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Original Research Article

Ultrasound evaluation of pregnancies with oligohydramnios in third trimester and their feto-maternal outcome at tertiary care hospital

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ABSTRACT

Background: Oligohydramnios presents a threat to the fetus due to increased risk of the umbilical cord getting compressed and resulting in impaired blood flow to the fetus. The objective of the study was to find out the significance of oligohydramnios during third trimester of pregnancy.
Methods: A hospital based prospective study was conducted in the Department of Radiodiagnosis and Obstetrics and Gynaecology, Sir T. Hospital, Bhavnagar. Amniotic fluid index (AFI) estimation was done on 60 pregnant women in third trimester, who were selected after screening for inclusion and exclusion criteria. Women with AFI < 5 cm were taken as cases while women with AFI > 5 cm as controls.
Results: Maximum number of the patients were belonging to 20-25-year age group in normal AFI, oligohydramnios and borderline oligohydramnios group. Incidence of malpresentation was significantly higher in oligohydramnios (20%), borderline oligohydramnios (17.5%). In oligohydramnios common, etiological factors were PIH (27.5%), idiopathic factor (27.5%), postdatism (12.5%) and IUGR (7.5%), while borderline oligohydramnios group is commonly associated with idiopathic factors (52.5%) followed by PIH (17.5%). Incidence of caesarean section was significantly higher in oligohydramnios group (67.5%) than normal AFI (18%). In borderline oligohydramnios group rate is significantly higher (45%) than normal AFI, but it is less as compared to oligohydramnios.
Conclusions: Identification of oligohydramnios can be done by a good clinical examination and confirmed by measuring AFI on ultrasonography. Poor fetal outcome in the form of preterm, IUD, LBW, low APGAR score at 5 minute and increased chances of still birth, NICU admission and neonatal death are seen with oligohydramnios in third trimester and more so if it is detected in early third trimester. Chances of induction of labour and risk of LSCS also increase. Thus, detection of oligohydramnios helps in proper management of the cases so that maternal and perinatal outcome can be improved.

Keywords: AFI, Oligohydramnios, Third trimester

INTRODUCTION

Amniotic fluid provides a protected environment for the growing foetus. It cushions the foetus against mechanical and biological injury and supplies nutrients for its growth. The normal average volume of amniotic fluid at 16 weeks of gestation is 250 ml, it increases to 800 ml at 28 weeks and further to 1000 ml at 38 weeks and decreases slightly to 800 ml at 40 weeks.[1] Oligohydramnios is described as a condition with decreased amniotic fluid volume relative to gestational age. It presents a threat to the foetus due to increased risk

of the umbilical cord getting compressed which results in impaired blood flow to the foetus. Manning et al., defined oligohydramnios as the condition when the largest pocket on ultrasound in its broadest diameter measured less than 1cm.[2] Subsequently they revised the criteria to a single pocket measuring 2cm in both vertical and horizontal planes.[3]

Phelan L et al., described amniotic fluid index by an ultrasound approach and defined oligohydramnios as a condition when amniotic fluid index (AFI) was ≤ 5 cm.[4]

Pre-eclampsia, intrauterine growth restriction (IUGR) and postdated pregnancies are the commonest causes of reduced amniotic fluid during third trimester of pregnancy due to chronic placental insufficiency and reduced renal circulation. Oligohydramnios is associated with increased maternal morbidity in terms of increase rate of induction of labour and caesarean section. It is also associated with adverse perinatal outcomes such as preterm delivery, low birth weight, fetal distress in labour, meconium passage, low APGAR score, neonatal resuscitation and NICU admission.[5] Thus, this study was conducted to find out the significance of oligohydramnios in determining the maternal and perinatal outcome in pregnant women with oligohydramnios during third trimester of pregnancy and to find out maternal high-risk factors associated with it.

METHODS

The present study is a prospective comparative study done in between in the year 2016-2017 in Department of Radiodiagonsis and Obstetrics and Gynaecology, Sir Takhtsinhji Hospital, Bhavnagar. The study population consists of 60 patients, which were clinically suspected who were admitted in Gopnath Maternity Home and referred to radiology department, Sir Takhtsinhji Hospital, Bhavnagar.

