



MATERNAL AND PERINATAL OUTCOMES IN BORDERLINE OLIGOHYDRAMNIOS IN A TERTIARY CARE CENTRE: AN OBSERVATIONAL PROSPECTIVE STUDY

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Introduction

Amniotic fluid is the protective fluid contained in the amniotic sac in a gravid uterus. This fluid acts as a cushion for the growing fetus and facilitates the exchange of water, nutrients and biochemical products between the mother and the fetus. Amniotic fluid is the ultrafiltrate of maternal plasma. It passes through the fetal membrane through osmotic and hydrostatic forces. Fetal kidneys become functional at approximately 16 weeks, fetal urine also contributes to the fluid. Although amniotic fluid is mainly removed by the fetal swallowing, some amount of fluid is absorbed by the fetal skin as well.

Amniotic fluid volume is also related to gestational age. Amniotic fluid measures approximately around 50 mL at 12 weeks, 400 mL at 20 weeks, and reaches almost 1 L at 36-38 weeks. Thereafter, the volume reduces to 600-800 mL at term gestation. It further decreases to approximately 200 mL beyond 42 weeks [1]. The fluid acts as shock absorber and protects the fetus from extraneous injuries. Additionally, it allows growth of the fetus and its free movement. Amniotic fluid guards against umbilical cord compression. Its aseptic and bactericidal action protects the fetus and prevent infection in the uterine cavity [1]. Amniotic fluid is an indicator of the placental function and is used for assessing fetal well-being. Amniotic fluid index (AFI) is calculated by adding the depth in centimeters of the largest vertical pocket in each of the four equal uterine quadrants. Normal AFI ranges between 8.1 and 25 cm. AFI of ≤ 5 cm is defined as severe oligohydramnios. Borderline oligohydramnios (BO) is defined as AFI of 5.1-8 cm [2].

According to some studies, borderline AFI increases the risk for cesarean section because of fetal distress and increases the incidence of low Apgar score, low birth weight (LBW), respiratory distress and increased need for neonatal intensive care unit (NICU) admission [2-4]. However, Luo et al. did not find any such correlation in terms of fetal distress or neonatal mortality. Even though the incidence of cesarean delivery in unfavourable cervical ripening was not assessed for every

patient, it was determined according to the cervical condition of the patient; hence, it was not assessed in the study.[5] In their study, Choi et al. did not find any correlation between borderline AFI and fetal outcomes [6]. Despite several studies, the prediction of adverse pregnancy outcomes in the presence of borderline AFI is not definite and hence prenatal surveillance is not recommended in borderline AFI [2]. We aimed to investigate the maternal and perinatal outcomes in borderline AFI.

Materials and methods

Study setting: Department of Obstetrics and Gynaecology, Swami Vivekananda Medical College and Research Institute, Tiruchengode, Tamil Nadu.

Study period: March 2024 to February 2025.

Study design: Observational prospective study.

Study participants: Women with singleton pregnancy with borderline oligohydromnios in their third trimester will be enrolled in this study.

Sample size:

On the basis of statistics obtained from Department of Obstetrics and Gynaecology, Swami Vivekananda Medical College and Research Institute, an average of 8 cases per month fitting the criteria of the study with study duration of 12 months, we can expect to have $N=96$. Based on this population size, using YAMANE equation, for a known population size, sample size (n) equal to

$$n = \frac{N}{1 + Ne^2}$$

n =sample size

N =population size

e = margin of error (for 95% of confidence level, margin error =0.05)

$$n = \frac{96}{1 + 96 * 0.05 * 0.05} = \frac{96}{1.24} = 78$$

Therefore, after approximating, the sample size of the study participants was fixed at 80.

Institutional Ethics Committee approval was obtained before commencing the study. Patients were recruited in the antenatal clinic after applying inclusion and exclusion criteria.

Selection of participants:

Inclusion criteria:

1. Women with singleton pregnancy of gestational age between 28 and 40 weeks.
2. Pregnant women with Amniotic Fluid Index (AFI) levels of 5.1-8cms.

