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Idiopathic polyhydramnios: persistence across gestation and impact on pregnancy outcomes

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ABSTRACT

Purpose: To investigate the likelihood of resolution of idiopathic polyhydramnios in pregnant women and compare outcomes between resolved and persistent cases.
Methods: One hundred and sixty-three women with idiopathic polyhydramnios who delivered at two medical centers during a 3 year period (January 2012–January 2015) were included in the study. Exclusion criteria included congenital fetal anomalies, maternal diabetes, isoimmunization, fetal infection, placental tumors or anomalies, and multiple gestation. Polyhydramnios was defined as SDP $\geq$ 8 cm or AFI $\geq$ 24 cm. Resolved cases were defined as those with AFI and/or SDP falling and remaining below 24 cm and 8 cm respectively. Pregnancy outcomes were compared between resolved and persistent cases. Two-sample *t*-test or Wilcoxon rank-sum test was used for continuous variables while chi-square test or Fisher's exact test was used for categorical measures.
Results: Resolution was noted in 61 of 163 (37%) patients. There were no differences in maternal age, gravidity or parity between resolved and persistent cases. Mean gestational age at diagnosis of polyhydramnios and overall mean AFI were significantly lower in the cases that resolved (29.7 ± 4.5 weeks vs 33.4 ± 4.1 weeks, $p < 0.0001$; 23.3 ± 3.5 cm vs 25.8 23.3 ± 4.0 cm, $p = 0.0002$). Similar to AFI measurements, mean SDP was also lower in cases with resolution ($p = 0.002$). There was no difference in induction rates, mode of delivery, amnioinfusion rates, meconium staining of amniotic fluid and fetal heart rate abnormalities influencing intrapartum management between the two groups. Induction of labor for fetal indication and rupture of membranes were significantly more common in the persistent group. Cesarean delivery for abnormal lie and fetal distress did not differ between the groups. There was an increased risk of macrosomia (>4000 g) and preterm delivery (<37 weeks) in the persistent group ($p < 0.05$).
Conclusions: Resolution rate was approximately 37% and more likely in cases diagnosed earlier in pregnancy and with lower mean amniotic fluid volume. Preterm delivery and macrosomia were more common in cases that persisted across gestation.

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Background

Amniotic fluid regulation is a complex and dynamic process involving movement of fluid into and out of the amniotic sac, and the mechanism which regulates this process is not well understood [1]. While polyhydramnios complicates 0.2–3.9% of pregnancies [2,3], approximately 50–60% of these are classified as idiopathic in etiology [4,5]. Idiopathic polyhydramnios is defined as polyhydramnios, or excess amniotic fluid volume which is not associated with congenital fetal anomalies, maternal diabetes, isoimmunization, fetal infection, placental tumors or multiple gestations. Overall, there are 3 commonly used ultrasonographic methods for diagnosing polyhydramnios which include subjective assessment [6], single deepest pocket (SDP) [7], or amniotic fluid index (AFI) [8]. Several studies have documented the association of idiopathic polyhydramnios with adverse pregnancy outcomes including preterm delivery [9], macrosomia [3,10], and perinatal morbidity/mortality [4,11–14] when compared to pregnancies with normal amniotic volume. A review of literature on idiopathic polyhydramnios from 1950 to 2007 revealed a 2–5-fold increase in the risk of perinatal mortality when compared to pregnancies

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without polyhydramnios [15]. A more recent study investigated perinatal outcomes of idiopathic polyhydramnios, but again compared outcomes in these cases to controls with normal amniotic fluid [16].

There is limited longitudinal research on the course of idiopathic polyhydramnios and pregnancy outcomes. Current research data on likelihood of resolution of idiopathic polyhydramnios is mixed. An older study on polyhydramnios using an amniotic fluid index of ≥20 centimeters (cm) to define polyhydramnios documented a resolution rate of 40% (27/67), and found no difference in preterm delivery rate between cases that persisted when compared to those that resolved [17]. Another study compared 50 women with idiopathic polyhydramnios to 85 women with normal amniotic fluid measurements. SDP was used to evaluate amniotic fluid and a measurement of 6–10 cm was classified as mild polyhydramnios while more than 10 cm was moderate to severe. Follow up scans were obtained on 43 of the 50 women with idiopathic polyhydramnios and 41 of the cases were classified as mild and 2 as moderate to severe. Polyhydramnios resolved prior to delivery in 31/41 (76%) of mild cases and in both cases with moderate to severe polyhydramnios. Comparison of persistence versus resolution showed similar demographic, obstetric and neonatal parameters, other than increased risk of meconium and fetal aneuploidy in persistent cases [18]. No other studies investigated the longitudinal course of idiopathic polyhydramnios or compared pregnancy outcome of persistent and resolved cases. Once polyhydramnios is diagnosed, what is the likelihood it will persist during pregnancy and does persistence or resolution impact perinatal outcome? The objective of this study was to investigate cases of idiopathic polyhydramnios, likelihood of resolution and compare pregnancy outcomes in both groups.