Inclusion criteria

- Antenatal patients in third trimester
- Intact membrane
- Singleton pregnancy
- Above 18 years and below 35 years of age.

Exclusion criteria

- Antenatal patients having heart diseases
- Renal diseases
- Premature rupture of membranes
- Multifetal gestation.

Patients admitted in the Gopnath Maternity Home for various reasons were taken in study after the satisfying the inclusion and exclusion criteria. A preliminary history taking, through general examination and obstetric examination was taken for study. Informed consent was taken for study. They were analyzed for amount of liquor (amniotic fluid index-AFI) by four quadrant techniques on ultrasonography.

In the present study, according to AFI patients were grouped in to normal AFI (>8-24.9), oligohydramnios (0-5), borderline oligohydramnios (>5-8). Their data was taken as per Performa.

The incidence, etiology, complications, maternal and perinatal outcome, in pregnancy with normal liquor, oligohydramnios, borderline oligohydramnios and polyhydramnios were compared. Each outcome was calculated in all the three groups and then the two groups compared via fisher's exact test. P value <0.05 was considered significant.

Amniotic fluid volume measurement

Clinical examination

Before the advent of ultrasound, clinicians had to rely on abdominal palpation and fundal measurement to detect abnormal fluid volume.

Dye dilution method

It involves injection of a small quantity of a dye such as aminohippurate into the amniotic cavity under sonographic guidance. The amniotic fluid is then sampled to determine the dye concentration and hence calculate the fluid volume in which it was diluted.[6]

Ultrasonography

Amniotic fluid volume evaluation is a component of every standard sonogram performed in the second or third trimester. Volume is typically assessed semi quantitatively, by measuring either single pocket or the amniotic fluid index (AFI) (phelan, 1987).

A qualitative or subjective estimate of amniotic fluid volume is also considered acceptable when performed by an experienced examiner.

Single deepest pocket

This is also known as maximum vertical pocket. The ultrasound transducer is held perpendicular to the floor and parallel to the long axis of the pregnant woman. In the sagittal plane, the largest vertical pocket of fluid is identified. The fluid pockets containing fetal parts and umbilical cord are not included in the measurement. The normal range for single deepest pocket that is most commonly used is 2 to 8 cm (chamberlain).[7,8]

Two deepest pockets

It involves measurement of a single pocket in both the vertical and transverse planes. Adequate fluid volume is

defined as 2*1 cm pocket, a 2*2 cm pocket. Or a pocket that is at least 15cm^2 (gramellini, magann).

Amniotic fluid index (AFI)

This was first described by phelan and coworkers (1987) more than 25 years ago. The uterus is divided in to four equal quadrants by using the umbilicus as a reference point to divide the uterus into upper and lower halves, and by using the linea nigra to divide the uterus into left and right halves. The maximum vertical dimensions of the largest fluid pocket in each quadrant are measured by ultrasonography in millimeters. The measurement obtained from each quadrant was summed to form the amniotic fluid index (AFI). The identified pocket is considered clear when the umbilical cord and other small parts of the fetus are absent.

RESULTS

Amniotic fluid volume serves as an indicator of fetal wellbeing. Decreased amniotic fluid volume in pregnancies without premature rupture of membranes reflects a fetus in chronic stress with shunting of blood to its brain, adrenal glands, and heart and away from other organs including the kidney.

Table 1: Type of admission.

Type	Normal AFI	Oligohydramnios	Borderline oligohydramnios	Total	Percentage
Registered	58	26	23	107	59.4%
Emergency	42	14	17	73	40.5%

Decreased renal perfusion results in decrease urinary output and oligohydramnios. Thus, the evaluation of Amniotic fluid volume has become an integral component of fetoplacental assessment in pregnancies which are at risk for an adverse outcome of pregnancy.

Majority of the patient from the urban area were registered for routine antenatal check-up, due to increased awareness regarding antenatal check-up.

