THE JOURNAL OF OBSTETRICS AND GYNECOLOGY OF INDIA

The Journal of Obstetrics and Gynecology of India (March–April 2017) 67(2):104–108
DOI 10.1007/s13224-016-0938-3

ORIGINAL ARTICLE

Oligoamnios and Perinatal Outcome

Sandhyasri Panda[1] · M. Jayalakshmi[1] · G. Shashi Kumari[1] · G. Mahalakshmi[1] · Y. Srujan[1] · V. Anusha[1]

Received: 25 May 2016 / Accepted: 16 August 2016 / Published online: 6 September 2016

About the Author

Dr. Sandhyasri Panda completed her postgraduate degree from MKCG Medical College in 1999. She worked as a gynecologist specialist for 5 years in JG hospital. She is passionate about academics, which made her to shift to MIMS, a teaching hospital. She is a professor and spearheading a unit, a laparoscopic surgeon by specialization: an active member of MEU and academic cell and a member of editorial board of IJHRMIMS, the quarterly journal published from MIMS. She believes performing as the best teaching/learning method; as an endeavor to it, besides her clinical excellency, she has a few publications to her credit. She is a guest speaker in national conferences.

Abstract

Objective(s) We aimed at evaluating the predictive value of amniotic fluid index ≤5 on perinatal outcome in terms of effect on cardiotocography, mode of delivery, meconium in liquor, birth weight, fetal distress, APGAR score at birth and neonatal admission to ICU.

Method(s) This is a prospective study of 308 antenatal women admitted to labor ward of MIMS during February 2014–December 2015 with gestational ages between 34 and 41 weeks. All women enrolled were subjected to history taking, examination, AFI estimation and compared between those with AFI ≤5 from rest.

Results The non-reactive CTG, cesarean section rate due to fetal distress, low birth weight, APGAR score <7 and NICU admission were significantly high among those with oligoamnios than the control group.

Conclusion Oligoamnios has a significant correlation with adverse perinatal outcome.

Keywords Oligoamnios · AFI · Perinatal outcome

Dr. Sandhyasri Panda, MD, FICOG, is the Professor in Department of OBGYN at MIMS, Vizianagaram; Dr. M. Jayalakshmi, MD, DGO, is the Professor and Head in Department of OBGYN at MIMS, Vizianagaram; Dr. G. Shashi Kumari, DGO, DNB, is Assistant Professor in Department of OBGYN at MIMS, Vizianagaram; Dr. G. Mahalakshmi, DGO, is a Senior Resident in Department of OBGYN at MIMS, Vizianagaram; Dr. Y. Srujan, PGT, is in Department of OBGYN at MIMS, Vizianagaram; Dr. V. Anusha, PGT, is in Department of OBGYN at MIMS, Vizianagaram.

✉ Sandhyasri Panda
dr.sandhyasree@gmail.com

[1] Department of OBGYN, MIMS, Vizianagaram, A.P 535217, India

Introduction

Amniotic fluid represents the structural and functional integrity of fetus in utero. Low amniotic fluid volume or oligoamnios is defined as amniotic fluid index 5 cm or less and can be associated with different conditions as described by Peipert and Donnenfeld [1]. Gagnon et al. [2] found that chronic severe placental insufficiency caused a reduction in amniotic fluid not attributable to reduced fetal urine output. Due to its association with chronic placental insufficiency and the inherent risk of cord compression in all labors, oligoamnios at term would likely have adverse impact on perinatal outcome as described by Grubb and Paul [3]. Therefore, such cases need a stringent antenatal fetal assessment which includes amniotic fluid volume assessment and intrapartum fetal monitoring. Amniotic fluid volume was measured as described by Phelen et al. [4] by adding largest pockets in all four equal uterine quadrants. Modified biophysical profile as described by Clark et al. [5] and by the American College of Obstetricians and Gynecologists and American Academy of Paediatricians in 2007 [6] remains the predictive tests of fetal well-being. Links have been found between decreased amniotic fluid volume and still birth, fetal anomaly, abnormal FHR tracings in labor, increase in cesarean section for fetal distress, fetal hypoxia and acidosis as described by Chamberlain et al. [7] as cited in Bhagat and Chawla [8]. In the present study, we quantified AFI as described by Phelan et al. [4] and we sought to correlate whether AFI $\leq$5 cm is associated with adverse perinatal outcome in terms of NR CTG, cesarean section for fetal distress, meconium staining of liquor, low APGAR score, low birth weight and neonatal admission to NICU.

