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Original Research Article

Study of predicting perinatal outcome in patients with oligohydraminos at term pregnancy

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ABSTRACT

Background: Amniotic fluid plays a major role in the fetal growth and development. It provides the fetus with a protective low resistance environment suitable for growth and development, a cushion against the constricting confines of the gravid uterus, allowing the fetus room for the movement and growth and protecting it from external trauma. The abnormalities of the fluid volume can interfere directly with the fetal development or may be an indirect sign of underlying disorder such as fetal hypoxia, neural tube defect or gastrointestinal obstruction. Aim of this study was to determine whether an amniotic fluid level of 5cm or less can be predictor of adverse perinatal outcome in terms of fetal distress, birth weight, APGAR score and neonatal morbidity and mortality.
Methods: Amniotic fluid index (AFI) was determined with a b-mode real time scanner with linear transducer operated at 3.5 MHz. AFI estimation done by four quadrant technique in supine position. The summation of measurement from each quadrant represented the amniotic fluid index in centimeters of each patient. Fetal outcome was assessed with respect to birth weight and gestational age; Apgar score at one and five minutes; any other neonatal complications intrapartum or postpartum during stay in hospital and maturity of baby - condition at the time of discharge of mother and baby.
Results: The labor was induced in 28% women with AFI <5cm, out of which 19 women delivered vaginally and 9 women underwent LSCS for failure of induction. The mean birth weight was 2.61 kg in our study. Maximum number of babies i.e. 57% were with birth weight between 2.1-2.5 kg. The APGR score at 5 min was 9 in 71% cases and 8 in 21% cases. The mean APGR score at 5 min was 8.63.
Conclusions: AFI can be used as an adjunct for fetal surveillance along with other methods to identify high risks foetuses to improve the perinatal outcome.

Keywords: AFI, Amniotic fluid, LSCS, Oligohydraminos, Term pregnancy

INTRODUCTION

The modern obstetrics is concerned with the health and wellbeing of both the mother and the unborn child. Recognition of fetus at risk for death or damage in utero, quantifying the risk, balancing the fetal risk against the risk of neonatal complications from immaturity and determining the optimal time and mode of intervention are the cornerstones of modern perinatal medicine[1]. Amniotic fluid plays a major role in the fetal growth and development. It provides the fetus with a protective low resistance environment suitable for growth and development. It provides a cushion against the constricting confines of the gravid uterus, allowing the fetus room for the movement and growth and protecting it from external trauma. It helps to maintain the fetal body temperature and plays a part in the homeostasis of fluid and by permitting extension of the limbs it prevents joint contractures. It prevents compression of the umbilical cord and thus protects the fetus from vascular and nutritional compromise. The abnormalities of the fluid volume can interfere directly with the fetal development or may be an

indirect sign of underlying disorder such as fetal hypoxia, neural tube defect or gastrointestinal obstruction.

Amniotic fluid index (AFI) of ≤5 cm or single deep pocket <2cm defines oligohydramnios as originally described by Phelan et al.[2] Clinical estimation of amniotic fluid volume is an important part of fetal assessment as variation in its amount has been related to a variety of pregnancy complications.[3] Quantification of amniotic fluid is an important component of the biophysical profile in ultrasound evaluation of the fetal wellbeing, especially in the third trimester.[4]