In the present study group, 59.4% patients were registered and 40.5% patients were emergency patients, who were referred from various centres for better management. All the patients were screened for amniotic fluid volume (Table 1).

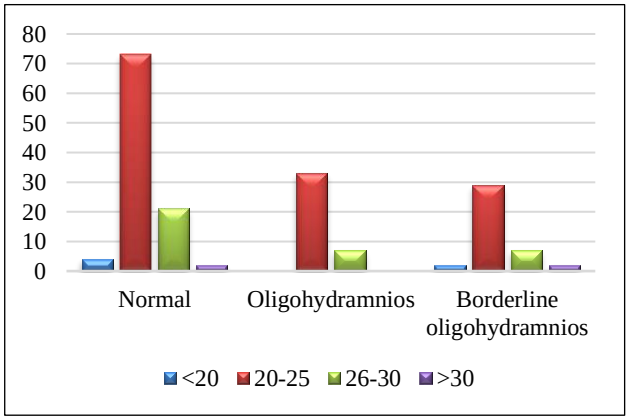


Figure 2: Maternal age distribution.

Table 2: Comparison of socio-economic class.

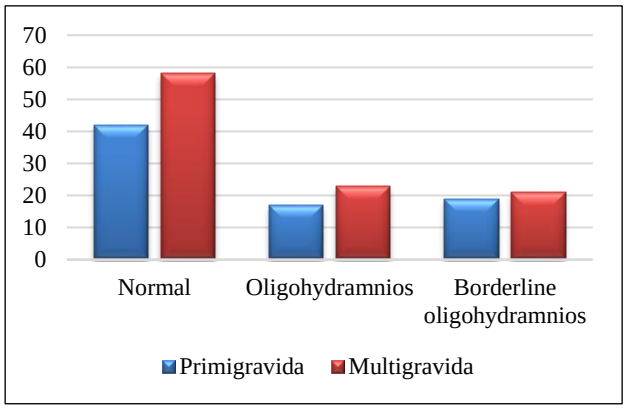
Type	Normal AFI	Oligohydramnios	Borderline oligohydramnios	Polyhydramnios	Total	Percentage
Lower	65	21	22	9	117	58.5%
Middle	35	19	18	11	83	41.5%
Upper	0	0	0	0	0	0%
Total	100	40	40	20	200	

In India, 20-25 years age group is reproductive age group. In present study, maximum group of the patients were in the 20-25 years age group. This is comparable with the study of abnormal liquor volume by Gita guin et al. Table 2 shows that 58.5% patients belong to lower socio-economic group while 41.5% belongs to middle socio-economic group. In the present study, incidence of oligohydramnios was 20%, borderline oligohydramnios was 20% and polyhydramnios was 10%. P value in multiparty for oligohydramnios and borderline oligohydramnios is 1.0 and 0.57 respectively which suggested no association between parity and

oligohydramnios. This is comparable with the study done by Akhter et al, Biggio et al and Gita guin et al. This is because of increased association between the increased maternal age and congenital anomalies.

Table 3: Comparison of incidence.

Study	Normal AFI	Oligohydramnios	Borderline oligohydramnios	Polyhydramnios
Present study	100(50%)	40 (20%)	40 (20%)	20 (10%)



P- Primigravida; M- Multigravida.

Figure 2: Maternal parity distribution.

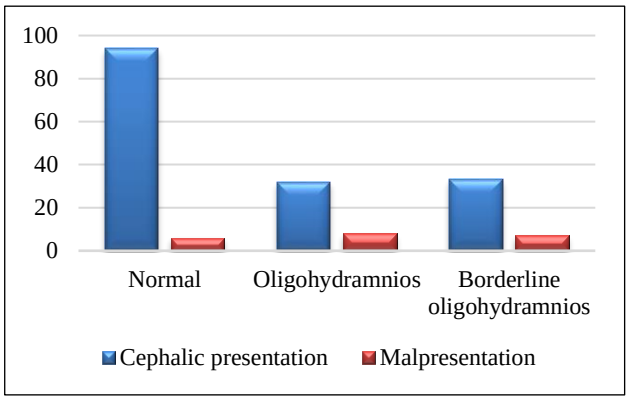


Figure 3: Malpresentation and its association with AFI.