Materials and methods

Electronic medical records of patients with a diagnosis of polyhydramnios who delivered at two tertiary medical centers from January 2012 through January 2015 were reviewed. The study was approved by the IRB at both centers (IRB# 138649 original approval date 2/20/2013 at the University of Arkansas for Medical sciences and IRB# 390722-1 at Madigan Army Medical Center). A total of 163 patients met inclusion criteria for idiopathic polyhydramnios. Exclusion criteria included congenital fetal anomalies, maternal diabetes, isoimmunization, fetal infection, placental tumors or anomalies and multiple gestations. Diabetes was excluded by identifying women who had risk factors for diabetes undergoing an early one hour glucose challenge test (GCT) and these were repeated at 24–28 weeks in all women including those women identified as at risk for diabetes who had an early GCT which was negative. Any positive GCTs were followed by a 3 h oral glucose tolerance test (GTT). All women with a positive GTT were excluded from the study. All cases had documented normal glucose testing during pregnancy. The clinical standard for diagnosing and serially following polyhydramnios, despite the inaccuracy of ultrasound estimates of amniotic fluid volume, remains ultrasound [19]. Polyhydramnios, for this study, was defined as SDP ≥ 8 cm and/or AFI ≥ 24 cm. These were further classified as mild (AFI 24–30 cm, SDP 8–11.9 cm) moderate (AFI 30.1–35 cm, SDP 12–15.9 cm) and severe (AFI > 35 cm, SDP ≥ 16 cm) [20,21]. Resolved cases were defined as those with AFI and/or SDP falling and remaining below 24 cm and 8 cm respectively. In those patients in which the polyhydramnios resolved, no further ultrasounds were done for the assessment of amniotic fluid volume alone. Other ultrasounds may have been done on this group for an indication other than polyhydramnios. Using this criteria, two groups were isolated comprising cases where polyhydramnios persisted and a corresponding cohort where polyhydramnios resolved. Maternal medical records were reviewed to obtain ultrasonographic variables including the gestational age where polyhydramnios was first diagnosed by ultrasound, degree of polyhydramnios on initial assessment, and subsequent evaluations. Demographic data was also obtained including the following: maternal age, gravidity, parity, ethnicity, gestational age at delivery, intrapartum measures including induction of labor and indications (maternal, fetal, rupture of membranes (ROM), post expected date of confinement, elective)

Table 1
Maternal demographic characteristics and ultrasonographic variables.

Maternal measures	Overall (*N* = 163)	Persistent (*N* = 102)	Resolved (*N* = 61)	*p*-Value
Age, mean ± SD (years)	27.9 ± 5.8	27.9 ± 5.5	28.0 ± 6.2	0.9113
Race, *N* (%)				0.0177
White	93 (57.06%)	61 (59.80%)	32 (52.46%)	
Black	32 (19.63%)	17 (16.68%)	15 (24.59%)	
Hispanic	11 (6.75%)	3 (2.94%)	8 (13.11%)	
Other	27 (16.56%)	21 (20.59%)	6 (9.84%)	
Gravidity, median, 25th and 75th percentile	2.0 [2.0, 4.0]	2.0 [2.0, 3.0]	2.0 [2.0, 4.0]	0.7985[a]
Parity, median, 25th and 75th percentile	1.0 [0,2.0]	1.0 [0,2.0]	1.0 [1.0, 2.0]	0.2613[a]
Ultrasonographic variables				
Female, *N* (%)	67 (41.10%)	43 (42.16%)	24 (39.34%)	0.7240
Gestation at diagnosis, mean ± SD (weeks)	32 ± 4.6	33.4 ± 4.1	29.7 ± 4.5	<0.0001
AFI, mean ± SD (cm)[c]	24.9 ± 4.0	25.8 ± 4.0	23.3 ± 3.5	0.0002
AFI, *N* (%)				0.0076[b]
<24	60 (37.74%)	31 (30.69%)	29 (50.00%)	
24–30	87 (54.72%)	58 (57.43%)	29 (50.00%)	
30.1–35	9 (5.66%)	9 (8.91%)	0 (0%)	
>35	3 (1.89%)	3 (2.97%)	0 (0%)	
SDP, mean ± SD [d]	9.1 ± 1.3	9.3 ± 1.5	8.7 ± 1.0	0.0029
SDP, *N* (%)				0.0268[b]
<8	16 (10.32%)	6 (6.19%)	10 (17.24%)	
8–11.9	133 (85.81%)	85 (87.63%)	48 (82.76%)	
12–15.9	5 (3.23%)	5 (5.15%)	0 (0%)	
≥16	1 (0.65%)	1 (1.03%)	0 (0%)	

[a] Results based on Wilcoxon rank-sum test.
[b] Results based on Fisher's exact test.
[c] Only 159 pregnancies had the amniotic fluid estimated using the AFI.
[d] Only 155 pregnancies had the amniotic fluid volume estimated using the SDP technique.

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