In pregnancy amniotic fluid surrounds the fetus and plays an important role in the development of fetus. From the very beginning of the formation of the extracoelomic cavity amniotic fluid can be detected. In early pregnancy, amniotic fluid is an ultrafiltrate of maternal plasma. By the beginning of second trimester it consists largely of extracellular fluid that diffuses through the fetal skin and thus reflect the composition of fetal plasma. After 20 weeks the cornification of fetal skin prevents this diffusion and it is composed largely of fetal urine.[5] At first it is mainly water with electrolytes, but by about 12-14th week the fluid also contain proteins, carbohydrates, lipids and phospholipid and urea, all of which aids in the growth of the fetus.[6] The volume of amniotic fluid at each week is variable and is positively correlated with the growth of fetus. From the 8th week when the fetal kidneys begin to function, fetal urine also contributes in the formation of the amniotic fluid. Approximately in the 10th week the breathing and swallowing of the fetus slightly decrease the amount of amniotic fluid but neither urination nor swallowing contributes significantly to amniotic fluid quantity changes. From the 10th to 20th week it increases from the 25 ml to 400 ml approximately. Until the 25th weeks when keratinization of skin is complete then the relationship between the amniotic fluid and the fetal growth stops. It reaches the plateau of 800 ml at 40 weeks. The amount of fluid declines to roughly 250 ml at 42 weeks. Assessment of amniotic fluid volume at term is often included in antepartum care as a method of evaluating fetal wellbeing. Alterations in AFI have classically been considered as an indicator of fetal compromise.[7]

Amniotic fluid is a clear, mildly yellowish coloured fluid contained in amniotic sac which is in circulation around the fetus. It has ennumerous functions which are important for the fetus and its development inutero.[8]

During pregnancy

It gives a physical space for the fetus to develop which is necessary for normal musculoskeletal development. It acts as shock absorber thereby protects the fetus from external and internal injury, and umbilical cord compression. It helps to prevent infection in the amniotic environment by its bacteriostatic property. It allows and helps in fetal swallowing-essential for the gastrointestinal tract development, and also supports in fetal breathing necessary for lung development. It maintains amniotic fluid pressure there by reducing the loss of Lung fluid which is an essential component for pulmonary development (Nicolini, 1989).[9]

During labour

Amnion and chorion form hydrostatic wedge which helps in dilation of cervix. Prevents marked interference with placental circulation. Protects fetus and placenta from pressure by contracting uterus.

Formation of amniotic fluid

The mechanism of amniotic fluid production, consumption, composition and volume depends on gestational age. Before the embryo becomes evident, an amniotic space is recognised just before the time of implantation. During first trimester major source of AF is amniotic membrane. During the later half of 1st and 2nd trimester as fetus and placenta differentiate, develop and grow, other pathway of AF production and consumption comes into play. This includes movement of fluid across chorionic frundosum and fetal skin, fetal urine output, fetal swallowing and GI absorption. The chorionic frundosum portion of chorion that develops into the fetal portion of the placenta is a site at which water is exchanged freely between fetal blood and AF across the amnion. Fetal skin is permeable to water and some solutes permitting direct exchange between fetus and AF until keratinization of fetal skin which occurs at 24-26 weeks of gestation. However, fetal skin continues to play important role in volume regulation throughout pregnancy. The importance of this pathway is evident in the significant higher transcutaneous fluid loss of preterm infants.

Newer concepts in management of oligohydramnios

In conditions like fetal obstructive uropathy, where oligohydramnios is commonly encountered, as a treatment procedure Vesico-amniotic shunts are found to be quite effective in treating low amniotic fluid levels.[10] But its effectiveness in maintaining pulmonary and renal functions is questionable yet. L-arginine, a precursor of vasopressin is a potent treatment option in the treatment of oligohydramnios.[11]

Newer drugs

Herbal extract of Salvia miltiorrhiza in its purified form have been found to improve the amniotic fluid volume in preterm through increasing uteroplacental perfusion and circulation. A Chinese medicine, Salvia miltiorrhiza is found to be effective in the treatment of oligohydramnios.[12]

The drug hemodialysate (solcoseryl) effectiveness on liquor volume in intra uterine growth restriction (IUGR) babies and its outcome in form of APGAR score and health

status studies concludes that solcoseryl remains as a drug of choice in pregnancy with IUGR, after 28 weeks of gestation.[13]

Current study aimed to determine whether an amniotic fluid level of 5cm or less can be predictor of adverse perinatal outcome in terms of fetal distress, birth weight, Apgar score and neonatal morbidity and mortality.

