

# SIGNIFICANCE OF COLOUR DOPPLER STUDY IN OLIGOHYDRAMNIOS, A HIGH RISK PREGNANCY

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## ABSTRACT

Background: Pregnancy associated with oligohydramnios, is a high risk pregnancy as it is associated with increased perinatal morbidity and mortality. Umbilical artery Doppler velocimetry is a non invasive technique that can be used to evaluate the blood perfusion of the fetoplacental unit. When appropriately used, it helps to identify the fetus at compromise and helps to plan timely intervention, to reduce perinatal mortality in these high risk pregnancies. Aim: To study the role of umbilical artery Doppler velocimetry in decreasing the perinatal mortality and also to decrease the rate of caesarean section. Methods: This prospective observational study was conducted on 40 women with gestation  $\geq$  34 weeks with oligohydramnios, in the department of Obstetrics and Gynaecology, GMC Amritsar from December 2012 to November 2014. Patients were evaluated by history taking, clinical examination, lab tests and ultrasonography reports. NST was done twice weekly and Colour Doppler study weekly. All these patients were monitored intensively with NST twice weekly and umbilical artery colour Doppler study weekly. Those patients with abnormal Doppler findings were timely intervened. Results and conclusion: Patients with reduced AFI carries increased risk of antepartum and intrapartum complications. It is a sign of chronic fetal hypoxia. Majority of patients were primigravidae, complicated by PIH in 37.5% cases, nonreactive NST was seen in 42.5% cases, meconium stained liquor was seen in 47.5% cases and those patients who were associated with abnormal color Doppler report were associated with more fetal distress and higher caesarean rate. Thus AFI of  $\leq$  5 cm, especially when associated with abnormal Doppler velocimetry, mandates closer antenatal surveillance.

**Keywords:** Oligohydramnios, Doppler velocimetry, Fetal distress, Perinatal outcome.

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## INTRODUCTION

As we know water is very essential for the human existence, the same applies to fetus in utero. Nature has made a floating bed in the form of amniotic fluid cavity filled with liquor amnii for the requirement of fetus. Oligohydramnios refers to amniotic

fluid index of less than 5cm<sup>1</sup> or largest umbilical cord free pocket of fluid with diameter  $\leq 2\text{cm}^2$  as diagnosed by ultrasound examination. It occurs in 1 to 5% of pregnancies at term<sup>3</sup>. In the absence of premature rupture of membranes and urinary tract anomalies, uteroplacental insufficiency is a common cause of oligohydramnios. Umbilical artery Doppler velocimetry gives information regarding blood perfusion of the fetoplacental unit. Oligohydramnios is a clinical sign of chronic fetal hypoxemia. It is associated with a number of complications like meconium aspiration syndrome, hypoglycemia, Hyaline membrane disease, intrapartum asphyxia and stillbirth in extreme cases. The perinatal mortality rate for these infants is 6 to 10 times greater as compared to those with normal AFI. This can be lowered by timely identification and management of these patients. In such cases umbilical artery velocimetry can help in identifying the compromised fetus early and helps in better management of such cases to reduce the adverse perinatal outcome.

Some studies show that reduced AFI is a poor predictor of adverse perinatal outcome<sup>4</sup>. Keeping in mind the above fact, the present study was conducted to find whether it can be used as a predictor and how the Umbilical artery Doppler study affects the neonatal and maternal outcome.

#### MATERIALS AND METHODS

The present study was conducted on forty singleton pregnant women of gestation  $\geq 34$  weeks with oligohydramnios, in the Department of Obstetrics and Gynaecology, Bebe Nanki Mother and Child care centre in

collaboration with department of Radiology, Government Medical College Amritsar. After obtaining appropriate informed consent, detailed history was taken and complete general physical and obstetrical examination was done. The inclusion criteria were the women with singleton pregnancy with gestational age  $\geq 34$  weeks with AFI  $\leq 5$  cm with intact membranes. The exclusion criteria were the women with multiple pregnancy, placenta praevia, malpresentations and were those who were not willing to participate in the study. AFI was measured ultrasonographically by four quadrant technique. In patients diagnosed with oligohydramnios, Umbilical artery Doppler velocimetry was done weekly and NST was done twice weekly. Those with abnormal Doppler findings or associated with IUGR were admitted and monitored intensively.

