

Longitudinal follow up study of neonatal outcome in relation with antepartum amniotic fluid volume

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Abstract:

Background: Nature has created the safest cradle for fetus inside mother's womb in the form of liquor amnii for its growth. Decreases in amniotic fluid volume or oligohydramnios has been correlated with increased risk of intrauterine growth retardation, meconium aspiration syndrome, severe birth asphyxia, low APGAR scores and congenital abnormalities. Oligohydramnios is also associated with maternal morbidity in form of increased rates of induction and operative interference. This study aims 1) To assess correlation between amniotic fluid volume and outcome of fetus. 2) To assess successful conduct of labour in relation to the amount of liquor. 3) To assess incidence of congenital anomalies in oligohydramnios 4) To assess fetal heart rate variations in oligohydramnios cases.

Materials and methods: My study was conducted at rural tertiary hospital between DEC 2017 to OCT 2019 on ANC patients coming to the OPD. Apparently normal antenatal cases in third trimester of Age group 20 – 30 years, primigravida or multigravida with previous fullterm normal delivery near term coming to postnatal care OPD are to be selected for ultrasonography. Cases are followed during labor maternal and neonatal outcome judge on agar score as well birth weight and results analysed.

Results: In my study, mean age in years was 22.79+2.91, ranging from 18 to 32 years. Mean AFI in cm was 7.2+2.83, ranging from 1 to 16 cms. Majority 65.06% having AFI in 5 to 10 cm. 82.96% delivered by normal vaginal delivery, 13.97% had LSCS and 3% had instrumental delivery. NICU admission were more among oligohydramnios and even one IUD was noticed among those having AFI with 5. Majority of cases were primigravida (52%). Association between gravida and AFI showed statistical significance ($P=0.05$).

Conclusion: Outcome of the newborn is definitely correlated to amniotic fluid volume. As amniotic fluid volume decreases chances of instrumental delivery or LSCS increase. Incidence of congenital anomaly in oligohydramnios is 22.22%. Fetal tachycardia/bradycardia is more frequent in severe oligohydramnios.

Key word: Amniotic fluid index; oligohydramnios; neonatal outcome

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I. Introduction

Nature has made floating bed in the form of amniotic fluid cavity filled with liquor amnii for the requirement of fetus, for its existence and growth in sterile environment, regulation of temperature, avoidance of external injury and reduction of impact of uterine contractions.

Oligohydramnios defined as an AFI \leq 5th centile for the gestational age, AFI \leq 50 mm or maximum vertical pocket devoid of umbilical cord or fetal limbs measure $<$ 20 mm, in the presence of intact membranes is a common obstetric complication, occurring in 3-5% of pregnancies at term. Such pregnancies are at an increased risk of adverse perinatal outcome such as fetal distress in labor, induction of labor, cesarean delivery for fetal distress, meconium passage, low Apgar score and neonatal resuscitation or neonatal intensive care unit admission. The objective of this study was to determine the association of isolated oligohydramnios at term with adverse perinatal outcome.

Decrease in amniotic fluid volume or Oligohydramnios has been correlated with increased risk of intrauterine growth retardation, meconium aspiration syndrome, severe birth asphyxia, low APGAR scores and congenital abnormalities. Oligohydramnios is also associated with maternal morbidity in form of increased rates of induction and/ or operative interference. With the help of method of amniotic fluid estimation by Amniotic fluid Index (AFI) using four quadrant technique during transabdominal USG, as per described by Phelan et al in 1997 better identification of fetus at high risk can be done. Increased induction of labour and elective caesarean deliveries are currently practiced for better perinatal outcome

Oligohydramnios is said to be a late sign of fetal malnutrition. Foetal wellbeing to a great extent depends upon the appropriate volume of amniotic fluid. Oligohydramnios in early pregnancy is attended by serious consequences to the foetus. Subjected to pressure from all sides the foetus assumes a peculiar appearance and musculoskeletal deformities such as club foot, talipes and wry neck may be seen. The skin of foetus appears dry, leathery and wrinkled. Pulmonary hypoplasia is common with oligohydramnios Diminished liquor is quite often associated with impaired Foetal growth, Foetal anomaly and malpresentations. This is also associated with abnormal FHR pattern and meconium staining of liquor which often requires caesarean section and results in perinatal mortality and morbidity. Different medical and interventional methods have been tried to treat oligohydramnios. The present study was done to see the effect of amino acid infusion an amniotic fluid index, mode of delivery and fetal outcome.

