Study of Oligohydramnios and Perinatal Outcome in Term Pregnancy

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ABSTRACT

BACKGROUND
Oligohydramnios is associated with an increased risk of adverse pregnancy outcomes. The perinatal mortality rate in oligohydramnios is high. Oligohydramnios is also associated with fetal heart conduction abnormalities, meconium staining of the amniotic fluid, umbilical cord compression, lower Apgar scores, poor tolerance of labour and fetal acidosis. We wanted to assess the perinatal outcome in term pregnancies complicated with oligohydramnios in this study.

METHODS
A prospective cohort study was conducted among 200 cases of pregnant women with singleton term pregnancy with intact membranes and AFI < 5cm admitted from January 2019 to June 2020 in the Department of Obstetrics and Gynaecology, Government Medical College, Kozhikode. Antenatal patients with oligohydramnios confirmed by USG were induced within 24 hrs based on the Bishops score. History and examination findings were recorded in a predesigned proforma. Mode of delivery and Apgar scores were also noted. Neonatal complications and the need for ICU admission were studied up until their NICU admission or hospital stay.

Statistical Analysis: Statistical tests of association using SPSS (version 20.0) were employed at the level of significance of 5 %.

RESULTS
The majority of patients in this study were primigravida (60.5 %) and belonged to the age group 20-29 yrs (73.5 %). There was a higher rate of induction (67.5 %) in oligohydramnios patients. Around 26 % had meconium-stained amniotic fluid. The rate of caesarean section was found to be 22.5 % and that of instrumental delivery was 3.5 %. Oligohydramnios was associated with a higher rate of NICU admission (27.5 %). The most common complications noted were jaundice (9.8 %), birth asphyxia (4.9 %), meconium aspiration syndrome (3.4 %) and respiratory distress syndrome (1 %). Only 1 case of neonatal mortality was seen in this study.

CONCLUSIONS
Oligohydramnios adversely affects the maternal and perinatal outcome. It is associated with higher rates of induction, caesarean section, meconium-stained amniotic fluid, low Apgar scores, fetal distress and perinatal morbidity and mortality. However, the outcome can be improved by good antepartum and intrapartum monitoring and neonatal care.

KEY WORDS
Oligohydramnios, Perinatal Outcome
Oligohydramnios refers to the amniotic fluid volume that is less than expected for gestational age. It complicates approximately 1 to 2 percent of pregnancies. It is typically diagnosed by ultrasound examination and may be described qualitatively (e.g., Normal, reduced) or quantitatively (e.g., Amniotic fluid index < 5). Amniotic fluid is necessary for the proper growth and development of the fetus, cushioning it from physical trauma, allowing fetal lung growth, and providing a barrier against infection. Normally, the volume of amniotic fluid changes throughout gestation, increasing up until 34 to 36 weeks and then levelling off; at approximately 400 mL, and remaining constant until term. After 40 weeks, the AFV begins to decrease steadily. The volume increases from approximately 30 mL at 10 weeks to 200 mL by 16 weeks and reaches around 800 mL by the mid-third trimester.

Oligohydramnios first diagnosed in the third trimester is often associated with PPROM or with uteroplacental insufficiency due to conditions such as preeclampsia or other maternal vascular diseases. Oligohydramnios frequently accompanies fetal growth restriction related to uteroplacental insufficiency. Fetal anomalies and abruption placenta also play a role at this gestational age. Amniotic fluid volume normally decreases post-term, so oligohydramnios may develop in these pregnancies. In addition, many cases of third-trimester oligohydramnios are idiopathic.

Other mechanisms of isolated oligohydramnios may include alterations in the expression of water pores (aquaporin 1, aquaporin 3) in fetal membranes and placenta. There may be an association between pregnancy during the summer season and oligohydramnios, likely related to suboptimal maternal hydration in hot weather.

There appears to be an inverse relationship between amniotic fluid volume in the third trimester and the incidence of adverse pregnancy outcomes. Adverse outcomes are related to umbilical cord compression, uteroplacental insufficiency, and meconium aspiration. The lack of amniotic fluid allows compression of the fetal abdomen, which limits the movement of its diaphragm. In addition to chest wall fixation, the lack of amniotic fluid flowing in and out of the fetal lung leads to pulmonary hypoplasia. Oligohydramnios is also associated with meconium staining of the amniotic fluid, fetal heart conduction abnormalities, umbilical cord compression, poor tolerance of labour, lower Apgar scores, and fetal acidosis. In cases of intrauterine growth restriction (IUGR), the degree of oligohydramnios is often proportional to growth restriction, is frequently reflective of the extent of placental dysfunction, and is associated with a corresponding increase in the perinatal mortality rate. The duration of oligohydramnios is also a prognostic factor. Patients who present with idiopathic oligohydramnios at an earlier gestational age are at increased risk for adverse perinatal outcomes compared with those presenting later in gestation. Prolonged oligohydramnios increases the risk of Potter sequence which includes pulmonary hypoplasia, fetal skeletal and facial deformities due to external compression and abnormal fetal development due to compression of the uterine wall and adherent fetal parts.

