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# Etiology and perinatal outcome of polyhydramnios: an experience of tertiary center

## Polihidramnioz tanılı gebelerde etioloji ve perinatal sonuçlar

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## ABSTRACT

**Aim:** To review our experience in fetuses with prenatally diagnosed with polyhydramniosis

**Materials and Methods:** Retrospective study of fetuses prenatally diagnosed with polyhydramniosis between October 2023 and January 2025 in a tertiary referral center.

**Results:** 104 pregnant women were included in the final analysis. When we classify the cases according to etiology of polyhydramnios, 31 (29.8 %) women had pregestational or gestational diabetes, in 8 (7.6 %) infants major structural or significant genetic anomalies were detected prenatally or postnatally, 65 (62.6 %) cases were classified as idiopathic and recent TORCH positivity was not observed in any of the cases 0 (0%). Most cases were delivered at term (81.8%), median gestational week at delivery was 36 (range, 23-41), and the mean standard deviation birthweight was 2996±969 grams. Polyhydramnios was more common in male than in female fetuses (67% vs 33%). Termination of pregnancy was selected in 1 (0.9%) of the cases diagnosed with acrania and performed at 23 weeks of pregnancy with fetocide. There were 2 intrauterine fetal demise at 32 and 35 weeks of gestation diagnosed with Trisomy 18 and cardiac anomaly respectively. 101 (97.1 %) were live born and 29 of 101 live born infants were needed neonatal intensive care unit.

**Conclusion:** Glucose tolerance test, detailed sonography, including fetal echocardiography should be performed in the pregnancies complicated with polyhydramnios. However, it is also reassuring for parents that the vast majority of cases are idiopathic.

**Keywords:** polyhydramnios, diabetes mellitus, outcome, etiology, idiopathic

## ÖZ

**Amaç:** Prenatal dönemde polihidramniyoz tanısı konulan fetüslerdeki deneyimlerimizi gözden geçirmek

**Gereç ve Yöntemler:** Üçüncü basamak bir sevk merkezinde Ekim 2023 ile Ocak 2025 tarihleri arasında prenatal olarak polihidramniyoz tanısı alan fetüslerin retrospektif çalışması.

**Bulgular:** Çalışmaya dahil edilen 104 vakada, olguları polihidramnios etiyolojisine göre sınıflandırdığımızda, 31 (%29,8) pregestasyonel veya gestasyonel diyabet, 8 (%7,6) fetüste prenatal veya postnatal olarak majör yapısal veya genetik anomaliler tespit edildi, 65 (%62,6) olgu idiyopatik olarak sınıflandırıldı ve hiçbir olguda yakın zamanda TORCH pozitifliği gözlenmedi (%0). Olguların çoğu miadında doğum gerçekleşti (%81.8), doğumdaki medyan gebelik haftası 36 (23-41) ve ortalama doğum ağırlığı 2996±969 gramdı. Polihidramnios erkek fetüslerde kız fetüslere göre daha yaygındı (%67 vs. %33). Akrania tanısı konulan olguların 1'inde (%0,9) gebelik terminasyonu 23. gebelik haftasında fetosit ile gerçekleştirildi. Sırasıyla Trisomi 18 ve kardiyak anomali tanısı konulan 32 ve 35. gebelik haftalarında 2 intrauterin fetal ölüm tespit edildi. 101 fetüste (%97.1) canlı doğum ve canlı doğan 101 fetüsün 29'unda yenidoğan yoğun bakım ünitesinde takibe alındı.

**Sonuç:** Polihidramnios ile komplike olan gebeliklerde glukoz tolerans testi, fetal ekokardiyografi de dahil olmak üzere ayrıntılı sonografi yapılmalıdır. Bununla birlikte, vakaların büyük çoğunluğunun idiyopatik olması da ebeveynler için güven vericidir.