AIMS AND OBJECTIVES

- 1) To assess correlation between amniotic fluid volume and outcome of newborn
- 2) To assess successful conduct of labor depending upon amount of liquor.
- 3) To assess incidence of newborn with congenital malformation in oligohydramnios.
- 4) To assess risk of fetal heart rate variations in antepartum oligohydramnios.

II. Materials and Methods

The study was conducted at rural tertiary care hospital between durations December 2017 to October 2019 patient coming to the outpatient department

Selection Criteria

- Apparently normal antenatal cases in third trimester
- Age group 20 – 30 years
- Primigravida or Multigravida with previous full term normal delivery

Exclusion criteria

- Age < 20 years and > 30 years
- Multigravida with previous caesarean section antenatal cases with medical disorders of pregnancy

Method

- Patients antenatal cases near term coming to postnatal care OPD are to be selected for ultrasonography Cases are followed during labour Maternal and neonatal outcome judge on agar score as well birth weight.

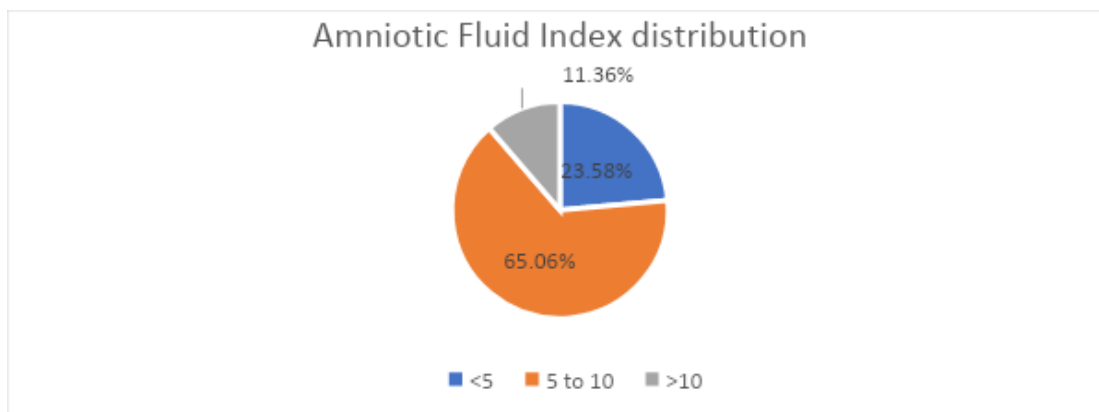
III. Result

Table 1: Age distribution

| Age in years | Number of cases | Percentage |
|--------------|-----------------|------------|
| <20 | 67 | 29.25% |
| 20-25 | 116 | 50.65% |
| 25-30 | 45 | 19.65% |
| >30 | 1 | 0.45% |
| Total | 229 | 100% |

Table 2: Gravida Distribution

| AFI | G1 | G2 | G3 | G4 | G5 | Total |
|---------|-----|----|----|----|----|-------|
| <5 | 22 | 18 | 12 | 1 | 1 | 54 |
| 5 TO 10 | 67 | 50 | 24 | 8 | 0 | 149 |
| >10 | 15 | 5 | 3 | 1 | 2 | 26 |
| Total | 104 | 73 | 39 | 10 | 3 | 229 |