Materials and Methods

This was a prospective case control study undertaken in Maharajah's Institute of Medical Sciences, Vizianagaram, A.P, over 2 years from Feb 2014 to Dec 2015 on the impact of oligoamnios on perinatal outcome. Three hundred eight antenatal ladies with singleton pregnancy between 34 and 41 weeks of gestation admitted to this hospital for confinement were included in the study. We have excluded cases of premature rupture of membrane, anomalous fetus, abnormal lie and presentations, placental abnormalities, Rh incompatibilities, diabetic mothers as well as multifetal gestations. All women were explained about the intention of the study, and a written consent was obtained with reassurance to maintain confidentiality of the outcome and that the study is for research purpose only.

After obtaining ethical clearance, enrolled ladies were subjected for a detailed history on demographic profile, medical illness, obstetric history and antenatal complication if any in the present pregnancy; general examination, obstetric examination and bimanual examination were performed. All booked cases underwent ultrasonography examination for estimation of amniotic fluid index by Phelen's method within a week prior to delivery; otherwise, AFI estimation was repeated after admission. Seventy-one women with AFI $\leq$5 were taken as cases in group 1 and 237 as controls in group 2. All have been subjected to cardiotocographic examination, pelvic examination for bishop's scoring and pelvic assessment. Accordingly, decision for mode of delivery was taken and followed through delivery with standard antepartum and intrapartum fetal and maternal monitoring. Data collected on age, parity, mean gestational age at delivery, CTG reading, ultimate mode of delivery, cesarean section due to fetal distress, birth weight, APGAR at 1 min and 5 min, NICU admission if any and duration of stay in NICU were recorded. A pragmatic statistics was used to compare samples to show demographic similarities between two groups; results were analyzed with Student's t test and Chi-square test to find the level of significance between two groups.

Results

Total 308 cases were enrolled for the study: 71 in group 1 (AFI $\leq$5) and 237 in group 2 (AFI >5). Mean maternal age in group 1 is 22.48 $\pm$ 3.4, and in group 2, it is 23.36 $\pm$ 3.4; mean gestational age in group 1 was 38.85 $\pm$ 1.57, and in group 2, it was 38.89 $\pm$ 0.49; 45 (63 %) women were nulliparous in group 1 and 109 (46 %) in group 2; 43 (60 %) women in group 1 had <10 kg weight gain during pregnancy as compared to 20 (8.4 %) in group 2 (Table 1). Obstetric and perinatal outcomes were studied in both the groups.

CTG was non-reactive among 19 (27 %) in group 1 and 25 (11 %) in group 2, which was statistically significant ($p = 0.0016$). Cesarean section was performed in 46 (64.78 %) women in group 1 versus 153 women (64.55 %) in group 2, having no statistical significance, whereas CS due to fetal distress 12 (26 %) in group 1 as compared to 18 (11.7 %) in group 2 is statistically significant ($p = 0.03$). Seventeen women (24 %) in group 1 and 41 (17 %) in group 2 had meconium-stained liquor. The difference was not significant statistically ($p = 0.1579$).

Low birth weight was found in 23 (32 %) in group 1 versus 30 (12 %) in group 2 women; this is found to be statistically significant ($p = 0.0003$). NICU admission was required for 17 (24 %) versus 28 (12 %) babies in groups 1 and 2, respectively; this is found to be statistically significant ($p = 0.020$). One-minute APGAR score of <7 was

Table 1 Maternal demography

	Group 1 (AFI <5) ($n = 71$)	Group 2 (AFI >5) ($n = 237$)	P value (<0.05 = significant)
Maternal age (mean ± SD)	22.48 ± 3.4	23.36 ± 3.4	0.0561
Mean gestational age	38.85 ± 1.57	38.89 ± 0.49	0.8859
Nulliparity	45 (63 %)	109 (46 %)	<0.0001
Maternal wt gain (<10 kg)	43 (60 %)	20 (8.4 %)	<0.0001

Table 2 Obstetric and perinatal outcome

	Group 1 (AFI ≤5) ($n = 71$)	Group 2 (AFI >5) ($n = 237$)	P value (<0.05)
Non-reactive NST	19 (27 %)	25 (11 %)	0.0016
Meconium-stained liquor	17 (24 %)	41 (17 %)	0.1579
Total cesarean delivery	46 (64.78 %)	153 (64.55 %)	1.0000
Cesarean due to fetal distress	12 (26 %)	18 (11.7 %)	0.0318
APGAR score			
1 min <7	15 (21 %)	20 (8 %)	0.0053
5 min <7	7	7	0.0237
Birth weight <2.5 kg	23 (32 %)	30 (12 %)	0.0003
NICU admission	17 (24 %)	28 (12 %)	0.0200

found in 15 (21 %) in group 1 neonates versus 20 (8 %) in group 2 ($p = 0.0053$), whereas 5-min APGAR score <7 was observed in 7 neonates in each group ($p = 0.0237$). Therefore, both 1-min and 5-min APGAR scores of <7 were noted among statistically significant number of neonates in group 1 (Table 2).