Those cases with absent diastolic flow were terminated after giving betamethasone coverage and those with reversed diastolic flow in umbilical artery were immediately terminated by cesarean section. Those with decreased end diastolic flow in umbilical artery were intensively monitored and the mode of termination was decided by cervical scoring at the time of induction. Women with no other risk factors were allowed for spontaneous onset of labour.

The nature of amniotic fluid was noted at the time of rupture of membranes and was classified as clear or meconium stained liquor. Those who developed significant variable decelerations and repetitive late decelerations or other ominous FHR pattern with or without meconium

stained liquor which persisted inspite of corrective measures like change in maternal position, hydration, O<sub>2</sub> inhalation and stopping oxytocin were delivered by LSCS. All new borns were attended by neonatologists and APGAR score at 1 and 5 min was documented. Various delivery and neonatal outcomes were recorded.

Collected data was statistically analyzed. Pearsons correlation tests and Chi- Square tests were used. In addition, epidemiological parameters like sensitivity, specificity, positive predictive value and negative predictive value were calculated for colour Doppler in prediction of adverse perinatal outcome.

## RESULTS

In the study, it was observed that the maximum numbers of cases of oligohydramnios i.e. 55% (22) cases were found in the age group of 21-25 years & majority of them 62.5% (25) cases were primigravidae, complicated by PIH in 37.5% cases, nonreactive NST was seen in 42.5% cases. 65% (26) cases needed to be induced due to abnormal colour Doppler findings or nonreactive NST. Meconium stained liquor was seen in 47.5% cases. LSCS was needed to be done in 67.5% (27) cases. The main indication of LSCS was fetal distress, abnormal colour Doppler findings or nonreactive NST.

The Umbilical artery colour Doppler was done in all these cases and they were divided into two groups. One with normal Doppler findings and the other with abnormal Doppler findings. Results were compared between these two groups and were statistically analysed. P value of <.05 was considered as significant. Results have been shown in tabulated form below. The mean S/D ratio in normal Doppler

group was 2.6 and in abnormal Doppler group was 4.32.

Incidence of Intrauterine growth restriction was 88.9% (16 cases) in patients with abnormal Doppler findings and 18.2% (4 cases) in patients with normal Doppler study, which was statistically highly significant ( $X^2 = 19.79$ ,  $p < .001$ ) (Table 1) Incidence of non reactive fetal heart tracing was seen in 72.2% (13) cases with abnormal Doppler findings and in 18.2% (4) cases with normal Doppler findings, which was statistically highly significant ( $X^2 = 11.83$ ,  $p = .001$ )

LSCS was needed to be done in 50% (11) cases with normal Doppler study and 88.8% (16) cases of abnormal Doppler findings which was statistically significant ( $X^2 = 6.93$ ,  $p = 0.031$ ) The most common indication of caesarean was fetal distress due to meconium stained liquor. In patients with abnormal Doppler findings, liquor was clear in 27.3% (6) cases and it was meconium stained in 72.2% (13) cases, which was statistically highly significant ( $X^2 = 8.2031$ ,  $p = .005$ ).

13.6% (3) patients with normal Doppler findings and 61.1% (11) patients with abnormal Doppler findings had deliveries at gestation less than 37 weeks, which was statistically significant (table 2). All babies of patients with normal Doppler findings were discharged and transferred **to the mother's side and 5% (2) babies** belonging to patients with abnormal Doppler findings could not survive.

## DISCUSSION

Hypertensive disorders which cause chronic placental insufficiency lead to oligohydramnios. In this study, there were 37.5% cases of oligohydramnios complicated with preeclampsia. The results of our study were in accordance with the study done by Sriya R et

al<sup>5</sup>where 31% cases of oligohydramnios were complicated with preeclampsia.

In the present study, occurrence of nonreactive NST was seen in 42.5% cases. Results were in accordance with studies done by Kumar P et al<sup>6</sup> and Sriya Ret al<sup>5</sup> where nonreactive NST was seen in 40% and 41.55% cases respectively. The incidence of meconium stained amniotic fluid is high in patients with oligohydramnios. The meconium stained liquor was noted in 47.5% in this study which is in accordance to study done by Sriya R et al<sup>5</sup> and Rutherford et al<sup>7</sup> where it was seen in 38.88% and 54% cases. Incidence of LSCS for fetal distress was 67.5% in this study which is in accordance to the study one by Chandra P et al<sup>8</sup> where rate of caesarean section was 76.92%.

