caesarean sections around 33%, meconium stained amniotic fluid, low Apgar scores, increased incidence of NICU admission but no significant incidence of intrauterine growth restriction. It was thus concluded that, borderline amniotic fluid index was associated with increased incidence of adverse perinatal outcomes which would require good antenatal fetal monitoring. They observed Apgar score of <7 at 5 minutes of life in 8% and rate of NICU admission as 18%. Borderline AFI group with low birth weight was around 12% in this study. Similarly, Giri et al reported an incidence of 14%.¹⁹

Table 5: Comparison of different studies.

Parameters	Gaikwad et al ¹³	Wood et al ²⁶	Giri et al ¹⁹	Ray et al ⁵	Present study
LSCS	19%	53%	33%	50%	38%
MSL	25%	16%	31%	76%	18%
Apgar <7	5.8%	5%	8%	3.7%	4.2%
LBW	64%	-	12%	50%	12.5%
NICU admission	10%	20%	18%	-	6.9%

Perinatal outcome

In this study, neonates with an Apgar score less than 7 at 5 minutes of life were significantly higher among women with borderline oligohydramnios (4%) as compared to women with normal liquor volume (1%). The rate of NICU admission was also significantly higher among women with borderline oligohydramnios (7%) as compared to women with normal liquor volume (2.7%). Similar to this study, Kwon et al, also observed a greater risk of neonates with an Apgar score less than 7 at 5 minutes of life and more NICU admission among women with borderline AFI.⁴ Banks et al, evaluated the perinatal outcome (intrapartum fetal distress, 5 minutes Apgar score <7 and meconium stained liquor) in women with borderline AFI and found that there was an increase in the incidence of adverse perinatal outcomes. 20 Similarly,

Gumus et al also observed significantly increased incidence of NICU admissions in women with borderline AFI.¹⁰ Hashimoto et al stated that Apgar score <7 at 5 minutes of birth did not differ between two groups and there was increased NICU admission around 20.2% in the borderline AFI group.²¹ Ghike et al, observed the incidence of NICU admission as 19.05%.²² Asgharnia et al, reported the incidence of NICU admission as 14.9% and Apgar score <7 at 5 minutes of birth as 20.2% in women with borderline oligohydramnios and both values were significantly higher than that seen in women with normal liquor volume.²³ Similarly, Jamal et al reported that though there was a higher incidence of meconium stained liquor in women with borderline AFI and there was no significant difference in 5 minutes Apgar score, birth weight and NICU admission.²⁴ In contrast, study done by Yaqoob et al, adverse perinatal outcomes were

not found to be associated with borderline perinatal outcome.²⁵ The Table 5 describes the comparison between variables analyzed in various studies and the present study. As is evident, NICU admissions are least in the present study while LSCS rate and Apgar scoring is almost similar. Meconium stained liquor and low birth weight are also on lower side.

Wood et al studied the relationship of borderline amniotic fluid with fetal intrapartum tolerance of labor, antenatal surveillance and outcome. He concluded that there is no significant difference in the parameters. Borderline amniotic fluid patients tend to undergo frequent antenatal surveillance offering no added benefit in the management. There was also increased presence of associated IUGR in these patients.²⁶ Amniyos et al studied three groups of AFI - ≤ 3 cm, 5 - ≤ 8 cm and 8 - ≤ 24 cm and compared the antenatal fetal parameters, intrapartum labor details and perinatal outcome. It was stated that with increasing gestational age, there was decrease in amniotic fluid volume with increase in abnormal fetal heart tracings, fetal distress. But there was no relation with cervical findings.²⁷ Intrauterine growth restriction is well associated with adverse perinatal outcomes, and increased surveillance in its presence is both warranted and indicated antenatally and intrapartum.²⁸

Every case needs to be individualized with respect to timing and route of delivery after appropriate discussion with the patient and relatives. Also providing good neonatal intensive care facilities helps optimize the perinatal outcome.⁵

In an era of cost effectiveness, it would seem reasonable to question the utility of increased surveillance for these pregnancies in case other co morbidities are not present. Multiple studies have reported an increased incidence of growth restriction or suboptimal growth in the setting of a borderline amniotic fluid index.²⁹⁻³³

There could not be any specific perinatal care or other protocols for these patients and that could be because of different reasons such as the variations in the study designs, the likelihood of a borderline index varied from 6-44% and 25-35% and the absence of specific statistics to determine the thresholds of adverse outcomes, and therefore, more research will be required to find out the effect of AFI on adverse pregnancy outcome.³⁴⁻³⁶

Thus, study have seen a beautiful comparison and discussion of various studies and results along with graphical and tabular representation for better understanding.

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