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Comparison Of Maternal And Perinatal Outcome Of Isolated Borderline Amniotic Fluid Index Versus Normal Amniotic Fluid In Low-Risk Pregnancies At Term

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Abstract

Objective: The objective of the study was to compare the maternal and perinatal outcomes in low-risk pregnancies having borderline Amniotic fluid index with normal amniotic fluid index at term.
Methods: This prospective observational study, included 540 low-risk pregnant women admitted at POF Hospital Wah Cantt between 1st June 2020-31st Dec 2022. Group A had 180 women with borderline AFI having normal umbilical artery Doppler and group B had 360 women with normal AFI between 37-40 weeks, who fulfilled the inclusion criteria. The data regarding baseline characteristics and fetomaternal outcome was collected on an already designed proforma and analysis was done by using SPSS version 23.
Results: The difference in overall cesarean section rate (p=0.071) and cesarean section for fetal distress (p=0.076) was not statistically significant between the two groups. The borderline AFI did not increase the risk of meconium-stained liquor (p=0.116), 5minute APGAR score <7 (p=0.218), admission to NICU (p=0.064) and low birth weight (mean birth weights p=0.278) compared to normal AFI.
Conclusion: Borderline oligohydramnios does not increase the risk of cesarean section and cesarean section for fetal distress. There is no increase in the risk of meconium-stained liquor, 5-minute APGAR score<7, admission to NICU and low birth weight.
Keywords: Amniotic fluid index, borderline oligohydramnios, cesarean section, fetal distress, meconium-stained liquor.

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1. Introduction

Amniotic fluid is required not only for the protection of the fetus from external trauma but also for the development of the gastrointestinal tract, neuromuscular and respiratory system[1,2]. The production of amniotic fluid increases from 30ml at 10 weeks to 800ml at 40 weeks. It is regulated by fetal swallowing, urination, respiratory tract and intramembranous absorption.[3]Amniotic fluid volume measurement is an integral component of the biophysical profile, and is used to assess the wellbeing of the fetus[4,5]. Amniotic fluid index (AFI) is the most frequently used quantitative method to assess the volume of amniotic fluid. Using transabdominal ultrasound, the vertical depth of the amniotic fluid pool devoid of the umbilical cord is measured in all quadrants of the uterus. By summing these AFI is calculated at [6,7,8].

Normal AFI is between 5-25cm while AFI <5 is labelled as oligohydramnios and AFI between 5 - 8cm is generally considered borderline oligohydramnos[9].

The causes of reduced liquor include fetal anomalies, in-utero restriction of growth, hypertensive disorders, vascular diseases and intake of NSAIDs in pregnancy. If no cause is detected, it is labelled as idiopathic isolated oligohydramnios[9,10]. Not only does oligohydramnios increase the risk of cesarean delivery, but it also leads to low birth weight babies, poor APGAR scores, and admissions to the neonatal intensive care unit (NICU)[11,12,13].

Studies on maternal and perinatal outcomes of borderline oligohydramnios have shown controversial results. Most of the studies have shown an increased risk of fetomaternal complications, while some have shown no increase in complication rate when compared with normal AFI. Some studies have included all women with borderline AFI, while other studies have included only low-risk women. There is little data on the perinatal outcome of isolated borderline oligohydramnios and there are no

clear guidelines for the management of these patients.

The study was planned to compare the maternal and perinatal outcomes of women having idiopathic isolated borderline oligohydramnios with those having normal AFI at term, and both groups were without comorbid. The rationale of the study was that if an association of isolated borderline AFI with adverse pregnancy outcomes is confirmed, then we can increase antenatal and intrapartum surveillance. This will improve maternal and perinatal outcomes.

2. Materials & Methods

This was an observational prospective study, carried out in the Department of Obstetrics and Gynecology after approval by the ethical committee. The study was conducted from 1st June 2020 to 31st Dec 2022. It included 540 women, both primigravida and multigravida, who fulfilled the inclusion criteria. It included women with low-risk pregnancies, who had single cephalic fetuses and delivered between 37-40 weeks of gestation. We excluded women who had multiple pregnancies, intrauterine growth restriction Preterm prelabour rupture of membranes, antepartum haemorrhage, congenital anomaly, previous cesarean section, myomectomy, Amniotic fluid index (AFI) <5cm or >25cm, hypertensive disorders of pregnancy, diabetes or any other disease. We also excluded women who delivered before 37 weeks or after 40 weeks of gestation. The detailed history was taken by a postgraduate resident. After clinical examination and investigations patients were divided into either group A or B, based on their AFI score. Group A included women with borderline AFI (5-8cm) and group B with normal AFI (8.1-24cm).