Exclusion criteria:

1. Subjects those who are not willing to participate in this study.
2. Pregnant women with multiple gestations, PROM(Premature rupture of membranes), PPRM(Preterm premature rupture of membranes), Polyhydromnios, Severe oligohydramnios and those undergone previous caesarean sections.

Methodology:

All eligible patients willing to participate in the study will be enrolled. After obtaining informed consent and thorough history, clinical examination, and necessary investigations, an ultrasound examination will be performed to assess fetal well-being and determine AFI.

Pehlan's technique will be used while performing ultrasonography (USG) to determine AFI. Obstetric USG with Doppler study (umbilical artery) will be done initially to decide the management plan.

The uterus will be divided into four imaginary quadrants with the linea nigra and a mediolateral line running through the umbilicus acting as the vertical and the horizontal axes, respectively.

The deepest pocket devoid of the umbilical cord and fetal parts was measured in the vertical dimension. The measurement of the four pockets will be done in centimeters. The sum of all four quadrants is the AFI value. The study will comprise patients with AFI of 5.1 - 8 cm.

Pregnant women will be supplemented with oral Arginine and intravenous hypotonic fluids and aminoacid infusion.

Fetal surveillance will be done with weekly USG and alternate-day Nonstress Test (NST). Doppler velocimetry will be carried out during ultrasound examination. Continuous intrapartum fetal tracing will be done during labor.

Timing and mode of delivery were based on the obstetric indication. Induction of labor will be done based on Bishop's score. For patients in labor, strict intrapartum surveillance will be performed.

Maternal outcomes will include the mode of delivery and term or preterm delivery. Perinatal outcomes included Apgar score, Respiratory distress syndrome (RDS), meconium aspiration syndrome, low birth weight and sepsis.

Method of data analysis:

The data will be compiled by using Microsoft Excel 2010 and analysed by using IBM SPSS Statistics 23 (IBM Corp., Armonk, NY, USA). Quantitative data will be presented as mean and qualitative data will be presented as frequency and percentage. Association between variables will be determined using the chi-square test, and pvalues of <0.005 will be considered to be statistically significant.

Results

Table: 1 A total of 80 women with borderline AFI were enrolled in the study. In our study, the mean maternal age was 28 years.

Maternal age in years	No. of patients	Percentage
20-25	9	11.25
26-30	38	47.5
30-35	27	33.7
36-40	6	7.5

Table: 2 Primigravida exceeded the number of multigravidas in our study. Primigravida contributed to 61.2% of the study population.

Parity	No. of patients	Percentage
Primigravida	49	61.2
Multigravida	31	38.8

Table: 3 The patients with range of AFI 7.1-8cm was the highest amounting to 60% in our study.

AFI in cm	No. of patients	Percentage
5.1-6	9	11.25
6.1-7	23	28.8
7.1-8	48	60

Table: 4 Gestational age of borderline AFI in our study was more from 37-40weeks in the present study.

Gestational age in weeks	No. of patients	Percentage
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28-32	19	23.8
33-36	28	35
37-40	33	41.3

Table: 5 Admission NST was reassuring in 72.5% of cases in the study.

NST	No. of patients	Percentage
Reassuring	58	72.5
Non reassuring	22	27.5

Table: 6 In our study we could observe that the termination of pregnancy after 37weeks was higher amounting to 52.5%.

Gestational age	No. of patients	Percentage
Term	42	52.5
Preterm	38	47.5

Table: 7 Mode of delivery

Mode of delivery	No. of patients	Percentage
Vaginal delivery	33	41.3
Caesarean section	47	58.8

Table: 8 Indication for caesarean section

Indications	No. of patients	Percentage
Fetal distress	18	38.3
Meconium stained liquor	10	21.3
IUGR	7	14.9
Breech presentation	2	4.3
Nonprogression of labor	6	12.8
CPD	4	8.5

Table: 9 Perinatal outcomes were computed as follows. 28 babies born to mothers with borderline AFI (35% of the neonates) required NICU admissions in our study.

