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Outcomes and management strategies in pregnancies with early onset oligohydramnios

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Summary

Objective: To evaluate the outcomes and management options in pregnancies with early onset oligohydramnios. *Materials and Methods:* The file datas of all pregnancies diagnosed as oligohydramnios or anhydramnios before 27 gestational weeks between January 2006 and September 2013 were evaluated retrospectively. The underlying pathology and associated anomalies, karyotype analysis, the outcome of the pregnancy (either termination or labour), and gestational week at the time of diagnosis were analyzed. *Results:* A total of 54 pregnancies were evaluated; mean gestational week at the time of the diagnosis was 19.8 ± 4.6. Mean maternal age was 27.28 ± 6.03. Thirty-seven pregnancies were anhydramniotic, 13 fetuses had associated anomalies, five of them had multicyctic dysplastic kidney, five had bilateral renal agenesis, one had hypoplastic right heart syndrome, one had clubfoot, and one had ventricular septal defect and cleft palate. Karyotyping was normal regarding the fetuses with structural anomalies. Nineteen patients had premature preterm rupture of membranes and 39 patients had termination of pregnancy. *Conclusion:* The prognosis of early onset oligohydramnios is poor. Main determinant is gestational week at the time of the diagnosis.

Key words: Antenatal ultrasound; Oligohydramnios; Congenital anomalies of kidney; Preterm premature rupture of membranes.

Introduction

Amniotic fluid is vital for the normal development of the fetus. The regulation of the amniotic fluid depends on the maternal and fetal amniotic structures: in early pregnancy, amniotic fluid mainly consists of the maternal transudate. The chorioamniotic membrane serves as a selective barrier for the molecules for the free passage of water and electrolytes. The contribution of the embryo is minimal during this period. However, hypotonic urine excretion by the fetal kidneys occurs during the 12 gestational weeks. After 24-26 gestational weeks, fetal kidneys and lungs become primary regulators for the amniotic fluid. At term, 800-1000 ml amniotic fluid is produced daily by fetal urine excretion. Approximately 340 ml amniotic fluid is produced by fetal lungs, 170 ml of that contributes directly to the amniotic fluid, the other 170 ml is reabsorbed by the fetal lung, 500 to 1000 ml fluid is swallowed by the fetus daily at term, and 200-500 ml fluid flow occurs intramembranously every day [1].

Researchers and clinicians used different thresholds in order to define the abnormalities in amniotic fluid volume (AFV). In general, oligohydramnios is decreased AFV according to the gestational week [2]. Oligohydramnios is defined differently by different researchers: single vertical pocket (SVP) < 0.5 cm by Mercer *et al.* [3], SVP < two cm by Manning *et al.* [4], SVP < three cm by Halperin *et al.* [5]. Magan *et al.* proposed the two diameter pocket (vertical x horizontal) < 15 cm [6]. Amniotic fluid index (AFI) < 5th percentile according the gestational age is defined by Moore *et al.* [7]. AFI < five cm by Phelan *et al.* [8], < seven cm by Dizon-Townson *et al.* [9], and AFI < eight cm by Jeng *et al.* [10].

The present authors aimed to evaluate the main causes of early onset oligohydramnios and discuss the management strategies in case of preterm premature rupture of the amniotic membranes rupture (PPROM) and in case of oligohydramnios with renal origin.

Materials and Methods

The file records of all pregnancies diagnosed as oligohydramnios or anhydramnios before 26 gestational weeks between January 2006 and September 2013 were evaluated retrospectively in our perinatology outpatient clinic. A total of 54 cases were included in the study. The underlying pathology and associated anomalies, karyotype analysis, the outcome of the pregnancy (either termination or labour), and gestational week at the time of diagnosis were analyzed. Oligohydramnios definition is regarded as the SVP < two or AFI < five cm. The underlying etiology was evaluated by ultrasonography. Pelvic examination with sterile speculum was made to exclude PPROM. PPROM cases were administered antibiotherapy with their first admission, usually via intravenous route. Tocolysis was not applied. The study was approved by the Institutional Ethics Committee.

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Table 1. — *Descriptive data of the study population.*

Mean maternal age (mean ± SD)	27.28 ± 6.03
Gravida (mean ± SD)	1.98 ± 1.13
Parity (mean ± SD)	0.63 ± 0.75
Abortus (mean ± SD)	0.35 ± 0.69
Gestational week (mean ± SD)	19.8 ± 4.6

Table 2. — *Associated anomalies with oligohydramniotic cases.*

Associated anomaly	N	%	Karyotyping
Clubfoot	1	1.9	Normal
Hypoplastic right heart	1	1.9	Normal
Multicystic dysplastic kidneys	5	9.4	Normal (n=3)
Renal agenesis	5	9.4	Normal (n=2)
VSD + cleft palate	1	1.9	Normal

Table 3. — *Features of early PPROM cases.*

		N	%
Early PPROM		18	30.0
Latency (days) (mean ± SD)		20.0 ± 14.57	
Mode of delivery	Cesarean	5	
	Vaginal	5	
Total		8	