**Anahtar Kelimeler:** polihidramnios, diabetes mellitus, sonuç, etiyoloji, idiyopatik

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## INTRODUCTION

Amniotic fluid (AF) is necessary for the normal growth and development of the human fetus. AF is obtained from the dialysis fluid, i.e. from the maternal serum that enters the amniotic cavity through the fetal membrane, the fetal lung exudate and the fetal skin, as well as from the fetal urine. While an adequate amount of AF can protect the fetus, abnormal amounts of AF can compromise the safety of the fetus and mother. Polyhydramnios is the excessive accumulation of AF and can occur in 1 – 2 % of pregnancies (1). The diagnosis is usually made sonographically by evaluating the SDP (Single Deepest Pocket) (2) or the AFI (Amniotic Fluid Index) (3) or by subjective sensation (4), and can be defined as SDP ≥ 8 cm, AFI ≥ 25 cm. Maternal and fetal conditions, including fetal structural and genetic anomalies, maternal gestational and pregestational diabetes, and TORCH infections (toxoplasmosis, other [syphilis, varicella-zoster virus, parvovirus B19], rubella, cytomegalovirus, and herpes simplex virus infections) can lead to excess amniotic fluid, while 50–60% of polyhydramnios cases appear to be idiopathic (5-7). Polyhydramnios is associated with an increased risk of perinatal morbidity and mortality, including prematurity, aneuploidy, caesarean section, fetal structural anomalies, premature rupture of membranes (PROM), abnormal fetal presentation, umbilical cord prolapse and postpartum haemorrhage (8-10).

Pregnancy complicated by polyhydramnios can still pose a diagnostic and therapeutic dilemma for obstetricians, although the association between polyhydramnios and adverse perinatal outcomes has been reported repeatedly. The aim of our study was to review our experience of polyhydramnios cases and the respective perinatal outcome in a tertiary referral hospital.

## MATERIALS AND METHODS

We performed a retrospective study on perinatal outcome of singleton pregnancies beyond 22 weeks of gestation diagnosed with polyhydramnios at the Department of Perinatology of Van Education and Research Hospital, between October 2023 and January 2025. This retrospective study was approved by the local ethics committee (no: GOKAEK/ 2025-01-04).

The sample size is based on all the pregnant women patients who were consulted to the perinatology outpatient clinic with a diagnosis of polyhydramnios from the antenatal outpatient clinic within the specified date range and whose diagnosis was confirmed by the perinatologist.

Ultrasound examinations were performed with a Voluson E8 system (GE Healthcare Medical Systems, Milwaukee, WI, USA) by the same resident. Polyhydramnios was defined as SDP ≥ 8 cm beyond 22 weeks of gestation (11) and detailed sonography was performed in all cases.

Diagnosis of polyhydramnios is routinely followed by performance of TORCH serology and review of oral glucose tolerance test (OGTT) results. In cases with associated prenatal or postnatal abnormalities or TORCH negative serologies or normal OGTT results with polyhydramniosis were advised to undergo fetal karyotyping. In the observed period OGTT was performed between 24 and 28 weeks of gestation by capillary blood analysis after 12 h of fasting and one and two hours after administration of 75 g glucose, and cut- off values for maternal diabetes mellitus were 92 / 180 / 153 mg/dl (12).

The inclusion criteria was singleton pregnancy, beyond 22 weeks of gestation. The exclusion criteria for the study were multiple pregnancies, pregnant women with missing TORCH serology. We searched our computerized database for prenatally diagnosed polyhydramnios and also performed a literature search to compare our data with those of previous series.

To perform this study, the following variables were also evaluated: Maternal age, gravidity, parity, previous miscarriage, living child, gestational week at diagnosis, presence of associated structural and genetic abnormalities, gestational age at delivery, neonatal sex, birth weight, Apgar scores at the first and fifth minutes, postnatal surgical and medical interventions and follow-up, mortality, and short-term outcomes.

Primary outcome parameter was the underlying etiology. For this analysis, the study group was retrospectively stratified into four groups: 1.) Recent TORCH infection (positive serology); 2.) Major structural anomalies or aneuploidies; 3.) Maternal gestational or pregestational diabetes; 4.) Idiopathic cases. In terms of severity, polyhydramnios was further categorized as mild or severe if the SDP was < 10 cm or ≥ 10 cm, respectively (1). Secondary outcome parameters were perinatal data including gestational age at birth, birth weight, mode of delivery, and neonatal mortality and morbidity. Fetuses with sonographic anomalies such as single umbilical artery, ventriculomegaly, macrosomia, mild renal pelvis dilatation in the prenatal period were not accepted as an anomalous group in the absence of additional structural and/or genetic anomalies in the postnatal period.

### Statistical analysis

Data were collected using an Excel 2007 spreadsheet (Microsoft Corp., Redmond, WA, USA). For statistical analysis, continuous variables were presented as mean and standard deviation (SD) or median and range values according to the normally distribution by using the Kolmogorov–Smirnov test. When the data were not

normally distributed, median values together with range were used. Mann-Whitney U test was performed for the comparison of median values amongst the groups. Categorical variables were presented as numbers and percentages.

