

Effects of Amniotic Fluid Index <5 cms on Perinatal Outcome in Tertiary Care Hospital

Apurva Y. Maurya¹, Kiran P. Patole²

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¹Junior Resident. ²HOD, Dept. of Obstetrics and Gynecology, Vasanttrao Pawar Medical College, Nashik, Maharashtra 422207, India.

Corresponding Author: Kiran P. Patole, HOD, Dept. of Obstetrics and Gynecology, Vasanttrao Pawar Medical College, Nashik, Maharashtra 422207, India.

E-mail: apurvamaurya90@gmail.com

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Abstract

Aim: To observe the effect of Amniotic fluid index (AFI) <5 cms in predicting subsequent fetal outcome in low risk pregnancy with regards to mode of delivery, fetal complications, intrapartum and early neonatal mortality and need for NICU admissions.

Method: Oligohydramnios is defined as AFI ≤5 cm. This study consists of an analysis of pregnancy outcome in cases with diagnosis of oligohydramnios (AFI <5) in 42 patients, by ultrasound after 37 completed weeks of gestation and those who fit the inclusion and exclusion criterias. This was a observational study done over a period of 28 months (August 2016 to December 2018). Low risk, at term women with 37 completed weeks of gestation was studied. For all the women, ultrasound examination was done, and AFI was calculated by four quadrant amniotic fluid volume measurement technique. For all women baseline investigations like hemoglobin%, blood group and Rh typing, urine examination, Non-stress test (NST) is done. It was have a regular charting of pulse, BP, weight, pedal edema, daily fetal movement count, fetal heart sound, amniotic fluid index and estimated fetal weight according to the latest sonography.

Results: A total of 42 patients were included in the study. Most of the study population was between 20-24 years (61%) of age group, were multigravida (69%) and gestational age was between 37-38 weeks (79%). Fetal movement counting (FMC) was less than 10 in 52%. LSCS (62%) was the most common mode

of delivery. Live births seen in 98%. Birth weight was less than 2.5 kg in 67% and APGAR score at 1 minute was less than 7 in 61% of study population. Number of NICU admission was found to be 14.3%. Meconium aspiration syndrome (MAS) was found in 26.2% of study population. Intrauterine growth retardation (IUGR) was found in 31%.

Conclusion: We need to increase the awareness about effects of oligohydramnios. Oligohydramnios increases the chances of cesarean delivery and with vaginal delivery strict vigilance in labor is mandatory. So timely detection, early intervention by an obstetrician may help in improving the perinatal outcome.

Keywords: AFI; Oligohydramnios; IUGR; MAS; Polyhydramnios.

Introduction

The amniotic fluid that surrounds the fetus serves several roles during pregnancy. It creates physical space for musculoskeletal development, promotes normal fetal lung development and helps to avert compression of the umbilical cord [1]. At term foetus produces on an average 500-700 ml of urine, with slight decline in hourly foetal urine production after 40 weeks of gestation [2].

Oligohydramnios complicates between 0.5-5% of all pregnancies [3]. The common etiological factors

associated with Oligohydramnios are placental insufficiency and congenital anomalies. The technique of four quadrant method of calculating AFI described by Phelan et al. is accepted by most authors [4].

Decreased amniotic fluid or oligohydramnios is typically defined as AFI <5 cms, which is calculated as sum of deepest vertical dimension in each quadrant of uterus [5].

This 5 cms threshold has been associated with increased rate of complications including small for gestational age neonate, non reassuring fetal heart tracing, still birth and neonatal death, intrauterine growth restriction, meconium aspiration syndrome, severe birth asphyxia, congenital abnormalities, low Apgar score [6].

A finding of diminished amniotic fluid index is generally perceived as a sign of placental insufficiency. Uteroplacental insufficiency is the most important cause of prerenal oligohydramnios. The decreased amniotic fluid is the result of decreased renal perfusion. Uteroplacental insufficiency may result in intrauterine growth restriction. Oligohydramnios can develop in any trimester, although its more common in third trimester [7]. Oligohydramnios is less prevalent in early pregnancy, if at all, it usually is associated with poor prognosis [5].