METHODS

The present study was conducted in the Department of Obstetrics and Gynecology, RNT Medical College, Udaipur during the period May 2020 to November 2020. The study group comprised of 100 clinically and sonographically proven cases of oligohydramnios at term attending antenatal clinic and those admitted in antenatal ward and clean labour room at random.

All patients fulfilling criteria of singleton pregnancy, four quadrant estimation of amniotic fluid index, gestational age at term and intact membranes were included.

All patients of multiple pregnancy, gestational age of >40 weeks, preterm rupture of membrane, polyhydramnios, chorioamniotitis, singleton pregnancy with gestational age less than 36 weeks and fetus with congenital anomalies like renal agenesis, polycystic kidney disease were excluded from the study.

Uterine height was measured by a metric tape made up of non-elastic material. Patient is laid down in supine position and legs was extended to prevent upward movement of symphysis pubis. The uterus was relaxed and bladder empty. The measurement was taken from upper border of symphysis pubis to superior fundus uteri. The reading was recorded irresponsible of the lie and presentation or degree of descent of presenting part into the pelvis. Symphysis fundal height (SFH) was measured on first visit after 28 weeks and then fortnightly.

Abdominal girth was measured with a non-elastic metric tape at the level of umbilicus at subsequent visits after 28 weeks.

Daily fetal movement recording (DFMR) was done by explaining the patient to count fetal movements three times a day (morning, noon and evening), each of one hour duration. The total counts multiplied by four gives daily (12 hours) fetal movement count. If there are <10 movements in 12 hours, then fetal demise is imminent. Strong kicking, punching, jobbing movements, flutters and hiccups are avoided. Amniotic fluid index (AFI) was determined with a b-mode real time scanner with Linear transducer operated at 3.5 MHz. AFI estimation done by four quadrant technique. This procedure was performed with patient in the supine position uterus was divided into four equal quadrant. The linea nigra was used as the midline to divide the uterus into the right and left halves. The mid point between fundus and pubic symphysis was obtained and straight line through the midpoint and perpendicular to the linear nigra divided the uterus into upper and lower halves. The transducer head is placed along maternal longitudinal axis, perpendicular to the floor. The vertical diameter of largest fluid pocket is identified and measured in centimeters for each quadrant. The summation of measurement from each quadrant represented the amniotic fluid index in centimeters of each patient.

The study group patients were given intravenous amino acid infusion on first day and then every alternate day till 12 days, after that, biweekly till patient delivers till term. Oral iron, calcium, protein, multi vitamins were also given. Patients were followed up the till their delivery.

Pregnancy outcome were assessed with respect to incidence of meconium stained liquor; intrapartum fetal distress; indication of caesarean section; labor-spontaneous, induced; date and time of delivery.

Fetal outcome was assessed with respect to birth weight and gestational age; Apgar score at one and five minutes; any other neonatal complications intrapartum or postpartum during stay in hospital and maturity of baby - condition at the time of discharge of mother and baby.

Statistical analysis

Presentation and analysis of collected data was done on the basis of statistics tools and techniques. Analysis of data was done on the basis of descriptive statistics in which use of proportion, mean and SD was used. For inferential analysis Chi square test was used. Statistical significant was assessed at $p<0.05$.

RESULTS

The age distribution is shown in table and the maximum number of cases were in the age group of. 21 yrs- 25 yrs. The mean age was 26.33 years (Figure 1).