AFI, calculated by a consultant or senior registrar within one week of delivery, was considered reliable to reduce bias and all the women with borderline AFI had umbilical artery Doppler studies by radiologists and those with abnormal Doppler were excluded from the study. The AFI was calculated by the imaginary division of the uterus into four quarters, where the linea nigra was used as a vertical and umbilicus as a horizontal landmark. The transducer was placed perpendicular to the floor and parallel to the longitudinal axis of the patient and the deepest vertical pool of amniotic fluid, without umbilical cord and fetal parts was calculated in centimeters. The amniotic fluid pockets in all four quadrants were added to calculate AFI[7]. The duration of gestation was calculated by the last menstrual period and if the woman was not sure of her dates, an ultrasound done in the first 20 weeks of pregnancy was used to calculate it.

The sampling technique was nonprobability purposive sampling. The women were followed in labour and information regarding baseline characteristics, mode of delivery, meconium staining of liquor, 5-minute APGAR score, birth weight and admission in NICU were entered on already designed proforma. We analysed 180 women with borderline AFI and 360 women with normal AFI, who fulfilled the inclusion criteria.

SPSS version 23 was used to analyze the data. For continuous variables mean and standard deviation was calculated. Student t-test was used to calculate the p-value. For categorical variables, percentages were calculated and the chi-square test was used to calculate the p-value. A p-value <0.05 was considered statistically significant.

3. Results

Out of 540 women included in the study,180 had borderline and 360 had normal AFI. The mean age of women in our study was 28.82 years and the difference in mean age of women was not significant statistically. (p=0.092). There were 127 (23.5%) primigravida and 413 (76.5%) multigravida women in this study. Both groups had more multigravida women (p=0.315). The difference in mean gestational age at the time of delivery in the two groups was not significant(p=0.8).

Table-1 Baseline characteristics: comparison of groups A &B

Baseline characteristics		Borderline AFI No=180 n (%)	Normal AFI No=360 n (%)	P-value
Mean maternal age (years)		28.46±3.96	29.18±4.19	0.092
Parity	Primigravida	47 (26.1%)	80 (22.2%)	0.315
	Multigravida	133(73.9%)	280(77.8%)	
Mean Gestational age at delivery		265.58 ±5.2 days (38 weeks)	267.44±5.1 (38 weeks 2 days)	0.8

The delivery mode was vaginal in the majority of women of both groups (Tabe-2). The difference in the caesarean section rate of the two groups (p=0.071) was not

significant statistically. Table 3 shows that 53.3% and 41% of women had a caesarean section for fetal distress (p=0.076) in groups A and B respectively.

More women had meconium staining of liquor in group A compared to group B (table 4), but the difference was not significant (p=0.116). The difference in neonatal outcomes mean birth weight (p=0.278), Apgar score <7 at 5 min (p=0.218) and NICU admission rate (P=0.064), was not significant between the groups (Table-4)

Table-2 Effect of AFI on mode of delivery

Mode of delivery	Borderline AFI No=180 n (%)	Normal AFI No=360 n (%)	p-value
Vaginal delivery	135(75%)	294(81.6%)	0.071
LSCS	45(25%)	66(18.3%)	

Table-3 Cesarean section: comparison of indications

Indication Of LSCS	Borderline AFI No=45 n (%)	Normal AFI No=66 n (%)	p-value
Fetal distress	24 (53.3%)	27 (41%)	0.076
Other	21 (47.6%)	29(60%)	

Table-4 Effect of AFI on Perinatal Outcome

Perinatal outcome	Borderline AFI No=180 n (%)	Normal AFI No=360 n (%)	p-value
Meconium-stained amniotic fluid	19(10.5%)	24(6.6%)	0.116
Apgar score<7 at 5 min	10(5.5%)	12(3.3%)	0.218
Mean Birth weight (Kg)	2.93±0.26	3.01±0.27	0.278
NICU admission	26(14.4%)	33(9.2%)	0.064

5. Discussion

This study was conducted to compare the maternal and perinatal outcomes in low-risk women who had idiopathic isolated borderline AFI and normal AFI after ethical committee approval. Most of the studies done so far have shown an increased risk of maternal and perinatal complications in patients who had borderline AFI, as opposed to our study results. This might be because we excluded cases of postdate pregnancies and abnormal Doppler studies along with other high-risk conditions.

The mean age of women in this study was 28.46±3.96 years and 29.18±4.19 years in borderline AFI and normal AFI group respectively, with a mean maternal age of 28.8 years. Vyas A in his study of 200 pregnant women calculated a mean age of 28.5 years, a finding similar to our study[14]. The mean age was 25.17 years in the study by Sadia S which was less than the mean age of our patients[15]. The majority of women in our study were multigravida (76.5% versus 23.5%). In the study by Aramabi EO, 72.8% of women were multigravida and 27.2% were primigravida, a finding similar to our results[16]. Mishra A in her study noted that 62% of women were primigravida and only 38% were multigravida[1].

We included patients delivered between the gestational age of 37-40 weeks as the incidence of fetal distress, meconium-stained liquor and cesarean section is high in postdate pregnancies[18]. While most of the studies conducted on this subject have included patients between 37-42 weeks[15-17].

