



Umbilical Artery Doppler Indices Better Predictor for Perinatal and Obstetrics Outcome in Oligohydramnios at or Beyond 34 Weeks of Gestation

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ABSTRACT

Aim: To compare the usefulness of umbilical artery Doppler velocimetry in predicting the obstetrical and perinatal outcome in oligohydramnios at or beyond 34 weeks of gestation. **Methods:** This comparative prospective study conducted among 50 pregnant women at 34 weeks of gestation with oligohydramnios (AFI < 5 cm). They are divided into two groups. The study group (n=21) consist of oligohydramnios at or beyond 34 weeks gestation with abnormal doppler and control group (n=29) with oligohydramnios with normal doppler. Results were statistically analyzed and compared using various variables of perinatal outcome. **Results:** In the study group the 28% cases in the AFI range of 1-2cm and none in control and 46.6% cases in study group were 4-5cm where as 79% of cases in control group. Among control group 65.5% had a LSCS while 34.5% delivered vaginally and in study group 85.7% had LSCS and 14.3% delivered vaginally. LSCS for fetal distress in study group were 42.8% and in control group 32.4%. In study group IUGR were 80.9% , NICU admission were 76.19% where as in control group IUGR were 34.48% & NIUC admission were 44.88%. **Conclusion:** oligohydramnios with normal flow velocimetry are at lower risk than those with abnormal umbilical artery Doppler velocimetry. Cases with abnormal Umbilical artery Doppler velocimetry were taken directly for LSCS, which reduced, the perinatal morbidity and mortality. Hence in all patients with oligohydramnios, Umbilical artery Doppler velocimetry should be done to recognize the compromised fetus.

KEYWORDS

Amniotic fluid index (AFI), Oligohydramnios, Umbilical Doppler velocimetry, lower Segment cesarean Section (LSCS).

Introduction

Phelan defined oligohydramnios as amniotic fluid index (AFI) ≤ 5 cm. Oligohydramnios occurs in about 1-5% of pregnancies at 34 to 42 weeks of gestation [1]. Women with oligohydramnios are more associated with IUGR, non-reactive FHR tracing, cord compression, poor tolerance of the labor by fetus thus an increased incidence of LSCS [2]. Oligohydramnios is also leading indication of labor induction [3]. Oligohydramnios is associated with high rate of pregnancy complications and increased perinatal morbidity and mortality. Thus umbilical Doppler velocimetry assessed antepartum would help to identify women who need increased antepartum surveillance for pregnancy complication and decreased perinatal morbidity and mortality [4,5].

Materials and Method

This was a comparative prospective study conducted among 50 women with gestational age at or beyond 34 weeks with oligohydramnios at J.L.N. Medical college Ajmer. The inclusion criteria were women with gestational age of 34 weeks or more, intact membranes, singleton pregnancy with cephalic presentation and exclusion criteria were multiple pregnancy, fetal congenital anomalies, malpresentation and placenta previa. The women were divided into two groups. First group consists of women with AFI less than or equal to 5 cm with abnormal study of umbilical artery doppler. Second (control) group with only AFI less than or equal to 5 cm with normal Doppler study.

On admission after complete history and examination, routine investigation done as required for gestational age followed by ultrasound, NST, BPP & Umbilical artery Doppler done. Documentation of obstetric intervention in the form of induction

or augmentation of labor with prostaglandins or oxytocin and mode of delivery was done. Various outcome measures recorded were induction of labor, nature of amniotic fluid, indication of caesarean delivery, APGAR score at 1 and 5 minutes, birth weight, IUGR, admission to NICU, perinatal morbidity and mortality.

The results were recorded and tabulated and statistically analyzed using parameters like mean, chi square test. Other parameters like sensitivity, specificity, positive predictive value, and negative predictive value were used at required observations.

Results

In this study most of them were primigravida in both groups. Incidence of LSCS was more in study group (85.7%) as compared to control group (65.5%) ($\chi^2=7.805, p \leq 0.013$). LSCS for fetal distress more in study group (42.8%) as compared to control which was 32.9% (Table 1). NICU admission in study group was (76.19%) and 34.4% in control group. Umbilical artery Doppler velocimetry in case of NICU admissions has a sensitivity of 60%, specificity of 59%, positive predictive value of 58% and negative predictive value of 62% ($\chi^2=13.634, p \leq 0.001$) (Table 2,5). Incidence of IUGR in study group was 80.9% and in control group was 34.48% which shows Umbilical artery Doppler velocimetry had in case a sensitivity of 65%, specificity of 61%, and positive predictive value of 54% and negative predictive value of 72%. ($\chi^2=23.104, p \leq 0.001$) (Table 3,5). Tachypnoea was commonest indication for NICU admission in both groups but 2nd most common cause of NICU admission in study group was pre-term while in control group hyperbilirubinaemia. In cases with S/D ratio more than 95th percentile IUGR was 85.7%, APGAR of ≤ 7 was 35.5% and NICU admission was 78%. In cases

with absent end diastolic flow, incidence of IUGR was 100%, APGAR of ≤ 7 was 80% and NICU admission was 80%. In cases with reversal of end diastolic flow, incidence of IUGR was 100%, APGAR of less than 7 was 50% and NICU admission was 50% with 50% perinatal death (Table 4). One case with reversal of diastolic flow was an IUD, hence not included for analysis.