Management depends on the clinical situation. In a pregnancy complicated by oligohydramnios and fetal growth restriction, close fetal surveillance is very important because of associated morbidity and mortality.

METHODS

We conducted this prospective cohort study on the patients admitted to the Institute of Maternal and Child Health (IMCH), Calicut Medical College, Kerala. The period of study was one year from January 2019 to June 2020.

According to 18th Perinatal outcome associated with oligohydramnios in the third trimester done by Kamlesh R. Chaudhari incidence of fetal distress in the study group and control was 8.9 % and 2.4 % respectively. Hence the minimum sample size required for our study using the formula.

\[ n = \frac{2(z_\alpha/2 + z_\beta)^2 \cdot p \cdot q}{d^2} \]

Where \( z_\alpha/2 = 1.96, \alpha = 5\% \)

\( z_\beta = 0.84, \beta = 20\% \)

\( p = 1 + p2 / 2, q = 100 - p \)

\( d = p1 - p2 \)

\( n = 197.8 \)

Hence we took 200 women with singleton term pregnancies, with intact membranes and AFI < 5 cm for this study. Women with PROM, IUGR, and medical complications like pregnancy-induced hypertension, gestational diabetes mellitus, renal diseases, connective tissue disorders, fetal anomalies, multiple pregnancies and previous cesarean section were excluded. On admission, detailed history and clinical examination were taken. Fetal surveillance was done by USG, and a modified biophysical profile and Doppler and oligohydramnios were confirmed.

During Non Stress Test, fetal heart rate was evaluated for a period of up to 20 minutes. Components of NST included baseline heart rate, variability, presence or absence of accelerations and decelerations. NST is interpreted as either reactive or non-reactive. Fetal heart rate baseline is the average number of beats per minute over 10 minutes. Variability refers to the expected fluctuations in the baseline FHR that are irregular in amplitude and frequency and are quantified as the amplitude of the peak to trough in beats per minute. Variability can be absent, minimal, moderate or marked. A reactive NST is defined as the presence of at least 2 accelerations of the FHR 15 beats per minute above the baseline and persist within 20 minutes of monitoring. A non-reactive NST lacks the appropriate number of accelerations or doesn’t meet the criteria for acceleration but does not demonstrate the absence of variability or decelerations. AFI is determined by Phelan’s technique using transabdominal sonography. AFI is measured by dividing the uterus into four quadrants and the pocket with the largest vertical dimension in each quadrant is measured. The sum of all four measurements gives the AFI. NST was performed in all patients - biweekly for cases and weekly for controls.

Those with AFI < 5 cm were induced within 24 hrs of confirmation by Foley EASI followed by PGE2 or PGE2 alone according to Bishop score. Those with a Bishop score of less than 5 were induced by Foley EASI followed by PGE2 and
those with a Bishop score of more than 5 were induced with PGE2 alone. During labour, intermittent auscultation of FHR to detect signs of fetal distress was done. The colour of liquor was noted during spontaneous or artificial rupture of membranes during the active phase of labour. Mode of delivery and intrapartum complications were noted. At birth, the neonate was assessed using the APGAR score, and birth weight was recorded. USG was done in neonates to assess for renal anomalies and they were followed up at 6 wks of age and perinatal mortality was assessed.

Statistical Analysis
Data were collected on a customized proforma. The data obtained were analyzed using the SPSS program.

RESULTS

In our study, 9.5 % of the women belonged to the group below 19 yrs, 73.5 % of the cases belonged to the group 20-29 yrs and 14 % of cases belonged to the group 30-35 yrs. Around 3 % of cases with age more than 35 yrs were also noted. 60.5 % of women were primi and 39.5 % of women were multi, 73 % of cases were booked and 27 % of cases were referred. Almost 89.5 % of the cases belonged to the group 37W0D - 40W0D and 10.5 % of the cases belonged to the group 40W1D - 40W3D. There were no cases with a period of gestation more than 40W3D. Around 32.5 % of the cases were spontaneous. The majority (67.5 %) of the cases were induced. Almost 1.5 % of the cases had Foley and 6.5 % of the cases had Foley + PGE2. Around 59.5 % of cases of PGE2 were also noted.