In the present study, incidence of oligoamnios is 23 %. The association of PIH, IUGR and prolonged pregnancies is statistically high among group 1 (46 %) compared to group 2 (13 %) (Fig. 1).

We found associated PIH among 17 % of group 1 versus 4.2 % of group 2 women. Similarly, postdatism was seen among 11 % in group 1 versus 5.9 % in group 2, and IUGR was associated in 18.3 versus 3.3 % between group 1 and group 2 women. In the present study, 46 % oligoamnios cases are associated with some risk factor and 54 % cases are idiopathic (Fig. 2).

Discussion

Mean maternal age was 22.48 ± 3.4 in our study group, which is similar to the mean (± SD) maternal age of 22.8 ± 4.2 years in a study by Bangal et al. [9]. Mean gestational age in group 1 was 38.85 ± 1.57 which is similar to mean gestational age 36.7 ± 4.1 weeks in a study by Bangal et al. [9]. These findings indicate that the problem of oligoamnios was more common in the later part of pregnancy. We found nulliparity to be 45 (63 %) in the study group **versus** 109 (46 %) in the control group, which is statistically significant, saying that oligoamnios is more prevalent among primigravida. This is similar to the finding of Krishna Jagatia et al. in 2013 in their study of maternal and fetal outcome in oligoamnios—a study of 100 cases [10]; their incidence of oligoamnios among primigravida was 52 %; similarly in a study by Locatelli A et al. in 2004, their observation was a significantly high incidence of oligoamnios among nulliparous women (0.001) [11]. Further by Bhagat et al. [8], the incidence of oligoamnios was noted among 68 % of **nulliparous** though the association was not statistically significant (0.22).

In the present study, our observation showed that 43 of 71 women versus 20 of 237 women had <10 kg weight gain during pregnancy; there is a statistically significant low maternal weight gain among oligoamnios group ($p = 0.0001$). Similar observation was made by Bhagat and Chawla [8] at RML hospital in their study on Amniotic Fluid Index and Perinatal outcome.

Our study showed CTG was non-reactive among 19 (27 %) in group 1 versus 25 (11 %) in group 2, which was statistically significant ($p = 0.0016$); similar observation was described by Bhagat et al. [8] in their study on Correlation of Amniotic Fluid Index with Perinatal Outcome. Though the present study did not show any significant difference in cesarean section rate between two groups, the CS due to fetal distress 12 (26 %) in oligoamnios group as compared to 18 (11.7 %) in control group was statistically significant ($p = 0.03$), which is similar to that reported by Chauhan et al. [12] in their meta analysis that intrapartum AFI <5 was associated with increased risk of cesarean section for fetal distress (pooled RR = 1.7). Similarly, Bhagat et al. [8] showed cesarean section rate 57.4 versus 38.7 % ($p = 0.048$).

In the present study, meconium-stained liquor was present in 17 (24 %) in group 1 and 41 (17 %) in group 2; the difference was not statistically significant ($p = 0.1579$). Similar studies conducted by Baron et al. [13] and Voxman et al. [14] concluded that there is no difference between the groups with regard to meconium-stained liquor.