Preeclampsia and postdated pregnancy both involve pathologic changes in placenta that may result in uteroplacental insufficiency and oligohydramnios [8].

Because amniotic fluid is more hypotonic than foetal plasma, it is postulated that exposure of amniotic fluid to the foetal capillary bed results in net movement of fluid from amniotic cavity into foetus. Amniotic fluid may also potentially be removed by continuous bulk flow i.e via hydrostatic and oncotic forces. Exchange of fluids may take place at chorionic plate, where exposure of relatively hypotonic amniotic fluid to the foetal surface of the placenta may lead to net reabsorption of fluid by foetus (up to 80 ml/day). A final perhaps underestimated pathway for volume regulation may occur within placenta itself. The large surface area of the foetal capillary intervillous interface could magnify small osmolar gradients between mother and fetus, resulting in large volumes of net fluid transfer. Exchange of fluid at this level would influence foetal intravascular volume potentially affect blood flow and urine production. In addition to the bulk flow of fluid, which occurs through pathways that are both phasic and non-phasic, there is also

bidirectional flow of fluid between amniotic and maternal compartments. This process occur by diffusion but with no changes in fluid volumes. At term fluid may leave cavity at the rate of 400-500 ml/hr by diffusion and bulk. However, some studies show that AFI is a poor predictor of adverse outcomes [9] in pregnancy and even the existence of entity like isolated oligohydramnios has been questioned by some authors [10].

During much of pregnancy, AF is derived almost entirely from the fetus and has a number of functions that are essential for normal growth and development [11].

- It cushions the umbilical cord from compression between the fetus and uterus.
- It has antibacterial properties that provide some protection from infection.
- It serves as a reservoir of fluid and nutrients for the fetus It provides the necessary fluid, space, and growth factors to permit normal development of the fetal lungs and musculoskeletal and gastrointestinal systems.

This study was conducted to evaluate poor perinatal outcomes attributable to AFI <5 cms.

Aims and Objectives

- To study fetal outcome in patients with oligohydramnios, i.e amniotic fluid index (AFI) <5 cms.
- To observe the effect of Amniotic fluid index (AFI) <5 cms in predicting subsequent fetal outcome in low risk pregnancy with regards to
 - Mode of delivery
 - Fetal complications
 - Intrapartum and early neonatal mortality and need for NICU admissions.

Materials and Methods

Study Design - Observational study.

Study Setting - A Tertiary Health Care Centre and Teaching Hospital.

Duration of Study - August 2016 To December 2018.

Study Population - Minimal estimated sample size for the aforementioned study would be 42 patients.

Sample Size Calculation Formula

$$\text{Formula: } n = z^2 \frac{pq}{L^2}$$

Where Z= 1.96 (critical value)

p=proportion of the diseased p= 0.0275

q= 1-p

L= margin of error = 5%

Eligibility Criteria*Inclusion criteria*

1. Amniotic Fluid Index ≤ 5
2. Single live intrauterine gestation with cephalic presentation
3. 37 completed weeks of gestation
4. Intact membranes

Exclusion criteria

1. Associated fetal malformations and anomalies.
2. Malpresentation.
3. High-risk pregnancy.
 - Pre existing or gestational diabetes
 - Cardiovascular disorder and maternal pulmonary disorder
 - Abruptio placentae
4. Multiple gestation
5. Fetal congenital anomalies

Methodology

Oligohydramnios or Oligoamnios is a condition where liquor amnii is deficient in amount to the extent of less than 200 ml at term. Sonographically, it is defined when the maximum vertical pocket of liquor is less than 2 cm or when amniotic fluid index (AFI) is less than 5 cm i.e less than 5 percentile [12].

This study consists of an analysis of pregnancy outcome in cases with diagnosis of oligohydramnios (AFI <5) by ultrasound after 37 completed weeks of gestation and those who fit the inclusion and exclusion criterias. Oligohydramnios is defined as AFI ≤ 5 cm. The amniotic fluid volume is considered normal if AFI is between 8 cm and 20 cm.