Graph no.1 amniotic fluid distribution

Table 3: Mode of Delivery

| Amniotic Fluid Index in cm | Normal delivery | Instrument | Lscs | Total |
|----------------------------|-----------------|------------|------|-------|
| <5 | 33 | 4 | 17 | 54 |
| 5-10 | 134 | 2 | 13 | 149 |
| >10 | 23 | 1 | 2 | 26 |
| Total | 190 | 7 | 32 | 229 |

| Amniotic Fluid Index in cm | Birthweight | | | Total |
|----------------------------|-------------|---------|--------|-------|
| | <2KG | 2-2.5kg | >2.5kg | |
| <5 | 5 | 14 | 35 | 54 |
| 5to10 | 21 | 47 | 81 | 149 |
| >10 | 2 | 6 | 18 | 26 |
| Total | 28 | 67 | 134 | 229 |

| Amniotic Fluid Index in cm | At 1 Min | | At 5 Min | |
|----------------------------|----------|-----|----------|-----|
| | <7 | >7 | <7 | >7 |
| <5 | 1 | 53 | 1 | 53 |
| 5 to 10 | 3 | 146 | 1 | 148 |
| >10 | 0 | 26 | 0 | 26 |
| Total | 4 | 225 | 2 | 227 |

Table 4: Birthweight Distribution

Table 5: APGAR score in neonates at 1min and 5 min

Table 6: Fetal complications and Fetal Outcomes

| Amniotic Fluid Index | Clear liquor | Meconium stained liquor | Total |
|----------------------|--------------|-------------------------|-------|
| <5 | 48 | 6 | 54 |
| 5 to 10 | 143 | 6 | 149 |
| >10 | 23 | 3 | 26 |
| Total | 214 | 15 | 229 |

| NICU Admission | Intrauterine Death |
|----------------|--------------------|
| 8 | 1 |
| 3 | 0 |
| 0 | 0 |
| 11 | 1 |

Table 7: Indications Of LSCS

| Amniotic Fluid Index | Failed Induction | Failed Progress | Fetal Distress | CPD | DTA |
|----------------------|------------------|-----------------|----------------|-----|-----|
| <5 | 1 | 2 | 17 | 3 | 2 |
| 5 to10 | 2 | 1 | 13 | 3 | 0 |
| >10 | 0 | 1 | 2 | 1 | 0 |
| Total | 3 | 4 | 32 | 7 | 2 |

Table 8: Symptoms and Maternal Outcome

| Amniotic Fluid Index | Abdominal Pain | Bleeding P/V | Decreased Fetal Movement | Loss of Fetal Movement |
|----------------------|----------------|--------------|--------------------------|------------------------|
| <5 | 44 | 6 | 3 | 1 |
| 5 TO 10 | 140 | 7 | 2 | 0 |
| >10 | 26 | 0 | 0 | 0 |

| | | | | |
|-----------------------------|-------------------|----------------------|---------------|--------------|
| Total | 210 | 13 | 5 | 1 |
| Amniotic Fluid Index | Atonic PPH | Traumatic PPH | Normal | Total |
| <5 | 2 | 2 | 50 | 54 |
| 5 To 10 | 1 | 2 | 146 | 149 |
| >10 | 1 | 0 | 25 | 26 |
| Total | 4 | 4 | 221 | 229 |

Table 9: Non stress pattern

| | | | |
|-----------------------------|---------------------|-------------------------|--------------|
| Amniotic Fluid Index | Reactive NST | Non-Reactive NST | Total |
| <5 | 35 | 19 | 54 |
| 5 TO 10 | 130 | 19 | 149 |
| >10 | 20 | 6 | 26 |
| Total | 185 | 44 | 229 |