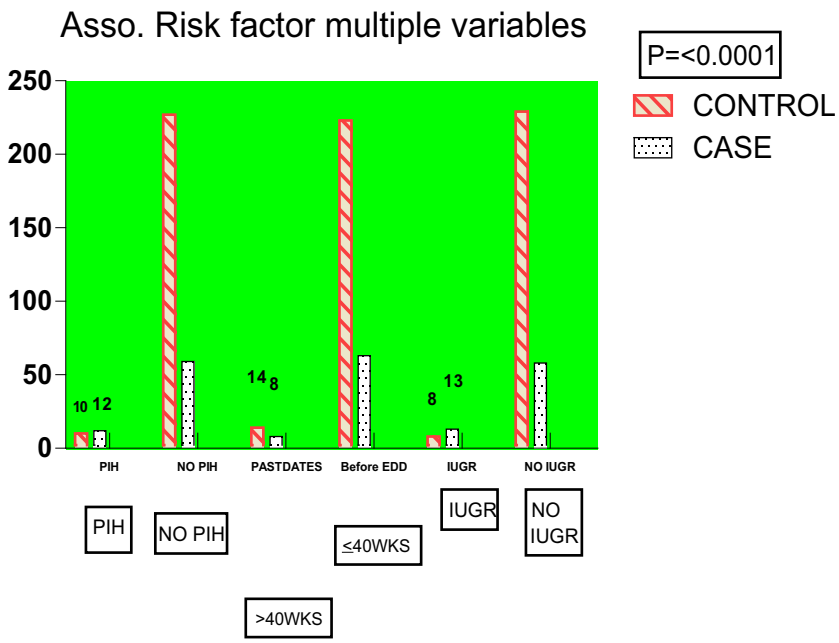

Fig. 1 Associated risk factor for multiple variables

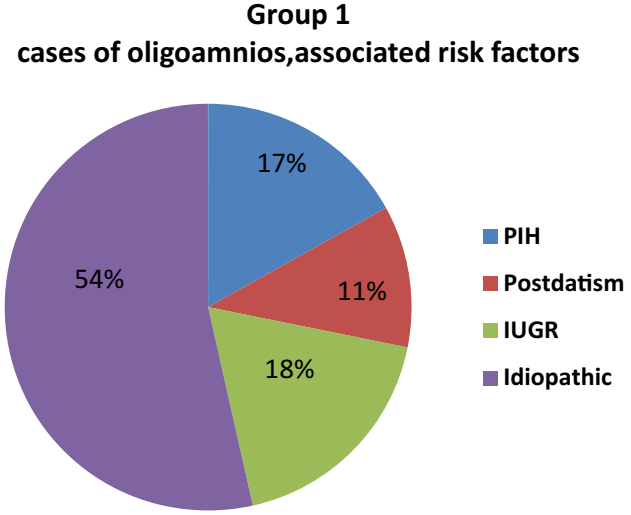

Fig. 2 Group 1 cases of oligoamnios, associated risk factors

In our study, both 1-min and 5-min APGAR scores <7 were significantly higher among oligoamnios group ($p = 0.0053$ and 0.0237, respectively); 5-min APGAR <7 was observed in 7 (10 %) neonates in our series, whereas Bangal et al. [9] reported it as 16 (16 %), whereas a study by Driggers et al. [15] reported the 5-min APGAR score <7 in 3.8 % babies in oligoamnios group versus 4.6 % in normal AFI group and concluded that there is no statistical difference. Another study by Grubb et al. [16] reported the 1-min APGAR score <7 in 84 % in AFI <5 group versus 14 % in the normal AFI group, which was highly significant ($p = 0.01$); their 5-min score <7 was 13 versus 5 % among oligoamnios versus normal AFI group.

Our study reported a LBW in 23 (32 %) in group 1 versus 30 (12 %) in group 2 women which was statistically significant ($p = 0.0003$). Locatelli et al. [11] reported that uncomplicated term pregnancies with oligoamnios (AFI <5) independently increased the risk of SGA infant. Morris et al. [17] recorded 60 % of babies were LBW in the group with AFI <5, indicating that oligoamnios had an association with growth restriction.

In the present study, NICU admission among babies in group 1 versus group 2 was 17 (24 %) versus 28 (12 %), and this was found to be statistically significant ($p = 0.020$). In a study by Brain et al. [18], their neonatal admission to NICU was (7 vs 2 %; $p < 0.001$).

In the present study, incidence of oligoamnios is 23 % which is high comparing to many studies. But the association of PIH, IUGR and prolonged pregnancies is statistically high among group 1 (46 %) compared to group 2 (13 %) (Fig. 1). We found associated PIH among 16 % of group 1 versus 4.2 % of group 2 women. Similarly postdatism was seen among 11 % in group 1 versus 5.9 % in group 2, and IUGR was associated in 18.3 versus 3.3 % between group 1 and group 2 women. Bangal et al. [9] found PIH association among 16 %, postdatism among 16 % and IUGR among 20 % cases; overall association of risk factors was among 78 % of oligoamnios cases. In a study by Jagatia et al. [10], among 100 cases of oligoamnios, 25 % cases associated with PIH and remaining 52 % cases are idiopathic. In the present study, 54 % oligoamnios cases are idiopathic.