The study consists of women admitted to a tertiary care hospital. This was a observational study done over a period of 28 months (August

2016 to December 2018).

All the cases that are available up to the study period were taken for the purpose of the study. Consent from the patient was taken and ethical clearance was taken from the Ethical Committee.

For all the selected cases, thorough history was taken, and complete examination was done. Clinical evidence of oligohydramnios was looked. The previous obstetric records and ultrasound reports was reviewed. Low risk, at term women with 37 completed weeks of gestation was studied. For all the women, ultrasound examination was done, and AFI was calculated by four quadrant amniotic fluid volume measurement technique.

For all women baseline investigations like hemoglobin %, blood group and Rh typing, urine examination was done. Non-stress test (NST) is done. Thorough follow up schedule over the three trimesters was provided to each candidate. Each visit consist of a examinations to keep a routine record of maternal and fetal wellbeing and to predict the appropriate mode of delivery and to avoid complications, both fetal and maternal.

Statistical Analysis

All the collected data was entered in Microsoft Excel sheet and then transferred to SPSS software ver. 17 for analysis. Qualitative data was presented as frequency and percentages.

Results**Table 1:** Age distribution amongst study population

Age group	Frequency	Percentage
20 to 24 years	26	61
25 to 29 years	11	25
30 to 35 years	6	14
Total	42	100

In the above table 1 it was observed that most of the study population was between 20-24 years (61%) of age group followed by 25 - 29 years (25%). The mean age of the study population was 25.12 \pm 4 years.

Table 2: Parity status among the study population

Parity	Frequency	Percentage
Primigravida	13	31.0
Multigravida	29	69.0
Total	42	100

In the above table 2 it was observed that most of the study population were Multigravida (69%) while primigravida was observed in 31.0%.

Table 3: Gestational Age amongst study population

Gestational Age	Frequency	Percent
37 to 38 weeks	33	79
39 to 40 weeks	7	16
41 to 42 weeks	2	5
Total	42	100

In the above table 3 it was observed that most of the study population had gestational age between 37-38 weeks (79%) followed by 39 to 40 weeks (16%).

Table 4: Mode of delivery amongst study population

Mode of delivery	Frequency	Percent
Vaginal	14	34
Instrumental	2	4
LSCS	26	62
Total	42	100

In the above table 4, LSCS (62%) was the most common mode of delivery followed by Vaginal (33%) and Instrumental (4%).

Table 5: Birth weight (Kg) amongst study population

Birth weight (Kg)	Frequency	Percent
< 2.5	28	67
≥ 2.5	14	33
Total	42	100

In the above table 5, Birth weight was less than 2.5 kg in 67% of study population while it was more than 2.5 kg in 33%.

- Birth outcome- Live Birth was occurred in 98% of study population while Still Birth occurred in 2%.

- APGAR score- at 1 minute was less than 7 in 61% of study population while APGAR score at 5 minute was less than 7 in 39% of study population

- Number of NICU admission was found to be 14.3% among the population study.

- Number of Meconium aspiration syndrome (MAS) was found in 26.2% of study population.

- Number of Intrauterine growth retardation (IUGR) was found in 31% of study population.

Discussion

A fetus is surrounded inside the uterus by amniotic fluid. Amniotic fluid plays a major role in the fetal growth & development. It enables continued fetal growth in a non-restricted, sterile and thermally controlled environment. The abnormalities of the amniotic fluid volume can thus interfere directly with the fetal development.

Amniotic fluid index (AFI) of ≤ 5 cm defines oligohydramnios as originally described by Phelan et al. [4] Many studies show that oligohydramnios is associated with variety of adverse pregnancy outcomes, such as fetal distress, low birth weight, perinatal morbidity and increased incidence by caesarean section [13-16].

Age group

In the present study, it was observed that most of the study population was between 20-24 years (61%) of age group followed by 25-29 years (25%). The mean age of the study population was 25.12 ± 4 years. This findings is in agreement with the study conducted by Ghosh R et al. in which 65.5% participants were belonged to 20 to 25 age group [17]. Similarly in the study conducted by Mushtaq E et al., in which maximum number of patients were in the age group of 26-30 years in study group [18] These findings are comparable with the study done by Biradar KD et al., Patel PK et al. but contrast result was found in study done by Vidyasagar et al. (80.49%) [19-21].