## RESULTS

During the specified period of the current study, 194 pregnancies were evaluated and of the 194 cases complicated with polyhydramnios, 90 cases were excluded from further analysis, and a total of 104 pregnant women were included in the final analysis Figure 1. When we classify the cases according to etiology of polyhydramnios, 31 (29.8 %) women had pregestational or gestational diabetes, in 8 (7.6 %) infants major structural or significant genetic anomalies were detected prenatally or postnatally, 65 (62.6 %) cases were classified as idiopathic and recent TORCH positivity was not observed in any of the cases 0 (0%) as presented in Figure 1.

The characteristics of the study population is presented in Table 1. Table 1 also outlines the associated major structural and/or genetic abnormal findings as detailed.

Table 2 summarize the fetal and neonatal outcomes of all cases with a prenatal diagnosis of polyhydramnios. Most cases were delivered at term (81.8%), median gestational week at delivery was 36 (range, 23-41), and the mean standard deviation (SD) birthweight was 2996±969 grams. In addition, polyhydramnios was more common in male than in female fetuses (67% vs 33%). Termination of pregnancy (TOP) was selected in 1 (0.9%) of the cases diagnosed

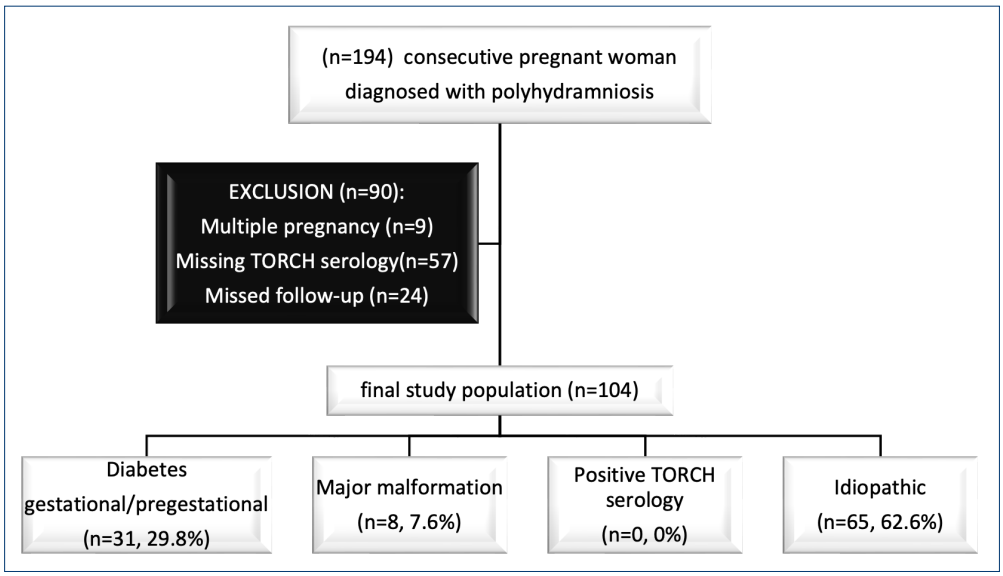


**Figure 1.** Flowchart illustrating study population selection and classification according to the etiology of polyhydramnios

**Table 1.** Characteristics and ultrasound findings of 104 pregnancies with a prenatal diagnosis of polyhydramnios

| | **Polyhydramnios(n=104)** |
|---|---|
| **Maternal age (median, min-max) (mean, SD)** | 30 (18-46)<br>30.1±6.54 |
| **Gravidity (median, min-max)** | 3 (1-12) |
| **Parity (median, min-max)** | 2 (0-10) |
| **Previous miscarriage (median, min-max)** | 0 (0-2) |
| **Living Child (median, min-max)** | 1 (0-10) |
| **Gestational week at diagnosis (median, min-max)** | 28 (24-41) |
| **Major Fetal Anomalies (n, %)**<br>**Congenital heart defects**<br>**Neural tube defects**<br>**Cleft lip**<br>**Holoprosencephaly**<br>**Hipospadias**<br>**Anal Atrezi**<br>**Trizomi 18** | 8 (7.6%) |