Apgar score <7 at 1 minute of birth was seen in 42.5% cases. This was in accordance to the study done by Sriya R et al<sup>5</sup> where Apgar score at 1 minute was 38.8%. Incidence of low birth weight babies was seen in 57.5% cases reflecting high incidence of low birth weight babies in patients with oligohydramnios. The results were in accordance to the study done by Sriya et al<sup>5</sup> where the incidence of low birth babies was seen in 58.38% cases.

In the study, babies of 18 cases (45%) of oligohydramnios required admission in neonatal ward. The results were comparable to study done by Sriya R et al<sup>5</sup> which showed 88% admission rate in NICU. Majority of the babies got **discharged and transferred to mother's side**. Occurrence of perinatal death was 5% in the present study which was in accordance to study done by Casey et al<sup>9</sup> where it was 6.4% and Jandial C<sup>10</sup> et al where it was 10%, whereas Jandial et al<sup>10</sup> reported 10% perinatal deaths.

In the study 45% (18) cases had abnormal umbilical artery Doppler findings. Out of them, 77.8% (14) cases were associated with adverse perinatal outcome, evaluated from rate of NICU admission and low Apgar score. Results were comparable to study done by Carroll BC et al<sup>11</sup> in which 81 cases were studied with oligohydramnios. 61.7% (50) patients had normal S/D ratio, out of which 24% (12) patients were associated with identifiable perinatal morbidity where as in 38.3%(31) patients with abnormal Doppler findings, 74% had adverse perinatal outcome.

Babies of 22.7% cases among normal Doppler group were admitted to NICU. In patients with abnormal Doppler with decreased end diastolic flow, 66.7% cases required NICU admission and 5 out of 6 babies with reversed or absent diastolic flow in umbilical artery velocimetry required admission. Results of our study were in accordance to study done by Deshmukhet al<sup>12</sup> where in these three groups of Doppler, results were 24.07%, 72.41% and 88.24% respectively.

In the present study, Apgar score <7 at birth was seen in 18% cases with normal Doppler, 41.6% cases with abnormal Doppler with decreased diastolic flow and 80% cases of ADF/RDF. The results were comparable to a study done by Deshmukhet et al<sup>12</sup>, there were 34.48% cases of Apgar score <7 in abnormal Doppler group with decreased end diastolic flow and 82.35% cases of Apgar score <7 in abnormal Doppler group with absent/reversed diastolic flow.

## CONCLUSION

Oligohydramnios is an indicator of poor perinatal outcome and represents chronic fetal hypoxia. The high incidence of low birth weight babies in patients of oligohydramnios may be because of chronic placental insufficiency causing

fetal growth restriction. Thus, AFI assessed antepartum or intrapartum help to identify women who need increased antepartum surveillance for pregnancy complications and thus managing the complications timely and effectively. Umbilical artery Doppler also decreases the rate of caesarean section as the patients with normal Doppler findings should be delivered vaginally under close supervision and intensive monitoring. Umbilical artery colour Doppler is a very helpful noninvasive tool in monitoring these patients. It also decreases the iatrogenic premature termination of pregnancy if it comes out to be normal. It is a valuable screening test for predicting fetal distress requiring cesarean section. So, any patient with oligohydramnios should be scrutinized for high risk factors leading to oligohydramnios especially preeclampsia and should be considered for Doppler velocimetry.

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Table 1: Colour Doppler findings in patients with antenatal complications

Antenatal complications	Normal Doppler (n=22)	Abnormal Doppler (n=18)	Pearson chi squarevalue	P value
Preeclampsia	3(13.6%)	13(72.2%)	14.15	.000**
Anaemia	3(13.6%)	2 (11.1%)	.058	.810
IUGR	4(18.2%)	16 (88.9%)	19.798	.000**

Table 2: Neonatal outcomes with colour Doppler velocimetry

Characteristics	Normal Doppler n=22	Abnormal Doppler n=18	Pearson X <sup>2</sup> value	P Value
1.Preterm Delivery	3(13.6%)	11(61.1%)	9.808	.002*
2.Apgar Score <7 at 1min	4(18%)	10(55.5%)	9.73	.002*
3.Apgar Score <7 at 5 min	1(4.5%)	5(27.8%)	4.19	.041*
4. Positive pressure ventilation required	1(4.5%)	12(66.7%)	17.62	.000*
5.NICU admissions	5(22.7%)	13(72.2%)	11.32	.001*
6.Perinatal death	0 (0%)	2(11.1%)	3.964	.052
P>0.05	Not significant			
P* value<0.05	Significant			
P**<.001	Highly significant			

