DECREASED AMNIOTIC FLUID INDEX AND ADVERSE PREGNANCY OUTCOME AT TERM

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ABSTRACT

Objective: *To find out the effect of decreased amniotic fluid index (AFI) on adverse pregnancy outcome at term.*

Methodology: *This experimental study was conducted at Gynae "B" unit Lady Reading Hospital Peshawar from September 2004 to August 2005. A total of 100 pregnant women admitted in labour ward were included in the study. Fifty cases with an amniotic fluid index of <5cm comprised the patient group. Fifty controls having AFI>5cm were matched with the cases regarding age (±3years), parity and antenatal complication (hypertension, diabetes). Apart from demographic details, maternal outcome measures such as induction of labour; mode of delivery; meconium stained liquor; and fetal outcome measures such as Apgar score and admission to neonatal intensive care unit were recorded on a semi structured proforma for both the groups and analyzed by Chi square test using SPSS v.11.*

Results: *Labour induction was significantly higher in patients having AFI<5cm as compared to the control group (p-value=0.009). Meconium stained liquor (p-value=0.023) and cesarean section rate for fetal distress (p-value=0.000) were higher in patients having AFI<5cm. Neonatal complications were found to be more frequent in the patients having AFI<5cm and these include, low Apgar score <7 (p=0.001) and neonatal intensive care unit admission (p=0.078). There was no perinatal mortality in both the groups.*

Conclusion: *Amniotic fluid index of <5cm was associated with adverse pregnancy outcomes in the form of meconium stained liquor, induction of labour, cesarean section for fetal distress, low Apgar score and neonatal intensive care unit admission.*

Key words: *Amniotic Fluid Index (AFI), Oligohydramnios, Meconium stained liquor.*

INTRODUCTION

The amniotic fluid that surrounds a developing fetus plays a crucial role in the normal development. Amniotic fluid volume varies with the gestational age. At term it is about 800ml with wide range from 400-1500 ml in normal cases[1].

Older techniques of determining amniotic fluid volume were cumbersome and required amniocentesis. They have been replaced by ultrasound techniques, including single deepest pocket technique, 2-Diameter pocket and amniotic fluid index[2]. Although these methods are only semi quantitative reflection of actual amniotic fluid volume, they have gained wide acceptance in clinical practice because they are non-invasive, simple to perform and reproducible. Although in future, 3-Dimensional ultrasound and magnetic resonance imaging will replace these techniques[2-4].

Although different studies have shown different results but direct volume measurement at midtrimester amnioinfusion has shown a significant linear relationship between amniotic fluid index and volume infused ($p<0.05$) as compared to deepest pocket measurement ($p>0.05$)[2].

Oligohydramnios has variously been defined according to the method adopted for measuring amniotic fluid volume. Amniotic fluid

index of ≤5cm or single deepest pocket of less than 3cm constitutes oligohydramnios[3,4]. The incidence of oligohydramnios varies from 3-5% depending on the study population and the definition of oligohydramnios[5,6]. About 50% increase in emergency operation for fetal distress was seen in women with AFI≤5cm, also patients with AFI≤5cm were associated with higher rate of labour induction as compared to patients with normal AFI[7,8]. Similarly it is associated with adverse perinatal outcome including meconium stained liquor, low Apgar score and increases neonatal intensive care unit admission[1,2,9,10].

Fetal medicine is a rapidly advancing field especially regarding fetal surveillance. Amniotic fluid measurement is one of the important aspects of fetal surveillance. Although much work has been done internationally but very little work has been done in our country. This field needs to be explored further and thus this study was planned to find out the effect of decreased amniotic fluid index on adverse pregnancy outcome at term.

METHODOLOGY

This experimental study was conducted from September 2004 to August 2005 in Gynae B unit, Lady Reading hospital, Peshawar-Pakistan. A total of 100 patients were included in the study, 50 cases and 50 controls. Consecutive 50 Patients having AFI≤5cm were included in the patient group; and those 50 with AFI>5cm constituted the control group, respectively. Each case was matched with the control regarding age (±3years), parity, gestational age and antenatal complication including hypertension, diabetes mellitus. Fetuses having congenital anomalies and intra uterine death were excluded from the study.