Abbreviations: SD: standard deviation, min: minimum, max: maximum

**Table 2.** Fetal and neonatal outcomes of fetuses with a prenatal diagnosis of polyhydramnios

| | (n=104) |
|---|---|
| **GA at delivery (median, min-max)** | 36 (27-41) |
| **Preterm delivery (<37 weeks) (median, min-max)** | 19 (18.2%) |
| **Birth weight (grams) (mean, SD)** | 2996±969 |
| **Gender (n, %)** | |
| Male | 70 (67%) |
| Female | 34 (33%) |
| **Apgar at 1st minute (median, min-max)** | 8 (0-9) |
| **Apgar at 5th minute (median, min-max)** | 9 (0-9) |
| **Mode of delivery (n, %)** | |
| Caesarean section | 55(52.8%) |
| Vaginal delivery | 49(47.2%) |
| **Short term outcome (n, %)** | |
| Termination of pregnancy | 1 (0.9%) |
| Intrauterine fetal demise | 2 (1.9%) |
| Live Birth | 101 (97.1%) |
| Need for NICU | 29 (27.8%) |

Abbreviations: GA: gestational age, SD: standard deviation, min: minimum, max: maximum, NICU: need for neonatal intensive care unit

with acrania and performed at 23 weeks of pregnancy with fetocide. There were 2 intrauterine fetal demise (IUFD) at 32 and 35 weeks of gestation diagnosed with Trisomi 18 and cardiac anomaly (atrioventricular septal defect), respectively. Among the 104 cases of polyhydramnios, 101 (97.1 %) were live born. 29 of 101 live born infants were needed neonatal intensive care unit (NICU).

While mild polyhydramnios was observed in the majority of the diabetic and idiopathic polyhydramnios group 61% and 68% respectively, it was observed in only 25% of the patients in the anomalous group.

## DISCUSSION

In the present study, we conducted a retrospective study on the etiology and perinatal outcome of polyhydramnios to improve information for counseling and management of affected pregnant women in our hospital. It is noteworthy that the vast majority of polyhydramnios cases (62.6%) were idiopathic with no evidence of fetal or maternal pathology, which should be communicated at informed consent. However, in the remaining 29.8% we found maternal diabetes, fetal structural or genetic abnormalities (7.6%) as causes of the condition. Although most cases of polyhydramnios are idiopathic, when an etiology is identified, it is most commonly due to a fetal anomaly or maternal diabetes. Our study findings are consistent with earlier reports on polyhydramnios and the respective etiology (13-15).

In our study, while maternal diabetes was found to be the most common etiology for polyhydramnios, which is consistent with the literature, none of the polyhyramnios cases was found to be associated with TORCH infection (16).

The most common associated anomalies in our study were cardiac and neural tube defects (NTD). Although NTDs often show sonographic findings during routine antenatal sonography, the prenatal detection rate of congenital heart anomalies is only 16.7 % (14, 16). We therefore strongly recommend that fetal echocardiography be included in the diagnostic work-up of cases with polyhydramnios.

Demographic data analysis in the current study showed that polyhydramnios was more common in younger women; the median maternal age in our study was 30 years, whereas in the literature it is conflicting. Biggio et al. found an association between idiopathic polyhydramnios and increasing maternal age and parity (13), while Khan et al. found it more common in younger women (17). Same study reported low Apgar scores at one minute and five minutes (17). In our study, we found no association between polyhydramnios and low Apgar scores.

In the literature, the incidence of aneuploidy in infants with polyhydramnios is between 0.4 and 3.2 % (8, 13, 18). Brady et al. reported an incidence of 3.2% and therefore advocated performing amniocentesis (18), while others did not recommend routine karyotyping in sonographically isolated polyhydramnios.

Unfortunately, in our study, the prevalence of genetic abnormalities was only 0.9%, because pregnant women did not accept genetic diagnostic invasive techniques. This condition is one of the limitations of current study. Our study have also other limitations, since it was retrospectively designed and reports a single-center experience.

## CONCLUSION

To summarize, a glucose tolerance test, a detailed sonography, including fetal echocardiography, should be performed in the pregnancies complicated with polyhydramnios. However, it is also reassuring for parents that the vast majority of cases are idiopathic. It is important to note that idiopathic polyhydramnios is a diagnosis of exclusion. While the cause may be unclear during pregnancy, the cause may become apparent after birth.

### Ethical approval
Ethics approval was obtained from the institutional review board. The study was conducted in accordance with the Declaration of Helsinki.

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The authors have no relevant financial or non-financial interests to disclose.

### Authors contributions
All authors contributed to the study conception and design and meet the ICMJE criteria for authorship. Material preparation, data collection and analysis were performed by [Aysegul Atalay] and [Tugba Gul Yılmaz]. The first draft of the manuscript was written by [Aysegul Atalay].[Saliha Sagnic] commented on previous versions of the manuscript and study supervision. All authors read and approved the final manuscript.

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