In our study majority of women had a vaginal delivery and the effect of reduced liquor on the mode of delivery was not significant (p=0.071). The cesarean section rate observed in group A was 25 % and in group B was 18.3%. Cesarean sections for fetal distress were done in 53.3% and 41% of patients in groups A and B respectively in our study, and the difference was not significant (p=0.076). Our findings are supported by Wood SL's study of 739 patients, of which 177 were with borderline AFI, where the difference in cesarean section rate done for fetal distress was not significant (p=0.074)[19]. Vennila M noted a higher cesarean rate of 31.3% in the borderline AFI group compared to 14% in the normal AFI group (p=0.002). In that study 57.4% and 38% of caesarean sections were done for fetal distress in borderline AFI and normal AFI groups respectively, (p=0.002)[20]. We also noted a higher rate of cesarean section and fetal distress in borderline AFI groups like Vennila M but the difference was not significant. Bajracharya N calculated a very high rate of cesarean section 76.6% (36/47) and 44.7% (21/47) in

borderline AFI and normal AFI groups respectively, as opposed to our results. On analysis of indications, only 12% (7/57) were done for fetal distress. The study included cases of PPROM, and fibroid uterus which were excluded from our study and 23% of cesareans were only on maternal request[21]. Vyas A also observed a very high cesarean section rate (59% versus 35%) in the borderline AFI group which might be because cases of IUGR and abnormal Doppler studies were not excluded[14].

Meconium staining of amniotic fluid was observed in 10.5% (19/180) and 6.6% (24/360) cases of borderline and normal AFI respectively in our study(p=0.116). There is an increased risk of meconium staining of liquor in postdate pregnancy, pre-eclampsia, prolonged labour, prelabour rupture of membranes, fetal distress and intrauterine growth restriction[22]. Our findings are supported by the studies of Bajracharya N and Wood SL who also observed no significant increase in meconium staining of amniotic fluid (p=0.216& p=0.23 respectively)[20,21]. Vyas A noted a higher rate of passage of meconium in cases of borderline AFI (27% versus 11%, p=0.006)[14]. The reason may be that he did not exclude women with pre-eclampsia and IUGR which increase the risk of meconium-stained liquor. More cases of meconium-stained liquor (18% versus &7%) were observed in the study by Desia DV which did not exclude high-risk pregnancies[23].

APGAR score assesses the fetal condition at birth. In borderline and normal AFI groups 10 (5.5%) and 12 (3.3%) newborns had APGAR scores less than 7 at 5 minutes (p=0.218). The borderline AFI did not increase the NICU admission rate (26 14.4% versus 9.2%, p=0.064) in our study. In studies by Vyas A and Vennila M more newborns in borderline AFI group had APGAR score <7 at 5 minutes and required admission in NICU[14,19]. The reason might be that they have not excluded women with medical and other risk factors. There was no significant increase in cases of meconium-stained liquor and NICU admission in a study by Arambi EO, which excluded women with medical comorbidities[16].

We excluded cases of intrauterine growth restriction and uteroplacental insufficiency from the borderline AFI group, so the difference in mean birth weight of newborns in the two groups was not significantly different (2.93±0.26 Kg versus 3.01±0.27Kg). Contrary to this, in a study by Jamal A mean birth weight of newborns was 2.85±2.4 Kg and 3.19±3.9 Kg in borderline AFI and Normal AFI group in low-risk pregnancies (p=0.001), which can be because of less gestational age at delivery (37weeks 5 days versus 38 weeks 6 days in borderline AFI and normal AFI groups) and uteroplacental insufficiency[24]. More newborns in the borderline AFI group had birthweight <2.5kg in studies by Vyas A, Aramabi EO and Mishra A (45%,10.5% 18.5%respectively) reflecting that uteroplacental insufficiency might be an etiological factor for reduced liquor[14,16,17]. Sahin E has observed no increase in perinatal complications in women with isolated borderline oligohydramnios in uncomplicated late preterm deliveries between 34 + 0–36 + 6 weeks, a finding similar to our study done in patients at term 25.

The limitation of our study is that we have used a convenient sampling technique. We had Doppler studies only in patients with borderline AFI, as it was not feasible to have Doppler studies in all patients. Data was noted by a postgraduate resident on duty, so there can be interobserver variation. Fetal scalp blood sampling is not available in our unit to confirm fetal hypoxia in cases of abnormal CTG. More studies are required with large sample sizes and better sampling techniques.

5. Conclusion

We concluded that isolated idiopathic borderline oligohydramnios does not increase the risk of maternal and perinatal complications. There is no significant increase in meconium-stained liquor and cesarean delivery for fetal compromise. The risks of APGAR score<7 at 5 minutes and NICU admission are not significantly increased. The effect on birthweight is also not significant. So, there is no need for increased antepartum and intrapartum surveillance in these women.

CONFLICTS OF INTEREST- None

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Contributions:
S.K - Conception of study
M.R, K.U.N, I.M - Experimentation/Study Conduction
S.K, N.M, M.R - Analysis/Interpretation/Discussion

S.K - Manuscript Writing
N.M, M.M - Critical Review
S.K, M.R, K.U.N, I.M, N.M, M.M- Facilitation and Material analysis

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