In the present study, incidence of malpresentation in oligohydramnios, borderline oligohydramnios was 20%, 17.5% respectively compared to patients with normal AFI which is 6%. This is comparable with the study done by panting and kemp et al and Gita guin et al. P value by fisher's exact test is 0.0246, 0.05 for oligohydramnios, borderline oligohydramnios respectively, that is <0.05 which is statistically significant. Higher incidence of malpresentation in cases of oligohydramnios and borderline oligohydramnios may be due to prematurity.

In our study, LSCS were done for different reasons. At a time, more than one reason was present for LSCS but the predominant cause was considered in this list. Majority of the LSCs were done for the fetal distress, abnormal NST and meconium stained liquor in oligohydramnios and borderline oligohydramnios group. In the present study, non-reassuring FHS was common complication associated with oligohydramnios and borderline oligohydramnios. P value for MSL in cases of oligohydramnios was 0.0002 which is highly significant.

Table 4: Indication of cesarean section.

Type	Normal AFI	Oligohydramnios	Borderline oligohydramnios
Fetal distress	3 (16.6%)	5 (18.5%)	3 (16.6%)
Thick MSL	2 (11.1%)	3 (11.1%)	1 (5.5%)
NPOL	3 (16.6%)	3 (11.1%)	2 (11.1%)
Previous LSCS	2 (11.1%)	0	2 (11.1%)
Malpresentation	2 (11.1%)	3 (11.1%)	2 (11.1%)
Face presentation	0	1 (11.1%)	0
Nonreactive NST	1 (5.5%)	9 (33.3%)	4 (22.2%)
Severe. PIH	0	1 (11.1%)	2 (11.1%)
Abnormal doppler	2 (11.1%)	0	2 (11.1%)
Macrosomia	1 (5.5%)	0	0
Abruption	1 (5.5%)	0	0
Induction failure	1 (5.5%)	2 (7.4%)	0
Total	18	27	18

Table 5: Feto-maternal complication in relation to AFI.

Type	Normal AFI	Oligohydramnios	Borderline oligohydramnios
Non-reassuring FHS	1 (1%)	12 (30%)	6 (15%)
Antepartum haemorrhage	1 (1%)	0	0
Meconium stained liquor	2(2%)	9 (22.5%)	2 (5%)
Preterm delivery	4 (4%)	4 (10%)	4 (10%)
Postpartum haemorrhage	1 (1%)	0	0

Table 6: Perinatal outcome in relation to AFI.

Outcome	Normal AFI	Oligohydramnios	Borderline oligohydramnios
Live birth	100	40	40
Stillbirth	0	0	0

Incidence of caesarean section was significantly higher in oligohydramnios group (67.5%) than normal AFI (18%). In borderline oligohydramnios group rate is significantly higher (45%) than normal AFI, but it is less as compared to oligohydramnios. No association between polyhydramnios and higher rate of LSCS found in the study. Rate of preterm delivery was 10% in oligohydramnios and borderline oligohydramnios group which was not statistically significant. Intrapartum complication like non-reassuring fetal heart rate, meconium stained liquor were highly associated with oligohydramnios. In the present study, 25% babies in oligohydramnios, 22.5% babies in borderline oligohydramnios, low APGAR score was seen in 22.5% patients of oligohydramnios, 17.5% patients of borderline oligohydramnios. Incidence of IUGR was higher in patients with oligohydramnios (17.5%), borderline oligohydramnios (15%) as compared to normal AFI group (4%).

DISCUSSION

Spontaneous premature rupture of membranes (PROM) is the most common cause of acute oligohydramnios. The incidence of rupture of membranes before term is approximately 1-2%.[9]

Oligohydramnios has been demonstrated in 3-54% of prolonged pregnancies, reflecting differences in sonography criteria used.[10-14] The pathogenesis is presumably similar to the mechanism causing a growth-retarded fetus, because it is clinically recognized that prolonged pregnancy is associated with uteroplacental insufficiency in approximately 10% of cases.