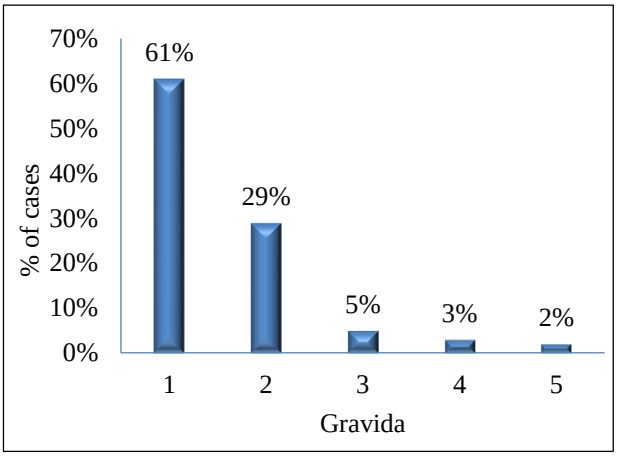

Figure 1: Gravida wise distribution of study subjects.

The distribution of cases according to gravidity is shown in above table. The maximum number of patients were primigravida i.e. 61%. The mean gestational age was 37.61 wks. In our study 37 wks of gestational group constitutes maximum i.e. About 42% and 38 wks of gestational group constitutes 25% (Figure 2).

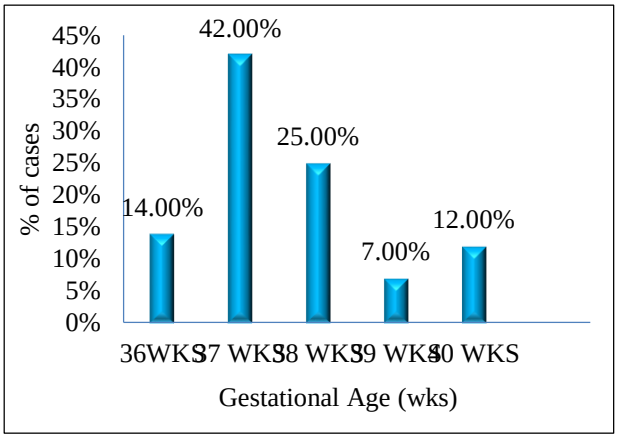

Figure 2: Distribution of cases according to gestational age.

The labor was induced in 28% women with AFI <5cm, out of which 19 women delivered vaginally and 9 women underwent LSCS for failure of induction. The decision for induction of labor was made depending upon gestational age and NST with FHR reading. Number of women delivered for LSCS was 72% in our study. In our study, 72% of cases were delivered by caesarean section. 34% cases had non-reactive NST for which LSCS were taken which constitutes 42.5% of all LSCS.

Table 1: Distribution of cases according to mode of delivery (MOD).

		No.	%
Mode of delivery (MOD)	Vaginal delivery (spontaneous)	9	9
	Vaginal delivery (induced)	19	19
	LSCS	72	72
Indication of labour	FD	34	42.5
	FOI	9	11.25
	Elective	29	36.25

Out of 28% cases which were induced, 9 women were delivered by LSCS for FOI (failure of induction) which comprises 11.25% of all LSCS.

In 36.25% cases LSCS were done due to other associated obstetrical risks such as previous LSCS (13 cases), bad obstetrical history with refusal for trial of labour (16 cases) (Table 1).

The mean birth weight was 2.61 kg in our study. Maximum number of babies i.e. 57% were with birth weight between 2.1-2.5 kg (Table 2).

Table 2: Distribution of cases according to birth weight.

Birth weight	No.	%
>3 KG	11	11.00
2.6-3 KG	28	57.00
2.1-2.5 KG	57	28.00
<2 KG	4	4.00
Total	100	100.00
Mean±SD	2.61±0.37	

Table 3: APGAR score at 1 min.

Apgar score	1 min		5 min	
	No	**%**	**No**	**%**
6	29	29		
7	53	53	8	8
8	18	18	21	21
9			71	71
Mean±SD	6.89±0.68		8.63±0.63	

The APGR score at 1 min in our study was 7 in 53% and 6 in 29%. The mean APGR score at 1 min was 6.89. The APGR score at 5 min in our study was 9 in 71% cases and 8 in 21% cases. The mean APGR score at 5 min was 8.63 (Table 3).

Table 4: NICU admission and neonatal death.

