

ULTRASONOGRAPHICALLY DETECTABLE FETAL CONGENITAL ANOMALIES ASSOCIATED WITH POLYHYDRAMNIOS

MAHMOOD S., AKBAR A.A. AND MAJID A.

Department of Radiology, Ch. Rehmat Ali Memorial Trust Hospital / Continental Medical College, Lahore – Pakistan

ABSTRACT

Background and Objectives: To determine frequency of ultrasonographically detectable fetal congenital anomalies in patients with polyhydramnios. It was a convenient sampling study conducted at Department of Radiology, Ch. Rehmat Ali Memorial Trust Hospital Township, Lahore from July 2012 to June 2013.

Methodology: This study was conducted on all pregnant women with singleton pregnancy in the second and third trimester. All women were subjected to ultrasonography. For convenience purpose the first 100 women with polyhydramnios were further investigated for fetal outcome. Amniotic fluid index greater than 24 cm or a maximum vertical pocket of liquor greater than 8 cm confirmed the diagnosis of polyhydramnios.

Results: Out of 100 subjects, 48 (48%) were found to have fetal anomalies. The congenital anomalies frequency was found to be directly associated with amniotic fluid pocket depth (AFPD) values. The frequency of anomalies ranged from 25% to 100%. The results showed that as the size of amniotic fluid pocket increased so did the frequency of fetal anomalies. For the lowest rank group (pocket size 8-9.5 cm) 13 fetuses (27%) manifested an anomaly. The highest rank group (pocket size 16 cm) carried a risk of 100% (1 of 1) for an anomaly.

Conclusion: The extent of congenital anomalies is related to the degree of polyhydramnios. Polyhydramnios should alert both clinician and sonologist to look for possible anomalies in fetus. Early and accurate diagnosis is necessary both for the help of mother and for the outcome of pregnancies. Ultrasound plays an important role in this regard.

Key words: Polyhydramnios, Congenital anomalies, Amniotic fluid pocket depth (AFPD), Amniotic fluid index (AFI).

INTRODUCTION

Amniotic fluid has some important functions to perform. It protects the fetus from physical trauma and provides media to the fetus for growth free from restriction by adjacent structures.

Amniotic fluid volume varies during the pregnancy. It is controlled by dynamic interactions among the fetal, placental and maternal compartments. If there is an imbalance between these compartments, an excess or deficiency of amniotic fluid may occur what is called as polyhydramnios and oligohydramnios respectively.

The amniotic fluid volume serves as an important marker to assess intrauterine wellbeing of fetus. So its quantification is very important in assessing status of the fetus.^{1,3}

After 10th – 12th weeks of gestation amniotic fluid is produced mainly by the fetal kidneys till term.² During 2nd and 3rd trimesters of pregnancy, volume of amniotic fluid is controlled by a balance of fetal fluid

production in urine and lung fluid, as well as fluid re-sorption by fetal swallowing.¹

Volume of amniotic fluid increases as the pregnancy proceeds. It reaches to a maximum of 1 liter at 36–37 weeks.⁴ Amniotic fluid volume is assessed by ultrasound. Gravid uterus is divided in to four quadrants by imaginary vertical and horizontal lines. Vertical heights of largest amniotic fluid pocket (free of fetal parts and umbilical cord) from each quadrant is taken and amniotic fluid index calculated by summation of these values, expressed in centimeters.⁵ It has also been documented by Moore and Cayle⁶ and other authors.⁷

Biophysical profile is a non-invasive test to assess the absence or presence of fetal hypoxia. There are five components of biophysical profile. Apart from fetal heart monitoring, fetal tone, gross fetal body movements and fetal breathing, amniotic fluid index is also its important component.⁸

Polyhydramnios is defined as amniotic fluid index

of > 24 cm or a single amniotic fluid pocket of at least 8cm deep which results in a total fluid volume of > 2 liters.⁴ Experienced operators can detect polyhydramnios subjectively.

In general obstetric population incidence of polyhydramnios ranges from 1 to 2 percent.⁹ Research has shown that as the severity of polyhydramnios increases chances of associated fetal anomalies also increases.^{4,11-13}

Congenital anomalies associated with polyhydramnios are mainly anomalies of central nervous system including anencephaly, hydrocephaly, encephalocele, spina bifida etc. Other system involvement can occasionally be seen including GIT, CVS, Head and Neck, Genitourinary and Respiratory systems.¹⁰

There are more chances of preterm delivery with polyhydramnios. Maternal discomfort, mal presentation, abruptio placenta, premature rupture of the membranes, cord prolapse and postpartum hemorrhage are few other complications.⁴ Chances of Caesarean section also increases. Polyhydramnios can be diagnosed confidently by ultrasound.