Amniotic fluid index was calculated by using ultrasound examination on all patients with a 3.5 Mhz transducer by a consultant sonologist, who was blind to assignment of patients to any group, through the method introduced by Phelan in 1987[5]. The calculation was by dividing maternal abdomen into 4 quadrants using the umbilicus and the linea nigra as reference markers. Then deepest pocket of amniotic fluid devoid of umbilical cord or fetal parts were summated[5].

Detailed history was taken and examination was done including obstetrical and per speculum examination for leaking. Relevant investigations were done including, blood group, HBs antigen, anti HCV antibodies, full blood count, urine for routine examination, random blood sugar and detailed obstetrical ultrasound was done to confirm viability, exclude malpresentation, multiple pregnancy, congenital abnormalities and intrauterine death.

Details of the labour and delivery including Apgar score, meconium stained liquor, fetal distress, induction of labour, and mode of delivery was recorded on a semi structured proforma. The neonates admitted to the neonatal unit were examined by consultant neonatologist. All the neonates were examined after one week for any morbidity by the researchers.

RESULTS

The average age of the cases was 28.6 while the average age of the controls was 29.4 with a p value of >0.05. Most of the patients and controls were in the range of 21-30 years (n=28, 56% each). Both the groups were similar regarding parity with majority being multipara (n=20, 40% each) followed by nullipara (n=18, 36% each) with a p value of >0.05. Most of the patients (n=34, 68%) and controls (n=45, 90%) were in the gestational age of 37-40 weeks (Table 1).

In 22 (44%) patients having AFI≤5cm induction of labour was done while in control group only 9 (18%) patients were induced with a p value of 0.0009. Patients having AFI≤5cm, 15(30%) were having meconium stained liquor, while those having AFI>5cm only 5 (10%) patients had meconium stained liquor with a p value of 0.023. Similarly caesarean section rate for fetal

Table 1: Demographic Details of the Sample (n=100)

		Cases (n=50)	Controls (n=50)
Age	< 20	6 (12%)	4 (8%)
	21-30	28 (56%)	28 (56%)
	> 31	16 (32%)	18 (36%)
Parity	Nullipara	18 (36%)	18 (36%)
	Primipara	5 (10%)	5 (10%)
	Multipara	20 (40%)	20 (40%)
	Grand Multipara	7 (14%)	7 (14%)
Gestational Age	37-40 Weeks	34(68%)	45 (90%)
	41-42 Weeks	16 (32%)	5 (10%)

Table 2: Comparison of both the groups in terms of adverse pregnancy outcome at term (n=100)

		Cases (n=50)	Controls (n=50)	p value
Induction of Labour	Done	22(44%)	09(18%)	0.009*
	Not Done	28(56%)	41(82%)	
Meconium Stain Liquor	Present	15(30%)	05(10%)	0.023*
	Absent	35(70%)	45(90%)	
Mode of Delivery	Cesarean Section	21(42%)	05(10%)	0.000*
	Normal Vaginal Delivery	29(58%)	45(90%)	
APGAR Score	<7	22(44%)	06(12%)	0.001*
	≥7	28(46%)	44(88%)	
Neonatal Intensive Care Unit Admission	Done	14(28%)	06(12%)	0.078
	Not Done	36(72%)	44(88%)	

*Statistically Significant

distress was significantly higher in patients having AFI≤5cm [n=21(42%)] compared to controls [n=5(10%)] with a p value of 0.000. In patients having AFI≤5cm, 22(44%) neonates were having Apgar score <7 as compared to only 6 (12%) neonates in the control group with a p value 0.001. In patients having AFI≤5cm, 14 (28%) newborns were admitted in neonatal intensive care unit, while in control group only 6 (12%) newborns were admitted with a p value of 0.078 (Table 2).

There was no perinatal mortality (stillbirth and/or early neonatal deaths) in both the groups.