Graph no 2: Congenital malformation

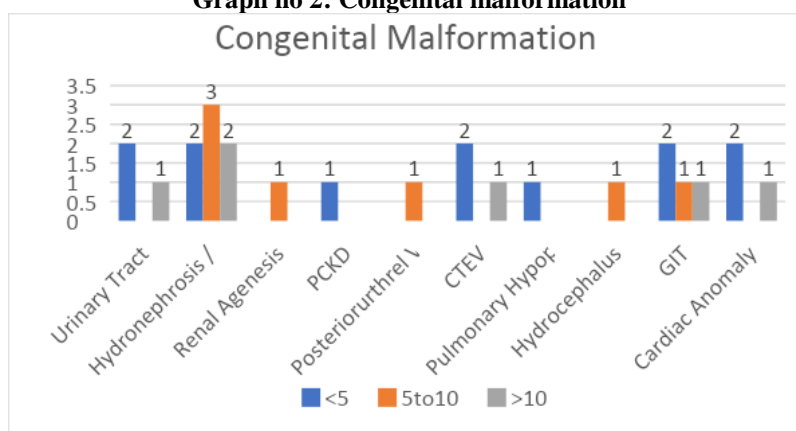


Table 10: Fetal Heart Rate

| | | | |
|-------------------------|-----------------------------|--------------|---------------|
| | Amniotic Fluid Index | | |
| Fetal Heart Rate | <5 | 5to10 | >10 |
| Bradycardia | 20 | 6 | 3 |
| Tachycardia | 25 | 7 | 4 |
| Normal FHR | 9 | 136 | 19 |
| Total | 54 | 149 | 26 |

IV. Discussions

In present study majority 50.65% were in age group of 20-25 years, followed by 29.25% less than 20 years, 19.65% in 25 to 30 years and only 0.45% more than 30 years. Mean age in years was 22.79+2.91, ranging from 18 to 32 years.

In present study majority 65.06% had AFI 5 to 10 cm, followed by 23.58% less than 5 and 11.36% had more than 10 cm. Mean AFI in cm was 7.2+2.83, ranging from 1 to 16 cm.

In present study 190 had normal delivery, among them 134 had AFI 5 to 10, 33 had less than 5 and 23 had more than 10. 7 had instrumental delivery, among them 2 had AFI 5 to 10, 4 had less than 5 and 1 had more than 10. 32 had LSCS delivery, among them 13 had AFI 5 to 10, 17 had less than 5 and 2 had more than 10. Applying chi square test, p value is <0.001, as p <0.05 shows statistical significance.

In present study, 28 neonates had birth weight less than 2 kgs, among them 21 had AFI 5 to 10, 5 had less than 5 and 2 had more than 10. 67 neonates had birth weight between 2 to 2.5 kgs, among them 47 had AFI 5 to 10, 14 had less than 5 and 6 had more than 10. and 134 had birth weight more than 2.5 kgs, among them 81 had AFI 5 to 10, 35 had less than 5 and 18 had more than 10. Applying chi square test, p value is 0.49, as p >0.05 shows no statistical significance.

In present study, 4 neonates had APGAR score at 1 min less than 7, among them 3 had AFI 5 to 10, 1 had less than 5. 225 APGAR score had more than 7, among them 146 had AFI 5 to 10, 53 had less than 5 and 26 had more than 10. Applying chi square test, p value is 0.76, as p >0.05 shows no statistical significance.

In present study, 2 neonates had APGAR score at 5 min less than 7, among them 1 had AFI 5 to 10, 1 had less than 5. 227 APGAR score had more than 7, among them 148 had AFI 5 to 10, 53 had less than 5 and 26 had more than 10. Applying chi square test, p value is 0.63, as p >0.05 shows no statistical significance.

In present study, 214 neonates had clean liquor, among them 143 had AFI 5 to 10, 48 had less than 5 and 23 had more than 10. 15 had meconium stained liquor, among them 6 had AFI 5 to 10, 6 had less than 5 and 3 had more than 10. Applying chi square test, p value is 0.1, as $p > 0.05$ shows no statistical significance.

In present study, 11 neonates had NICU admission, among them 3 had AFI 5 to 10, 8 had less than 5. One intrauterine death was observed which had AFI less than 5. Applying chi square test, p value is 0.2, as $p > 0.05$ shows no statistical significance.

In present study, 104 were primigravida, among them 67 had AFI 5 to 10, 22 had less than 5 and 15 had more than 10. 73 were gravida 2, among them 50 had AFI 5 to 10, 18 had less than 5 and 5 had more than 10. 39 were gravida 3, among them 24 had AFI 5 to 10, 12 had less than 5 and 3 had more than 10. 10 were gravida 4, among them 8 had AFI 5 to 10, 1 had less than 5 and 1 had more than 10. 3 were gravida 5, among them 1 had less than 5 and 2 had more than 10. Applying chi square test, p value is 0.05, as $p < 0.05$ shows statistical significance.