	Study group (n=80)	
	No.	**%**
NICU admission	17	17
Neonatal death	03	22.5

In our study, 17% neonates were admitted to neonatal ward for meconium aspiration syndrome (9 neonates) and low birth weight (8 neonates). Out of 17 neonates which were admitted in NICU, 3 neonatal deaths were seen in our study. One neonatal death was due to Meconium Aspiration Syndrome (MAS). Two neonatal deaths were due to MAS with very low birth weight neonates. Strict FHS monitoring in labour room and timely intervention lead to decrease in perinatal mortality in our study (Table 4).

DISCUSSION

It is a known fact that severe oligohydramnios is associated with adverse perinatal outcome. Often oligohydramnios is used as an indication for operative delivery. Hence assessing amniotic fluid volume antenatally is essential in determining high and low risk groups.

A cohort study conducted in PDZH, RNT medical college Udaipur from May, 2020 to November, 2020 which contains 100 clinically and sonographically proven cases of oligohydramnios to determine the perinatal outcome.

Age and gravidity wise analysis

In our study, maximum number of women were in the age group of 21 to 24 years (n=45). Of which highest percentage of women (61) were primipara and (39) were multiparous. This was partially evident with that of Jagatia et al, where they reported that incidence of oligohydramnios was more in primipara which is compatible with the study of Petrozella et al and Jandial et al.[14,15]

Mode of delivery wise analysis

The present study revealed that, overall caesarean section (n=72) rate was higher. Among non-reactive CTG group (n=34) emergency LSCS were done. This goes with the study by Jandial et al which stated a nonreactive CTG + AFI <5 cm indicated fetal jeopardy according to revised biophysical profile scoring by Clark et al.[16,17] The fetal jeopardy reflected an increased operative interference in this study. Among reactive CTG group, elective LSCS (n=29) were done which was higher compared to vaginal delivery (n=28).

Birth weight wise analysis

In our study, 57% of babies were born with birth weight <=2.5kg (LBW). Similar finding is seen in study by Jandial et al (58%), Sriya et al and Chandra et al.[16,18,19]

NICU admission wise analysis

About 17% of newborns were admitted in neonatal ward for various morbidities like low birth weight, fetal distress etc. It is comparable to studies conducted by Chandra et al and Sriya et al which showed high incidence of NICU admission i.e. 46.15% and 88.88% respectively.[19,18] In our study, there were 3 neonatal death. In study by Baron et al and Casey et al there was no mortality probably because of good neonatal intensive care unit facilities.[20,21] The 1 min APGAR score 7 is seen in 53% of neonates.

While conducting this study, many patients were induced and under continuous monitoring vaginal delivery was done in 19% of induced cases and by continuous monitoring and timely intervention neonatal morbidity recorded was only 3%.

This study has some limitations. Only 100 cases were studied which constitute very small sample size. Also number of cases were less due to the Covid-19 pandemic which affected the admission rates. The diagnosis of fetal distress was made depending on the FHR tracings on CTG. Fetal acidosis was not proved by fetal scalp blood sampling or other methods because of non-availability. The use of backup surveillance methods like scalp blood sampling and acoustic stimulation and amnioinfusion would have altered the outcome.

CONCLUSION

In our study concluded that Amniotic fluid is helpful in screening high risks patients during labour and AFI <5cm is one of the predictors of comparatively poor perinatal outcome. The statistical significance between Oligohydraminos with Non-reactive NST and LSCS for fetal distress and the incidence of meconium stained liquor on ARM in induced patients would help in identifying patients which may land up in Emergency Caesarean section. So, AFI can be used as an 'Admission test' to categories high risks pregnancy cases. In the presence of low AFI, the incidence of abnormal FHR, Non-reactive NST, NICU admission, rate of LSCS, Low birth weight was high. Thus, AFI can be used as an adjunct for fetal surveillance along with other methods to identify high risks foetuses to improve the perinatal outcome.

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