Conclusion

Oligoamnios at term pregnancy is found to be associated with increased non-reactive CTG readings intrapartum. It is a strong predictor of adverse perinatal outcome in terms of increased cesarean sections for fetal distress, low APGAR score at 1 and 5 min, LBW due to IUGR and NICU admissions.

Acknowledgments We thank all expectant mothers who participated in this study, all colleagues, all postgraduate students in the Department of OBGYN who cooperated in making the study and the management for encouragement. We specially thank Dr. Y. Roja Ramani, Asst Prof of Pharmacology, MKCG Medical College, for her relentless help in statistical analysis for the study.

Compliance with Ethical Standards

Conflict of interest All the authors declare that they have no conflict of interest.

Informed Consent Informed consent was obtained from all individual participants included in the study.

References

1. Peipert JE, Donnenfeld AE. Oligohydramnious: a review. Obstet Gynecol Surv. 1991;46:325.
2. Gagnon R, Harding R, Brace RA. Amniotic fluid volume and fetal urinary response to severe placental insufficiency in sheep. Am J Obstet and Gynecol. 2002;186:1076.
3. Grubb DK, Paul RH. Amniotic fluid index and prolonged antepartum fetal heart rate decelerations. Obstet Gynecol. 1992;79:558.
4. Phelen JP, Smith CV, Broussard P, et al. Amniotic fluid volume assessment with the four quadrant technique at 36–42 weeks' gestation. J Reprod Med. 1987;32:540.
5. Clark SI, Sabey P, Jolley K. Non stress testing with acoustic stimulation and amniotic fluid volume assessment: 5973 tests without unexpected fetal. Am J Obstet Gynecol. 1989;160:694.
6. Americam college of Obstetricians and Gynecologists and the American Academy of Paediatrics. Guidelines for perinatal care. 6th ed. Oct 2007.
7. Chamberlain PF, Manning FA, et al. The relationship of marginal and decreased amniotic fluid volumes to perinatal outcome. Am J Obstet Gynecol. 1984;150(3):245–249 as cited in Bhagat M, Chawla I, JOGI, Vol 64:1, Jan–Feb 2014.
8. Bhagat M, Chawla I. Correlation of Amniotic Fluid Index with Perinatal Outcome. http://www.jogi.co.in.2014. 64:1.
9. Bangal VB, et al. Incidence of oligohydramnios during pregnancy and its effects on maternal and perinatal outcome. J Pharm Biomed Sci (JPBMS). 2011;12(05):1–4. www.jpbms.info.
10. Jagatia Krishna, et al. Maternal and fetal outcome in oligoamnious—a study of 100 cases. Int. J. Med. Sci. Public Health. 2013;2(3):724–7. doi:10.5455/ijmsph.2013.070520132.
11. Locatelli A, Vergani P, et al. Perinatal outcome associated with oligohydramnios in uncomplicated term pregnancies. Arch Gynecol Obstet. 2004;269(2):130–133. Epub 2003 Aug 20
12. Chauhan SP, et al. Perinatal outcome and amniotic fluid Index in the antepartum and intrapartum periods: a meta-analysis. Am J Obstet Gynecol. 1999;181(6):1473–8.
13. Baron C, et al. The impact of amniotic fluid volume assessed intrapartum on Perinatal outcome. Am J Obstet Gynecol. 1995;173(1):167–74.
14. Voxman EG, et al. Low amniotic fluid index as a predictor of adverse perinatal outcome. J Perinatol. 2002;22(4):282–4.
15. Drigger RW, Holcroft CJ, et al. An amniotic fluid index below 5 cm within 7 days of delivery in third trimester is not associated with decreasing umbilical artery pH and acid base excess. J Perinatol. 2004;24(2):72–6.
16. Grubb DK, Paul RH. Amniotic fluid excess and prolonged antepartum fetal heart rate decelerations. Obstet Gynecol. 1992;79(4):559–60.
17. Morris JM, Thompson K, et al. The usefulness of ultrasound assessment of amniotic fluid in predicting adverse outcome in prolonged pregnancy: a prospective blinded observational study. Br J Obstet Gynecol. 2003;110(11):989–94.
18. Brain M, Casey MD, et al. Pregnanacy outcome after antepartum diagnosis of oligohydramnios at or beyond 34 weeks gestation. Am J Obstet Gynecol. 2000;182(4):909–12.