

THE EXPERIENCE OF AMNIOINFUSION FOR OLIGOHYDRAMNIOS DURING THE EARLY SECOND TRIMESTER

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SUMMARY

Objective: In the past, oligohydramnios occurring early during the secondary trimester was the reason to terminate the pregnancy because of poor prognosis. Even though amnioinfusion has been reported for improving the prognosis of the infant, it is still not frequently used because of unfavorable results. We present our experience with amnioinfusion for oligohydramnios with or without preterm premature rupture of membranes.

Materials and Methods: A retrospective study was performed from July 2005 to December 2006 in our hospital. Amnioinfusions were performed in pregnant women found with oligohydramnios during their second trimesters. Chromosomal studies were recommended and performed under informed consent. Level II sonography was performed after each amnioinfusion. Magnetic resonance imaging was arranged for those with suggested urinary tract malformations.

Results: Seventeen cases were included in our study. No mother was exposed to drugs that have been associated with oligohydramnios. The women received one to six procedures of amnioinfusion separately with a total of 28 procedures. Only one procedure failed. No chromosomal anomalies were found. Fetal anomalies were found after amnioinfusion in five cases. One woman had preterm delivery within 1 week after amnioinfusion. In the four cases of oligohydramnios with rupture of membranes, one case had a healthy full-term baby delivered. In the thirteen cases of oligohydramnios without rupture of membranes, there were two preterm infants delivered before 34 weeks of gestation, including pulmonary hypoplasia in one neonate, and three healthy babies delivered after 35 weeks of gestation.

Conclusion: Amnioinfusion performed the first time might provide some benefits for those with early-onset oligohydramnios, such as to provide confirmation of rupture of membranes, detailed sonography examination and further counseling. We would recommend that this procedure be considered once for these cases. [*Taiwan J Obstet Gynecol* 2007;46(4):395–398]

Key Words: amnioinfusion, oligohydramnios, preterm premature rupture of membrane, second trimester

Introduction

Oligohydramnios developing early in pregnancy is less common, and the fetal outcomes are usually poor. This is because prolonged decrease in amniotic fluid may cause compression sequences, such as pulmonary

hypoplasia, muscle hypotrophy or joint constriction. Early-onset oligohydramnios may be caused by preterm premature rupture of membranes (pPROM) or decreased secretion of amniotic fluid. Early rupture of membranes always leads to poor prognosis despite antepartum intervention such as amnioinfusion. Oligohydramnios without ruptured membranes implies fetal urinary tract malformations or chromosome anomaly. However, even normal infants may suffer from the consequences of oligohydramnios, such as amniotic band syndrome, congenital postural deformities, pulmonary hypoplasia and cord compression. Decades

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ago, termination of pregnancy was the standard for those with early-onset oligohydramnios that indicated bad prognoses. In recent years, more and more published reports in the literature have mentioned that amniotomies can prolong pregnancies and improve perinatal outcomes in cases of pPROM. We present our experience with amniotomies for patients with oligohydramnios with or without rupture of the membrane early in the second trimester.

Materials and Methods

A retrospective study was performed at our hospital from July 2005 to December 2006. We collected the data of pregnant women who were diagnosed with oligohydramnios (amniotic fluid index [AFI], <5 cm) during the early second trimester. The AFI was rechecked 1 week after the initial diagnosis to determine the case of fluid intake. If oligohydramnios persisted, amniotomies were performed after counseling, using warm, sterile isotonic sodium chloride solution. If there was fluid leakage from the vagina after amniotomy, pPROM was diagnosed or confirmed. Those women whose membranes had ruptured were hospitalized and empiric antibiotics were prescribed for them. Chromosomal studies of washed amniotic fluid was performed under informed consent. All of the cases received level II sonography after amniotomy. Magnetic resonance imaging was arranged for those with suggested urinary tract malformations.

The subsequent amniotic fluid volume was measured with AFI using sonography every week during the first month after diagnosis, then once a month until birth. During the pregnancies, subsequent serial amniotomies were performed when oligohydramnios persisted and patients requested for the procedure after counseling.

Results

We collected the data from 17 pregnant women diagnosed with oligohydramnios, with gestational age ranging from 15 to 25 weeks and maternal age from 20 to 37 years. Fifteen cases were singleton pregnancies, one case was a twin pregnancy with one fetal death, and another was a triplet pregnancy with two fetal deaths. Analysis of the maternal health status revealed: one case of diabetes mellitus, chronic hypertension, placental previa totalis and placenta increta; one case of sicca syndrome under steroid therapy; one case of preeclampsia; one case of carcinoma *in situ* of the uterine cervix,

with conization surgery 2 years prior to pregnancy; and one case of cervical incompetence, with cervical cerclage early during the second trimester. No case was exposed to drugs associated with oligohydramnios.