DISCUSSION

In our study induction of labour was higher in patients having amniotic fluid index less than 5cm. Out of 50, in 22 (44%) patients labour was induced, while in control group only 9(18%) patients were induced. Casey et al has reported that induction of labour was significantly increased with decreased AFI compared with AFI values >5cm (42% v. 22%: p<0.001)[11]. Rainford M et al has shown even a much higher rate of labour induction 98% vs. 51% with p value <0.001[12].In one of the local study conducted by Jabeen S et al, 66.6% patients were induced with AFI≤5cm[13]. Even in uncomplicated pregnancies at term, oligohydramnios is independently associated with a higher rate of labour induction p<0.001 [14].Our results were consistent with above studies. All the patients with AFI≤5cm were having a higher rate of labour induction. Any sign of fetal compromise prompt for an early delivery. Waiting for an expectant management may not be acceptable for the obstetrician and the patient.

In this study, frequency of meconium stained liquor was higher in patients having AFI≤5cm as compared to the control group. Out of 50, 15 (30%) patients were having meconium stained liquor while in control group only 5 (10%) patients were having meconium stained liquor. Sriya R et al has also reported a higher incidence of meconium stained liquor in patients having AFI≤5cm (38.8%) while in control group it was 18.05%[15].

The mode of delivery in our study was significantly affected by amount of liquor. In low AFI group 21 (42%) patients ended up in cesarean section for fetal distress. While in control group only 5 (10%) patients had caesarean section. Our study was consistent with the study conducted by Sriya R et al. In their study cesarean section for fetal distress was documented in 43.05% cases with AFI≤5cm. While in control group with AFI >5cm, 12.5% patients had emergency cesarean section[15]. In a local study conducted by Jabeen S et al has also documented a higher incidence of emergency cesarean section for fetal distress, 33.3% patients ended up in cesarean section having AFI≤5cm[13]. Locatelli et al has reported 8.2% cesarean section rate in patients with AFI≤5cm while in control group with normal amniotic fluid index, 3.9% women ended up in cesarean section for fetal distress[14]. Morris JM et al has reported 26% incidence of cesarean section for fetal distress[16]. Zhang J et al has reported 10% incidence of cesarean section for fetal distress in patients having AFI≤5cm while in control group it was only 5 % [6].Results which are inconsistent with our study are because of difference in defining fetal distress. In our study fetal distress was diagnosed by the presence of meconium stain liquor and/or fetal heart rate abnormalities detected on intermittent auscultation. While in the reports diagnosis of fetal distress was based on continuous

electronic fetal heart tracing and fetal scalp pH values. As both of these facilities for defining fetal distress were not available therefore our cesarean section rate for fetal distress was higher than above mentioned studies.

In our study 22 (44%) newborns had Apgar score less than 7 at 1 minute in patients having AFI≤5cm, while in control group only 6 (12%) newborns were delivered with low Apgar score. Syria R et al in their study have reported 38.8% incidence of Apgar score less than 7 at 1 minute. While in control group the corresponding results were 25%[15]. Zhang J et al has documented 19.2% incidence of Apgar score<7 at 1 minute while in control group 11.5% had low Apgar core at 1 minute[6]. Chauhan SP et al has documented increased incidence of low A/S with AFI≤5cm (RR 5.2, 95% CI=2.4-11.3)[17]. Results which are inconsistent with our study are because they have selected patients with isolated oligohydramnios only, i.e., there was no associated risk factors e.g., hypertension, premature rupture of membranes.

In the study 14 (28%) newborns were admitted in neonatal intensive care unit in patients having AFI≤5cm while in control group 6 (12%) newborns were admitted in neonatal intensive care unit (NICU). Syria R et al has reported a very high incidence of NICU admission. In their study 88.88% newborns were admitted in NICU in patients having AFI≤5cm while in control group 52.8% newborns were admitted in NICU[15]. Casey BM et al in their study have reported 7% admission to the NICU in patients with AFI≤5cm. While in control group only 2% newborns was admitted[11]. Zhang J et al in their study have reported 29.4% admission to NICU in patients with AFI≤5cm.While in control group 20.1% newborns were admitted in NICU[6].

There was no perinatal mortality reported in our study. Casey BM et al has reported 5% neonatal deaths in patients having AFI≤5cm while in control group incidence was 0.3%. This high incidence of perinatal mortality is because they haven't excluded babies with congenital anomalies from their study[11]. Regarding perinatal mortality our study is consistent with the study conducted by Morris JM et al with no perinatal mortality[16].