Reason for NICU admissions	No. of babies	Percentage
APGAR <7 at 5min	6	21.4
RDS	7	25
MAS	4	14.3
LBW	8	28.6
Sepsis	3	10.7

Discussion

In the past several years, many studies have been conducted to determine the association between borderline AFI and perinatal outcomes. In most of these studies, rates of maternal and fetal complications were higher in pregnancies with borderline AFI [2]. The importance of the amniotic fluid volume as an indicator of fetal status with the normal functioning placenta and Borderline Oligohydromnios as an indicator of chronic hypoxia is a recent development [7].

In our study, the mean maternal age was 28 years compared to 23.9years in a previous study. We found that Borderline Oligohydromnios was more common in primigravida, which was similar to previous studies[8- 10].

In our study, maternal outcomes such as preterm delivery, meconium-stained liquor, and higher rates of LSCS were seen, similar to a previous study [11]. Similarly, poor perinatal outcomes such as Apgar score of <7, RDS, higher NICU admissions, and LBW were also more in patients with Borderline Oligohydromnios, which is consistent with another study reporting a higher incidence of small for gestational age, cesarean section for fetal distress, meconium stained liquor and NICU admissions in the borderline AFI group [12]. However, another study reported no significant difference in meconium staining, cesarean section rate, LBW, low Apgar score, and the need for NICU admission. There were no neonatal deaths in our study [13]. This may be because of the better NICU facilities available in our institute. We did not find any congenital malformation in babies in the borderline AFI group, whereas a previous study showed a higher incidence of fetal malformations in the borderline AFI group [14].

Overall, 47% of cases underwent LSCS in our study which was comparable to that reported by Chaudhari et al. [10]. The most common cause of LSCS in the borderline AFI group was fetal distress (38.3%), as shown by nonreassuring CTG. Moreover, vaginal delivery was also significantly higher in our study, which was comparable to another study [14,15]. Pregnant women below the gestational age of <28 weeks were not included in our study as it is associated with poor perinatal outcomes. Additional monetary concern regarding the affordability of NICU was also another factor. A previous study reported an increased rate of cesarean sections due to fetal distress and meconium-stained liquor in patients with Borderline Oligohydromnios, as well as increased occurrence of LBW (<2.5 kg) which was similar to our study [15].

We found 21.4% of neonates had Apgar scores of <7 at one minute and 28.6% had birth weights of <2.5 kg in the study, which are comparable to the study of Manning et al. [17]. The incidence of LBW and IUGR was high possibly due to chronic placental insufficiency. AFI is an indicator of normal placental function and placental insufficiency in borderline oligohydromnios may lead to decreased fetal growth. Similar findings were reported by Chaudhari et al. [10]. NICU admissions in our study was 35% which was comparable to the findings of Jhonson et al. [18]

A study found a correlation between borderline AFI group and neonatal complications such as low Apgar score, IUGR, LBW, and the need for NICU admission, which was similar to that found in our study [14].

Study limitations

First, because our sample size was small, our results cannot be applied to whole population. Fetal distress was diagnosed based on CTG, which can lead to subjective bias, and it was not confirmed with fetal scalp blood sampling

Conclusion

Patients with borderline AFI have a higher risk of adverse perinatal outcomes in the form of fetal growth restriction, preterm birth and fetal malformations. This is especially true for patients presenting with borderline AFI before 24 weeks of gestation. Hence, there is a need for intensive fetal surveillance from early gestation in the antepartum period. Adequate oral and intravenous hydration therapy along with fetal monitoring can have fruitful maternal and perinatal outcomes. During labor, proper vigilance and continuous electrofetal monitoring become the key for better fetomaternal outcomes. Every case needs careful antenatal assessment, follow up and individualization of the decision regarding the timing and mode of delivery. Future well-controlled trials with larger sample sizes should focus on the evaluation of the management strategy for improving fetomaternal outcomes in patients presenting with borderline AFI.

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