In present study, 3 had failed induction among them 2 had AFI 5 to 10 cm and 1 had less than 5cm. 4 had failed progress among them 1 had AFI between 5 to 10cms, 2 had AFI less than 5cm, and 1 had more than 10 cm. 32 had fetal distress among them 13 had AFI 5 to 10 cms, 17 had less than 5cm and 2 had more than 10cms. 7 had CPD among them 3 had AFI 5 to 10 cm, 3 had less than 5cm and had more than 10cms. 2 had DTA and they had AFI less than 5cm. Applying chi square test, p value is 0.82, as $p > 0.05$ shows no statistical significance.

In present study, 210 had abdominal pain as chief complaint among them 140 had AFI 5 to 10 cm, 44 had AFI less than 5 and 26 had more than 10cm. 13 had per vaginal bleeding as chief complaint among them 7 had AFI 5 to 10 cm, 6 had AFI less than 5. 5 had decreased fetal movement as chief complaint among them 2 had AFI 5 to 10 cm, 3 had AFI less than 5. And one had loss of fetal movement and AFI was less than 5. Applying chi square test, p value is 0.76, as $p > 0.05$ shows no statistical significance.

In present study, 4 mothers had atonic PPH, among them 1 had AFI 5 to 10 cm, 2 had AFI less than 5 and 1 had more than 10cm. 4 had traumatic PPH among them 2 had AFI 5 to 10 cm, 2 had AFI less than 5. Rest others were normal. Applying chi square test, p value is 0.31, as $p > 0.05$ shows no statistical significance.

In present study, 185 had reactive NST among them 130 had AFI 5 to 10 cm, 35 had AFI less than 5 and 20 had more than 10cm. Applying chi square test, p value is < 0.001 , as $p < 0.05$ shows statistical significance.

In present study, among 54 having AFI less than 5, 12 newborn had congenital malformation. Among them 2 had urinary tract infection, 2 had hydronephrosis, 2 had CTEV, 1 had PCKD, 1 had Pulmonary hypoplasia, 2 had GIT disorder, 2 had cardiac anomaly. Among 149 having AFI between 5 to 10 cms, 7 newborn had congenital malformation. Among them 3 had hydronephrosis, 1 had renal agenesis, 1 had posterior urethral valve disorder, 1 had hydrocephalus, 1 had GIT disorder. among 26 having AFI more than 10cms, 6 newborn had congenital malformation. Among them 1 had urinary tract infection, 2 had hydronephrosis, 1 had CTEV, 1 had GIT disorder, 1 had cardiac anomaly. Applying chi square test, p value is 0.04, as $p < 0.05$ shows statistical significance.

In present study, 29 had bradycardia, among them 20 had AFI < 5 , 6 had 5 to 10 cm and 3 had > 10 . 36 had tachycardia, among them 25 had AFI < 5 , 7 had 5 to 10 cm and 4 had > 10 . Applying chi square test, p value is < 0.0001 , as $p < 0.05$ shows statistical significance.

In present study, 164 had spontaneous labour, among them 40 had AFI < 5 , 140 had 5 to 10 cm and 24 had > 10 . 25 had induced labour, among them 14 had AFI < 5 , 9 had 5 to 10 cm and 2 had > 10 . Applying chi square test, p value is < 0.0001 , as $p < 0.05$ shows statistical significance.

In present study, 32 had $<$ weeks of gestation, among them 8 had AFI < 5 , 20 had 5 to 10 cm and 4 had > 10 . 46 had = weeks of gestation, among them 24 had AFI < 5 , 20 had 5 to 10 cm and 2 had > 10 . 151 had $>$ weeks of gestation, among them 22 had AFI < 5 , 109 had 5 to 10 cm and 20 had > 10 . Applying chi square test, p value is < 0.0001 , as $p < 0.05$ shows statistical significance.

V. Conclusion

1. Outcome of the newborn is definitely correlated with amniotic fluid volume.
2. As amniotic fluid volume goes down chances of instrumental delivery or Caesarean section increases.
3. Incidence of congenital anomaly with mother with oligohydramnios is 22%.
4. Fetal tachycardia and bradycardia is more frequent in severe oligohydramnios.

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