When present study is compared to other past studies, following data were assessed. In our study, congenital anomalies were more common in patients of polyhydramnios (45%) as compared to normal AFI (2%). P value for polyhydramnios group is <0.0001 which is extremely significant. Congenital anomalies were also found in cases of oligohydramnios (p value 0.007) and borderline oligohydramnios (p value 0.14), which suggested that congenital anomalies were more commonly associated with oligohydramnios group than borderline oligohydramnios. Incidence of congenital anomalies studied in Gita guin et al is comparable with present study.

Table 7: Incidence of congenital anomalies in relation to AFI.

Type	Normal AFI	Oligohydramnios	Borderline oligohydramnios
Gita guin et al		4.2%	3.5%
Present study	2(2%)	6(15%)	3(7.5%)

Table 8: Factors associated with oligohydramnios.

Factors	Pregnancy induced hypertension	Post-datism	Congenital anomaly	Intrauterine growth restriction	Uteroplacental insufficiency	Idiopathic
Gita guin et al	3.5%	10.7%	4.2%	14.3%		
Present study	11 (27.5%)	5 (12.5%)	6 (15%)	3 (7.5%)	4 (10%)	11 (27.5%)

Table 9: Factors associated with borderline oligohydramnios.

Factors	Pregnancy induced hypertension	Post-datism	Congenital anomaly	Intrauterine growth restriction	Idiopathic
Guin G et al	16.4%	12.8%	3.5%	11.4%	
Present study	7 (17.5%)	3 (7.5%)	3 (7.5%)	6 (15%)	21 (52.5%)

In the present study, pregnancy induced hypertension, intrauterine growth restriction and postdatism were common factors in cases if oligohydramnios, which were also common factors for oligohydramnios in study conducted by Guin G et al.

In borderline oligohydramnios, idiopathic causes were more common than in oligohydramnios. Pregnancy induced hypertension; intrauterine growth restriction and postdatism were other common factors, which were also common factors for borderline oligohydramnios in study conducted by Guin G et al.

In the present study, in patients with normal liquor 6 patients were induced, out of which 5 (83.3%) delivered vaginally and 1 (16.6%) underwent LSCS. In oligohydramnios, 8 patients were induced, out of which 4 (50%) delivered vaginally and 4 (50%) underwent LSCS for various reasons. In borderline oligohydramnios group, 5 patients were induced, out of which 4 (80%) delivered vaginally and 1 (20%) underwent LSCS. In polyhydramnios group, 7 were induced, out of which 4 (57.1%) delivered vaginally and 3 (42.9%) underwent LSCS. Higher rate of induction found in cases of oligohydramnios (p value 0.024) and polyhydramnios (p value0.0012) as compared to normal AFI, which is statistically significant. While rate of induction is lower in borderline oligohydramnios (p value 0.29) as compared to oligohydramnios group, which is comparable with normal AFI and not statistically significant. This result are comparable with study conducted by Guin G et al.

In the present study, incidence of low birth weight was higher in patients with oligohydramnios (25%), borderline oligohydramnios (22.5%) and polyhydramnios (50%) as compared to normal AFI group (10%). P values for the same were 0.03, 0.03 and 0.0001 which suggested significant association between low birth weight and oligohydramnios, borderline oligohydramnios.

CONCLUSION

Oligohydramnios is frequent occurrence and demands intensive fetal surveillance and proper antepartum and intrapartum care. Oligohydramnios is frequent findings in pregnancies involving IUGR, PIH and pregnancies beyond 40 weeks of gestation. AFI is a predictor of fetal tolerance in labour and its decrease is associated with increased risk of abnormal heart rate and meconium stained fluid. Due to intrapartum complication and high rate of perinatal morbidity and mortality, rates of caesarean section are rising, but decision between vaginal delivery and caesarean should be well balanced so that unnecessary maternal morbidity prevented and other side timely intervention can reduce perinatal morbidity and mortality.