Results

A total of 54 pregnancies were evaluated; mean gestational week at the time of the diagnosis was 19.8 ± 4.6. Mean maternal age was 27.28 ± 6.03 years. The descriptive data is shown in Table 1. Thirty-seven pregnancies were anhydramniotic, 13 fetuses had associated anomalies, five of them had multicyctic dysplastic kidney, five had bilateral renal agenesis, one had hypoplastic right heart syndrome, one had clubfoot, one had ventricular septal defect (VSD) and cleft palate (Table 2). Karyotyping was offered for the cases with associated anomalies, but performed only in eight cases. Karyotype analysis was normal regarding the fetuses with structural anomalies. Eighteen patients had PPROM. Mean latency period was 20.0 ± 14.57 days for labour, five of which had cesarean and five of which had vaginal labour (Table 3). Mean birth weight of newborns was 782 ± 35 grams (512-1,072 grams). Thirty-nine patients had termination of pregnancy.

Discussion

Normal amniotic fluid shows mainly the intact fetal gastrointestinal and urinary system. It is vital for the maintenance of normal fetal development. Reduced AFV in the first and early second trimester raises questions about renal functions: the clinician should evaluate the kidneys by ultrasonography: do fetal kidneys present? If yes, do they appear normal in shape and size? If the answer is yes, then oligohydramnios should be due to renal origin. In the present study the most common renal anomaly associated with oligohydramnios was renal agenesis and multicyctic dysplastic kidneys. The prenatal recognition rate of the associated renal anomalies was 10/56 (17.8%). This is much lower than the true incidence of the renal origin oligohydramnios cases. Approximately 50% of oligohydramnios cases may have associated renal and urinary tract anomaly. However, in case of severe oligohydramnios, it is very difficult to screen the fetus appropriately. Furthermore, fetal prognosis is poor. Klaassen *et al.* evaluated 23 fetuses with renal-origin oligohydramnios, 16 of which had congenital kidney anomalies, four autosomal recessive policystic kidney disease, and three renal tubular agenesis; 30 % of them died mostly due to pulmonary hypoplasia and renal failure [11].

If renal origin could be ruled out by sonographic examination, then PPROM is to be suspected [12]. PPROM before 24 gestational weeks is less than 1% of all pregnancies [13]. The management of PPROM before viability is controversial. If anhydramnios has occurred or if any evidence of chorioamnionitis is found, termination of pregnancy is inevitable. However, cases with small leakage of amniotic fluid without any infection sign can be managed expectantly. Dinsmoor *et al.* evaluated 46 cases with PPROM before viability threshold, 43 of which elected expectant management with a mean latency period 13 days (range: 0-96). Overall survival rate was 47%. Only 37% of the survivors had severe sequelae [14]. In the present study, 18 cases had PPROM before 24 gestational weeks, eight of them had termination of the pregnancy, ten cases managed were expectantly. Similarly to the study of Dinsmoor *et al.*, mean latency period was 20 days in the present study group. The main limitation of the present study was the lack of the data regarding the newborn sequela. Regarding PPROM, use of corticosteroids, use of tocolytic agents, and the type and mode of antibiotics are controversial. Recent studies highlighted that steroids should not be used before 24 weeks. The repetitive doses do not add any benefit [15]. Regarding the tocolytic use, Cochrane review comprising of eight studies with 408 pregnancies between 23-27 weeks concluded that tocolytics may increase the risk of intra-amniotic infection and increase the long term sequela such as cerebral palsy [16]. The different antibiotic regimens are not superior to each other; however co-amoxiclav should be not used as it increases the risk of necrotizing enterocolitis [17]. Another problem is where to follow-up these pregnancies: at home or at hospital? The recent studies suggest that follow-up at home may be a good option. In a review with 116 cases showed that patients followed up at home had approximately ten days less hospital stay and thay had lower cesarean rates [17]. In the present department, the authors follow-up the PPROM pregnancies at home only if there is no amniotic fluid leakage since three days, if there is no anhydramnios, and if there is no clinical and laboratory sign of infection.

The prognosis mainly depends on the gestational week, duration of the oligohydramnios, and the severity of oligohydramnios. Even when the fetus had no genetic or structural anomalies, early onset oligohydramnios may cause pulmonary hypoplasia, fetal contractures, and lethal infection dangerous for both the mother and the fetus. The main mechanism for the associated of pulmonary hypoplasia is thoracic compression and the improper breathing movement due to anhydramnios or severe oligohydramnios.

The present study has some limitations. Firstly, the authors could not provide the neonatal outcomes of the newborns as the record system failed. Secondly, they do not know the true incidence of associated renal anomalies in this study, because the parents did not want fetal postmortem biopsy after pregnancy termination. However, the present study is important as the clinicians face commonly with oligohydramniotic pregnancies before viability threshold. From that point of view, this study shows some practical clues for the clinicians.

Conclusion

Pregnancies with anhydramnios detected before 24 gestational weeks should be offered termination. However, beyond 26 gestational week, in case of PPROM, expectant management may be offered. Antibiotherapy should be initiated. The pregnant woman must be followed up every two days by leucocyte count and C-reactive protein levels. If chorioamnionitis is suspected, delivery should be performed.

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