Gravida status

In the present study, it was observed that most of the study population were Multigravida (69%) while primigravida was observed in 31.0%. This findings is in agreement with the study conducted by Ghosh R et al. in which 65.5% participants were Multigravida [17]. Similarly in the study conducted by Mushtaq E et al., in which 58.2% of the patients in the study group were primigravida [18]. In similar study done by Biradar et al., Vidyasagar et al. and Patel RK et al., where Primigravida participants were 33.0%, 46.3% and 35.8% respectively [19-21].

Gestational age

In the present study, it was observed that most of the study population had gestational age between 37-38 weeks (79%) followed by 39 to 40 weeks (16%). This findings is in agreement with the study conducted by Swapan Das et al., in which maximum number of patients in both groups were at gestational age of 38-40 weeks [22]. Similarly in the study conducted by Ghosh R et al. in which 72.7% participants belongs to 34-37 weeks gestational age [17].

Mode of delivery

In the present study, LSCS (62%) was the most common mode of delivery followed by Vaginal

(33%) and Instrumental (4%). This findings is in agreement with the study conducted by Mushtaq E et al., in which Cesarean delivery was done in 93 (63.69%) patients in the study group [18]. Similar study done by Biradar et al. [19], Patel PK et al. [21], Bangal VB et al. [23], Sowmya K et al. [24], found LSCS incidence in 62.0%, 41.0%, 44.0%, 50.0%, respectively.

Birth weight

In the present study, Birth weight was less than 2.5 kg in 67% of study population while it was more than 2.5 kg in 33%. This findings is in agreement with the study conducted by Swapan Das et al., in which 62% of study population had Birth Weight < 2.5 kg. [22] Similarly in the study by Chandra P et al. [25] and Sriya et al. [26] reported that 61.53% and 58.38% of study population had Birth weight was less than 2.5 kg respectively. Intrauterine growth retardation (IUGR) was found in 31% of study population.

Outcome

In the present study, Live Birth was occurred in 98% of study population while Still Birth occurred in 2%. This findings is in agreement with the study conducted by Mushtaq E et al., in which 1 (0.68%) still birth in the study group [18]. Meconium aspiration syndrome (MAS) was found in 26.2% of study population [27].

APGAR score

In the present study, APGAR score at 1 minute was less than 7 in 61% of study population while APGAR score at 5 minute was less than 7 in 39% of study population. Low APGAR Score are 1 min was 39% and 38.88% in studies conducted by Sriya et al. and Guin et al. respectively [26,28]. Chandra et al. showed low APGAR score in 5 min 23.07% of cases [25]. Similarly in the study conducted by Mushtaq E et al., in which 14 babies out of 146 (9.59%) had Apgar score <7 at 1 min and 3 babies (2.05%) in the study group had Apgar score <7 at 5 min [18]. Similar study done by Biradar et al. [19], Patel PK et al. [21], Vidyasagar V et al. [20], Sriya V et al. [26] found APGAR score <7 at 1 minute in 26.0%, 34.6%, 35.0%, 38.8% respectively.

NICU admission

In the present study, number of NICU admission was found to be 14.3% among the population study. Similarly in the study conducted by Mushtaq E

et al., in which 11 out of 146 (7.6%) babies in the study group were admitted in NICU [18]. Study conducted by Swapan Das et al., in which NICU admission rate was 40% in study group [22]. Also Chandra et al. [26] showed 46.15% of new born in oligohydramnios group were admitted in neonatal intensive care unit (NICU).

Conclusion

Oligohydramnios was a concept first introduced by Phelan in 1987 but has seen tremendous research and awareness in the later years. Antenatal care is as much the obstetricians concern as of the mother's. Amniotic fluid less than 5 cms i.e oligohydramnios can change the mode of delivery, neonatal outcome, poor apgar and undetected fetal renal or other anomalies. Early detection and timely intervention can save the foetus from long term complications and reduce the burden of NICU stay.

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