Table 1: Mode of delivery in Doppler

Mode of delivery	AFI ≤ 5 cms with abnormal umbilical artery Doppler (n=21)	AFI ≤ 5 cms with normal umbilical artery Doppler (n=29)	Total (n=50)
FTVD	02 (9.5%)	08 (27.5%)	10 (20%)
PTVD	01 (4.7%)	01 (3.4%)	02 (4%)
Vacuum delivery	00 (0%)	01 (3.4%)	01 (2%)
LSCS	18 (85.7%)	19 (65.5%)	37 (74%)

$\chi^2 = 7.805$, p value = 0.005

Table 2: NICU Admission

Admitted to NICU	Study Group		control Group	
	N	%	n	%
Admitted to NICU	16	76.19%	10	34.4%

$\chi^2 = 13.634$ p value = 0.001

Table 3: IUGR

Study Group		control Group	
N	%	N	%
17	80.90	7	34.48

$\chi^2 = 23.014$, p value = 0.001

Table 4: Perinatal outcome in umbilical artery Doppler group with AFI ≤ 5 cms

Perinatal outcome	AFI ≤ 5 cms with abnormal umbilical artery Doppler (n=21)	AFI ≤ 5 cms with normal umbilical artery Doppler (n=29)	Total (n=50)
Fetal Distress	8 (38.2%)	13 (44.82%)	21 (42%)
APGAR ≤ 7	1 min 8 (38.2%)	8 (27.58%)	16 (32%)
	5 min 2 (9.52%)	0 (0%)	02 (4%)
IUGR	17 (80.9%)	10 (34.48%)	27 (54%)
NICU Admission	16 (76.19%)	13 (44.88%)	29 (58%)
Perinatal Death	01 (4.76%)	00	01 (2%)

Table 5: Nature of abnormal Doppler study and perinatal outcome

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Doppler variables	IUGR	FD	Apgar ≤ 7		NICU admission	Perinatal death
			1min	5min		
S/D ratio $>95^{th}$ percentile (14)	12	8	5	0	11	0
AEDF (5)	5	5	3	1	4	0
REDF (2)	2	1	1	1	1	1

Discussion

Carroll BC⁶ et al conducted a study in 1998 to evaluate the Doppler velocimetry in predicting perinatal outcome in patients with oligohydramnios. They identified 81 cases with documented oligohydramnios and did umbilical artery Doppler velocimetry in them.

50 patients (61.7%) had normal S/D ratio, out of which 12 patients (24%) were associated with identifiable perinatal morbidity where as in 31 patients (38.3%) with abnormal Doppler findings, 74% had adverse perinatal outcome.

In the present study, out of 50 cases, 29 (58%) had normal umbilical artery Doppler velocimetry and adverse perinatal outcome was 35.7% and 21(42%), had abnormal umbilical artery Doppler velocimetry with adverse perinatal outcome in 73.3%. In the present study, rate of induction of labour in cases with abnormal Doppler finding is 23.8% and that in cases with normal Doppler finding is 27.5%.

In 2005, Arora et al⁷ evaluated pregnancy outcome in growth restricted fetuses with normal and abnormal umbilical artery Doppler velocimetry. Induction of labour in their study was 29% in cases with normal Doppler findings and 17.1% in cases with abnormal Doppler findings. In the present study, in cases with normal umbilical artery Doppler findings, 31% had non-reactive NST, 27.5% had low APGAR and NICU admission was 44.8%.

In a study by Arora et al⁷, non-reactive NST was 6.3%, low Apgar score was 13.3% and NICU admission was 40%.

In cases with decreased end diastolic flow (S/D ratio $> 95^{th}$ percentile), 57% had non-reactive NST, 28.5% had low Apgar score and 71.4% had NICU admission.

The findings by Arora et al⁷ was 22%, 10% and 70% respectively. In cases with absent / reversal of diastolic flow, incidence of non-reactive NST was 90%, low Apgar was 60% and NICU admission was 70% which is comparable to observation by Arora et al⁷ (64.3%, 57% and 100% respectively).

One of the cases with reversal of end diastolic flow was an IUD, hence not included in analysis.

Conclusion

In the presence of oligohydramnios, the occurrence of non-reactive NST, abnormal FHR tracing during labor and thick meconium-stained liquor; development of fetal distress; the rate of LSCS; low 5-min APGAR score; low birth weight; and perinatal mortality are high. Umbilical artery Doppler velocimetry was very useful in identification of high risk cases in oligohydramnios and perinatal outcome improved significantly. In study group, most of the cases with abnormal Doppler findings were taken directly for LSCS, which reduced the perinatal morbidity and mortality. Hence, in all patients with oligohydramnios, umbilical artery Doppler should be done to recognize the compromised fetus.