METHODOLOGY

The study was carried out at the Department of Radiology, Ch. Rehmat Ali Memorial Trust Hospital Township, Lahore in collaboration with Department of Obstetrics and Gynecology of the same hospital from July 2012 to June 2013. Total 100 patients with polyhydramnios detected on screening ultrasonography were included in the study. Purposive / convenient sampling was undertaken. Informed consent was then taken from patients. All singleton pregnant women in second and third trimester were included excluding first trimester pregnancies. Every patient presented to Radiology Department was enquired about her personal data like name, age, parity, gravidity and consanguinity. Screening ultrasound of all patients was done with ultrasound machine having a convex probe of 3.5 MHz. Uterus was divided into four equal quadrants by imaginary vertical and transverse lines passing through the umbilicus and deepest vertical amniotic fluid pocket was measured in centimeters in each quadrant and then Amniotic fluid index was calculated by summing all four measurements. Polyhydramnios was labeled with AFI > 24 cm or a maximum vertical pocket of liquor greater than 8 cm. These patients were scanned in detail for any congenital anomaly in isolation or related to system involvement. Numbers of patients carrying normal and anomalous fetuses with polyhydramnios were recorded. Gestational weeks at the time of diagnosis of polyhydramnios were recorded. *The fetal anomalies were classified according to systems.* Anomalies not limited to single system were also recorded. Percentage for single and multiple malformations in anomalous fetuses was calculated.

Number of consanguineous marriages (first and

second cousins) and non relatives with polyhydramnios were recorded and their percentage calculated.

The collected information was entered into S.P.-S.S. version 16 and analyzed. The variables of cases like age, gravidity, consanguinity, stage of pregnancy were analyzed for descriptive presentation.

The number of patients having fetal congenital anomalies with polyhydramnios were expressed in percentages. The number of patients with polyhydramnios and no fetal anomaly were also recorded.

RESULTS

One hundred patients with polyhydramnios detected on screening ultrasonography were studied in a period of one year. Of 100 cases studied 48 (48%) were anomalous and 52 (52%) were normal.

Sixty percent patients with polyhydramnios were older gravida (age group 30 – 42 years). This group forms majority of the cases. Forty percent were in the 20 – 29 years age group.

Distribution of gravidity with polyhydramnios shows that fifty five percent patients were gravida three or above. Gravida two were twenty five percent and gravida one were twenty percent. Thus incidence of polyhydramnios increases as the gravidity of the patient increases.

Thirty seven percent anomalies were seen in the 26 – 30 weeks of gestation. Twenty six percent anomalies were seen in the 31 – 35 weeks of gestation and twenty two percent in the 36 – 40 weeks of gestation. Fifteen percent anomalies were seen in the 15 – 25 weeks of gestation.

Sixty one percent anomalies were related to central nervous system. Anencephaly was the most frequently encountered anomaly.

Of the 48 anomalous fetuses, 33 cases had only one anomaly. This comes to 69%. Rest of the fetuses (31%) had multiple anomalies.

Eighty percent patients belonged to lower socio economic group. Sixty eight percent patients were married in the family to their first cousins. Present study showed that as cousin marriages are quite common in our society, so is the number of abnormal fetuses. Thus a cause effect relationship is exist.

This study showed that polyhydramnios was not always a sequel of fetal congenital anomalies. It is influenced by many other factors e.g. maternal age, gravidity, low socio economic status, consanguineous marriages and number of weeks of gestation.

DISCUSSION

Polyhydramnios was confirmed by the presence of amniotic fluid pocket depth of > 8 cm. In this study there were 5 patients in amniotic fluid pocket size of 14 – 15.5 cm, out of which 4 (80%) were with anomalous fetuses. Whereas in the study of Pamer¹¹, out of 106 patients in this group, 52(48%) were with anoma-

lous fetuses. In this group 72% survived and 28% died in utero. The largest amniotic fluid pocket in the present study was that of 16 cm and in this case the fetus was abnormal, whereas in the study of Pamer¹¹, there were 8 patients in this category out of which 7 (88%) were abnormal.

Lazebnik¹² also reported that the relative risk of congenital malformations increased with the severity of polyhydramnios, although in his study polyhydramnios was determined according to amniotic fluid index.

Barkin¹³ also observed that increasing severity of polyhydramnios was related to increasing frequency of fetal anomalies. However, they used the subjective impression to grade the severity of polyhydramnios.

In the present study, there were 51 patients in the amniotic fluid pocket size of 8 – 9.5 cm (mild polyhydramnios) in which 38 were normal (75%) and 13 (25%) were abnormal. In the study of Barkin¹³ there were 71% normal fetuses in the mild polyhydramnios category, which is comparable with the present study.

In the current study, CNS anomalies were the most common (61%). CNS anomalies were also most common in the studies of Waheed N.¹⁴ and Khatoun K.¹⁵ In our study anencephaly was the most common CNS anomaly detected (45.4%) in the third trimester.

Anomalies with polyhydramnios regarding GIT and Hydrops fetalis were second in occurrence in the present study. These were also second most common anomalies in the study of Khatoun K.¹⁵

The frequency of polyhydramnios and congenital anomalies among first degree relatives was 68% in this study whereas it was 43.3% in the study of Khatoun K.¹⁵

The gestational age at the time of diagnosis of polyhydramnios, in most cases in this study was between 26 – 30 weeks. It was true for the study of Damato¹⁶ but there were differences in the two studies for other gestational ages. The current study had significantly lower number of patients in the 15 – 25 weeks of gestation and higher number of patients in the 3rd trimester in comparison with the study of Damato.¹⁶ Higher number of patients in the last weeks of gestation in this study showed that most of the patients, due to lack of awareness and resources, presented to hospital quite late.