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REFERENCES

1. Entezami M, Albig M, Gasiorek-Wiens A, Becker R. Placenta, cord and amniotic fluid (Chapter 14) In: Ultrasound diagnosis of fetal anomalies. Edition III US: Thieme Medical Pub; 2003:301.
2. Manning FA, Hill LM, Platt LD. Qualitative amniotic fluid volume determination by ultrasound: Ante partum detection of intrauterine growth retardation. Am J Obstet Gynecol. 1981;139:254-8.
3. Manning FA, Harman CR, Morrison I, Menticoglou SM, Lange IR, Johnson JM. Fetal assessment based on fetal biophysical profile scoring. IV. An analysis of perinatal morbidity and mortality. Am J Obstet Gynecol. 1990;162(3):703-9.
4. Phelan JP, Smith CV, Small M. Amniotic fluid volume assessment with the four-quadrant technique at 36 to 42 weeks gestation. J Reprod Med. 1987;32:540-2.
5. Sherer DM. A review of amniotic fluid dynamics and the enigma of isolated oligohydramnios. Am J Perinatol. 2002;19:253-66.
6. Chauhan SP, Sanderson M, Hendrix NW, Magann EF, Devoe LD. Perinatal outcomes and amniotic fluid index in the antepartum and intrapartum periods: a meta-analysis. Am J Obstet Gynecol. 1999;181:1473-8.
7. Chamberlain PF, Manning FA, Morrison I. Ultra-sound evaluation of amniotic fluid volume. II. The relationship of increased amniotic fluid volume to perinatal outcome. Am J Obstet Gynecol. 1984;150:250.
8. Bottoms SF, Welch RA, Zador IE. Limitations of using maximum vertical pocket and other sonographic evaluations of amniotic fluid volume to predict fetal growth: technical or physiologic? Am J Obstet Gynecol. 1986;155:154.
9. Vintzileos AM, Campbell WA, Nochimson DJ. Degree of oligohydramnios and pregnancy outcome

in patients with premature rupture of the membranes. Obstet Gynecol. 1985;66:162.
10. Phelan JP, Smith CV, Broussard P. Amniotic fluid volume assessment with the four-quadrant technique at 36-42 weeks gestation. J Reprod Med. 1987;32:540.
11. Chamberlain PF, Manning FA, Morrison I. Ultra-sound evaluation of amniotic fluid volume. II. The relationship of increased amniotic fluid volume to perinatal outcome. Am J Obstet Gynecol. 1984;150:250.
12. Bottoms SF, Welch RA, Zador IE. Limitations of using maximum vertical pocket and other sonographic evaluations of amniotic fluid volume to predict fetal growth: technical or physiologic? Am J Obstet Gynecol. 1986;155:154.
13. Moore TR, Cayle JE. the amniotic fluid index in normal human pregnancy. Am J Obstet Gynecol. 1990;162:1168.
14. Rutherford SE, Phelan JP, Smith CV. The four-quadrant assessment of amniotic fluid volume: An adjunct to antepartum fetal heart rate testing. Obstet Gynecol. 1987;70:353.
15. Akhter H, Guha K, Daisy KP. amniotic fluid index in high risk pregnancies and pregnancy outcome. Dinajpur Med Col. 2010;3(1):1-5.
16. Guin G, Punekar S, Khare S. A prospective clinical study of feto-maternal outcome in pregnancies with abnormal liquor volume. J Obstet Gynecol India. 2011;61(6):652-5.
17. Chen KC, Liou JD, Hung TH, Kuo DM, Hsu JJ, Hsieh CC, et al. Perinatal outcomes of polyhydramnios without associated congenital fetal anomalies after the gestational age of 20 weeks. Chang Gung Med J. 2005;28(4):222-8.
18. Christensen S, Michael W, Lourdes S. Cord containing amniotic fluid pocket: a useful measurement in management of oligohydramnios. Am J Obstet Gynecol 1992:80(5):775-8.

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