The perinatal complications were significantly higher in PGE2 (68.9 %) compared to Foley + PGE2 (15.4 %) and Foley (0.0 %). Almost 18.5 % of the cases had grade 1 meconium and 5.5 % of the cases had grade 2 meconium. Around 2.0 % of cases with grade 3 meconium were also noted. Perinatal complications were significantly higher in grade 3 (100 %) compared to grade 1 (37.8 %) and grade 2 (90.9 %). Around 83.3 % of the cases had normal CTG and 18 % of the cases had abnormal CTG. Perinatal complications were more in those with abnormal CTG (61.1 %) than those with normal CTG (20.1 %). 74.0 % of the cases were normal vaginal delivery and 22.5 % of the cases were caesarean section. Around 30.0 % cases of vacuum and 0.5 % cases of forces were also noted. Perinatal complications were more in instrumental delivery (37.5 %) and it was almost the same in normal vaginal delivery (27.3 %) and caesarean section (31.1 %). The distribution of APGAR at 1 minute was studied. 87.5 % of the cases belonged to the APGAR group 7-10 and 12 % of the cases belonged to the group 4-6. 1 case with APGAR 0-3 was noted. Perinatal complications were significantly higher in patients with APGAR 4-6 (95.8 %) and APGAR 0-3 compared to the patients with APGAR 7-10 (17.7 %). 95 % of the cases belonged to the APGAR group 7-10 and 4.5 % of the cases belonged to the group 4-6. 1 case with APGAR 0-3 was noted. Perinatal complications were significantly higher in patients with APGAR 4-6 (100 %) and APGAR 0-3 (1 case) compared to the patients with APGAR 7-10 (23.7 %). 72.5 % of the cases had no NICU admission and 27.5 % of the cases had NICU admission. The majority (72.5 %) of the cases had no perinatal complications. The most common complications noted were jaundice (14.5 %), birth asphyxia (4.9 %), meconium aspiration syndrome (3.4 %) and respiratory distress syndrome (1 %). 1 case of death was also noted.

This study compared the maternal and perinatal outcomes of oligohydramnios in term pregnancy. Parity and maternal age were independent factors for oligohydramnios. The majority of patients were in the age group 20-29 yrs (73.5 %).

The majority were primigravida (60.5 %) in this study. Almost 89.5 % of the cases belonged to the group 37W0D - 40W0D and 10.5 % of the cases belonged to the group 40W1D - 40W3D.

The present study showed that the majority (67.5 %) of the cases were induced. Almost 1.5 % of the cases had Foley induction and 6.5 % of the cases had Foley + PGE2. Around 59.5 % of cases of PGE2 were also noted. 68.9 % of PGE2 induction, 15.4 % of Foley + PGE2 induction and 32.3 % of those not induced were found to have perinatal complications. But the relationship between mode of induction and perinatal complication was not found to be statistically significant.

Almost 18.5 % of the cases had grade 1 meconium and 5.5 % of the cases had grade 2 meconium. Around 2.0 % of cases with grade 3 meconium were also noted.

In the study of[1] Alchalalbi HA et al., it was demonstrated that the incidence of stained amniotic fluid following induction of labour at term in patients with oligohydramnios was higher.

18 % of cases had abnormal CTG in the present study. In a study by[2] Kagne S et al., 44.44 % had non-reassuring CTG. 74.0 % of the cases were normal vaginal delivery and 22.5 % of the cases were caesarean section. Around 3.0 % cases of vacuum and 0.5 % cases of forceps were also noted. In a study by[3] Casey B et al., the rate of induction of labour (42 %) and caesarean section (32 %) was found to be higher in oligohydramnios cases.[4] Golan A et al. found that the caesarean section was performed in 35.2 % of pregnancies. These are comparable to my study.

The instrumental vaginal delivery was 3.5 % in my study. Perinatal complications were more in instrumental vaginal delivery (37.5 %) and almost the same in normal vaginal delivery (27.3 %) and caesarean section (31.1 %). In a study conducted by[5] Manzanaras S et al., the rate of operative vaginal delivery and that of non-reassuring fetal heart rates were found to be high.

27.5 % of babies of patients with AFI < 5 required NICU admission. In a study by[6] Zhang J et al. 29.4 % of babies required NICU admission, similar to my study. Similarly in a study by[7] Kagne S et al. the incidence of NICU admission was around 22.85 %.

In a study by[8] Sriya R et al. the incidence of NICU admission was very high. In their study, 88.88 % of newborns were admitted to NICU in patients having AFI < 5 cm. In a study by[9] Casey BM et al. the NICU admission rate was reported to be 7 % among patients with AFI< 5 cm.
72.5% had no complications. Common complications noted were jaundice (14.5%), birth asphyxia (4.9%), meconium aspiration syndrome (3.4%) and respiratory distress syndrome (1%). In a study by [2] Kagne S et al. the incidence of meconium aspiration was found to be 12.85%. The neonatal mortality rate was found to be 0.5% (1 case) in my study. This is comparable to the study by[2] Kagne S et al. which had a mortality rate of 1.42% (1 case). Perinatal mortality was 2.4% in the study by[8] Nazlima et al.

**CONCLUSIONS**

Oligohydramnios at term pregnancy has an adverse effect on the perinatal outcome. Ultrasonography should be utilized for early detection, monitoring and management of women with reduced liquor volume. Perinatal morbidity and mortality are more in the presence of oligohydramnios and include meconium-stained amniotic fluid, fetal distress, higher cesarean section rate, low APGAR score and low birth weight. Good antepartum and intrapartum fetal surveillance and neonatal intensive care unit facility can ensure a better perinatal outcome.

**REFERENCES**