Eighty percent patients belonged to lower socio economic group whereas this does not seem to be the case elsewhere as no mention has been made of this factor in majority of the studies.

This study showed that polyhydramnios was not always a sequel of fetal congenital anomalies. It is influenced by many other factors e.g. maternal age, gravidity and number of weeks of gestation.

Earlier the anomalies are diagnosed, easier it is to terminate. Also the expectant mother has not yet developed an emotional bond. So the decision regarding termination is not mentally very traumatic.

In **conclusion** our study demonstrated convincingly that the frequency of fetal congenital anomalies increases according to the severity of polyhydramnios. Accuracy of ultrasound increases its importance in the detection of polyhydramnios and concurrent anomalies. The rationale of the study is that the early detection, follow-up and timely decisions regarding management of anomalies help to reduce emotional and financial implications later in life.

Limitations

Several diagnostic imaging challenges were encountered during this study. In polyhydramnios the fetus had a large volume of fluid surrounding it, excessive movements made examination of an organ or structure quite difficult. Likewise, the fetus may be positioned deep within the uterus, far from the ultrasound transducer and beyond the ideal imaging zone.

ACKNOWLEDGEMENTS

We are highly thankful to our patients included in the study. We also express our deep admiration to the Department of Obstetrics and Gynaecology Ch. Rehmat Ali Memorial Trust Hospital, for their support and facilitation throughout the study.

REFERENCES

1. Callen WP. Amniotic Fluid Volume: Its Role in Fetal Health and Disease. In: Ultrasonography in Obstetrics and Gynaecology. 5th ed. Philadelphia: Saunders, 2008: pp 758-779.
2. Birang SH. Ultrasonographic assessment of normal amniotic fluid index in a group of Iranian women. Iranian J Radiol. 2008; 5 (1): 31-34.
3. Alao OB, Ayoola OO, Adetiloye VA, Aremu AA. The Amniotic Fluid Index in Normal Human Pregnancies in Southwestern Nigeria. The Internet J. of Rad. 2007: 5 (2).
4. Carter BS, Boyd RL, Windle ML, Clark DA. Polyhydramnios and Oligohydramnios, Medscape, Feb. 2008.
5. Phelan JP, Ahn MO, Smith CV, Rutherford SE, Anderson E. Amniotic Fluid Index measurements during pregnancy. J Reprod Med. 1987; 32 (8): 601-604.
6. Moore TR, Cayle JE. The amniotic fluid index in normal human pregnancy. Am J Obstet Gynecol, 1990; 162 (5): 1168-1173.
7. Hernandez – Herrera RJ, Ochoa-Torres M, Salazar – Garcia D, Solis – Estrada B. Amniotic Fluid Index Accuracy in Mid – Trimester. Fetal Diagn Ther. 2009; 26 (1): 6-9.
8. Gearhart P, Sehdev HM, Ritchie WOM. Ultrasonography in Biophysical Profile, Medscape, 2008.
9. Pri – Paz S, Khalek N, Fuchs KM, Simpson LL. Maximal amniotic fluid index as a prognostic factor in pregnancies complicated by polyhydramnios. Ultrasound Obstet Gynecol. 2012; 39: 648.
10. Mathew M, Saquib S, Rizvi SG; Polyhydramnios. Risk factors and outcome. Saudi Med J. 2008 Feb; 29 (2): 256-60.
11. Pamer HU, Veireck V, Krauss V, Osmers R, Krauss T.

- Incidence of fetal malformations in pregnancies complicated by Oligo and Polyhydramnios. *Arch Gynaecol Obstet.* 2003; 268: 52-6.
12. Lazebnik N, Many A. The severity of polyhydramnios, estimated fetal weight and preterm delivery are independent risk factors for the presence of congenital malformations. *Gynecol Obstet Invest.* 1999; 48: 28-32.
 13. Barkin SZ, Pretorius DH, Beckett MK, Manobester D K, Nelson T R, Manco – Johnson M L. Severe polyhydramnios: incidence of anomalies. *AJR Am J Roentgenol.* 1987; 148: 155-9.
 14. Waheed N, Ashraf M. Fetal outcome in pregnancies with polyhydramnios. Department of Obstetrics and Gynaecology, Holy Family Hospital, Rawalpindi. *J Rawal Med Coll.* 2003; 7: 73-6.
 15. Khaula Khatoon, Clinical review of Polyhydramnios (Dissertation) Lahore, Pakistan, College of Physicians and Surgeons Pakistan, 1994.
 16. Damato N, Filly RA, Goldstein RB, Callen PW, Goldberg J. Frequency of fetal anomalies in sonographically detected polyhydramnios. *J Ultrasound Med.* 1993; 12: 11-15.