The non availability of color Doppler was a major limitation.

CONCLUSION

Amniotic fluid index of ≤5cm was associated with adverse pregnancy out come. The induction of labour, the presence of meconium stained liquor, caesarean section for fetal distress and low Apgar score of the neonates were all significantly higher in patients having AFI≤5cm. However perinatal mortality was not affected.

REFERENCES

1. Anderson D, Yang Q, Hohimer A, Faber J, Giraud G, Davis L. Intramembranous absorption rate is unaffected by changes in amniotic fluid composition. Am J Physiol Renal Physiol 2005;288:964-8.
2. Sepulveda W, Flack NK, Fisk NM. Direct volume measurement at midtrimester amnioinfusion in relation to ultrasonographic index of amniotic fluid volume. Am J Obstet Gynecol 1994;170:1160-3.
3. Underwood MA, Gilbert WM, Sherman MP. Amniotic fluid: Not just fetal urine any more. J Perinatol 2005;25:341-8.
4. Magann EF, Chauhan SP, Barrilleaux SP, Whitworth NS. Amniotic fluid index and single deepest pocket: Weak indicator of abnormal amniotic fluid volumes. Am J Obstet Gynecol 2000;96:737-40.
5. Phelan JP, Smith CV, Broussard P, Smau M. Amniotic fluid volume assessment with the four quadrant technique at 36-42 weeks gestation. J Reprod Med 1987;32:540-2.
6. Zhang J, Troendle J, Meikle S, Klebanoff AM, Rayburn WF. Isolated oligohydramnios is not associated with adverse perinatal outcomes. Br J Obstet Gynaecol 2004;111:2220-5.
7. Sawdy RJ, Groom KM, Bennett RR. Experience of the use of nimesulide, a Cyclooxygenase-2 selective prostaglandin synthesis inhibitor, in the prevention of preterm labour in 44 high- risk cases. J Obstet Gynaecol 2004;24:226-9.
8. Taylor MO, Fisk NM. Hydramnios and oligohydramnios. In: Taylor MO, Fisk NM, editors. High risk pregnancy. 3rd ed. London: Elsevier, 2006. p.272-90.
9. Dasari P, Niveditta G, Raghavan S. The maximal vertical pocket and amniotic fluid index in predicting fetal distress in prolonged pregnancy. Int J Gynaecol Obstet 2007;96:89-93.
10. Gumus II, Koktener A, Turhan NO. Perinatal outcomes of pregnancies with borderline amniotic fluid index. Arch Gynecol 2007;276: 17-9.
11. Casey BM, McIntire DD, Bloom SL, Lucas MJ, Santos R, Twicker DM, et al. Pregnancy outcome after antepartum diagnosis of oligohydramnios at or beyond 34 weeks gestation. Am J Obstet Gynecol 2000;182:909-12.

12. Rainford M, Adair R,Scialli AR, Ghidini A,Spong CY. Amniotic fluid index in the uncomplicated term pregnancy. J Reprod Med 2001;46:589-92.

13. Jabeen S, Shafqat T, Ahmed S. Oligohydramnios causes and pregnancy outcome - third trimester versus second trimester and significance of amniotic fluid index. J Postgrad Med Inst 1997;11:182-5.

14. Lacatelli A, Vergani P, Verderio M, Pezzullo J, Ghidini A. Perinatal outcome associated with oligohydramnios in uncomplicated term pregnancies. Arch Gynecol Obstet 2004;269: 130-3.

15. Syria R, Singhal S, Rajan M, Sharman M, Nagel P. Perinatal outcome in patients with AFI<5cm. J Obstet Gynecol India 2001;51:98-100.

16. Morris MJ, Thompson K, Smithy J, Gaffney G, Cooke I, Chamberlain P, et al. The useful ness of ultrasound assessment of amniotic fluid in predicting adverse outcome in prolonged pregnancy. Br J Obstet Gynaeol 2003; 110:989-94.

17. Chauhan SP, Sanderson M, Hendrix NW, Magann EF, Devoe LD. Perinatal outcome and AFI in the antepartum and intrapartum period: A meta analysis. Am J Obstet Gynaecol 1999;181:1473-8.

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