Amniotomy was performed using warm isotonic sodium chloride solution. The volume ranged from 250 to 600 mL, and the rate ranged from 10 to 15 mL/minute. Every case received one to six procedures separately with a total of 28 procedures. Only one procedure failed. Three cases had pPROM before amniotomy, and one case was diagnosed with rupture of membranes after amniotomy. Chromosomes were studied in the 15 cases after informed consent, and all of them had normal karyotypes except for one. Fetal anomalies were found in five cases on sonography after adequate visualization of the fetal structures (three cases of fetal renal disease, one case of amniotic band syndrome and hydrops fetalis, one case of anomaly of fetal extremities). Magnetic resonance imaging was performed in the three cases with suggested renal disease. One case had bilateral renal dysgenesis, another had right renal agenesis with left renal dysgenesis, and the third case had autosomal recessive polycystic kidney disease. One case had idiopathic severe oligohydramnios which lasted more than 2 weeks. Women in six cases decided to terminate their pregnancies, with fetal anomalies in five cases and persistent severe oligohydramnios in one case.

One case had preterm delivery within 1 week after amniotomy, and intrauterine fetal death occurred within 2 weeks of the amniotomy in four cases. In the four cases of oligohydramnios with rupture of membranes, a healthy full-term baby was delivered in one case (Table 1). In the thirteen cases of oligohydramnios without rupture of membranes, two cases had preterm deliveries before 34 weeks of gestation, and three had healthy babies delivered after 35 weeks of gestation (Table 2). In the case with placenta previa totalis and increta with pPROM, the neonate was delivered via cesarean section at 28 weeks of gestation because of massive antepartum hemorrhage and chorioamnionitis. This neonate had complication of pulmonary hypoplasia. In the five live healthy babies, four cases received amniotomy once and one case received amniotomy twice, and the amniotic fluid volume persisted within normal limits until the pregnancies were full-term.

Discussion

In most cases, the cause of oligohydramnios is rupture of the membranes. Other causes such as fetal abnormalities

Table 1. Amnioinfusion in oligohydramnios with rupture of membranes

Case	Gestational age at diagnosis* (wk)	Number of amnio-infusions	Gestational age at delivery (wk)	Birth body weight (g)	1-min Agpar score	5-min Agpar score	Note
1	19	1	21	310	0	0	Post-cervical cerclage ROM
2	25	1	26	485	0	0	REDV at 25 weeks
3	19	1	20	320	1	0	Triples with two fetal demises
4	16	2	40	3,830	9	10	Post-amniocentesis ROM

*Diagnosis of oligohydramnios. ROM = rupture of membranes; REDV = reversed end-diastolic velocity in umbilical artery.

Table 2. Amnioinfusion in oligohydramnios without rupture of membranes

Case	Gestational age at diagnosis* (wk)	Number of amnio-infusions	Gestational age at delivery (wk)	Birth body weight (g)	1-min Agpar score	5-min Agpar score	Note
1	20	6	29	1,100	0	0	Bilateral kidneys dysgenesis on MRI
2	21	2	28	1,160	1	0	Right renal agenesis and left renal dysgenesis on MRI
3	23	2	30	1,450	1	0	ARPKD on MRI; ARPKD on autopsy
4	16	1	17	180	0	0	Amniotic band syndrome, hydrops fetalis
5	18	1	22	480	0	0	Bilateral ulnar and radius genesis
6	15	1	19	300	0	0	Twin with one IUFD at 7 weeks of gestation
7	25	1	27	750	0	0	
8	25	2	27	600	0	0	
9	18	2	28	1,270	4	5	Diabetes mellitus, chronic hypertension, placenta previa totalis with increta; ROM at 24 weeks of gestation
10	19	1	40	2,830	9	10	Normal fetal urinary system on MRI
11	23	1	39	2,520	9	10	Sicca syndrome
12	19	1	35	1,480	8	10	Preeclampsia, IUGR
13	24	1	33	1,800	8	9	

*Diagnosis of oligohydramnios. MRI = magnetic resonance imaging; ARPKD = autosomal recessive polycystic kidney disease; IUFD = intrauterine fetal death; ROM = rupture of membranes; IUGR = intrauterine growth retardation.

(urinary tract malformations or chromosome anomalies), drugs, uteroplacental insufficiency, and maternal disease (hypertension, preeclampsia, diabetes) should be considered. Healthy infants may also suffer from the consequences of early onset of severely diminished amniotic fluid, whether or not the membranes are intact. Pulmonary hypoplasia is more common as gestational age decreases. In patients with pPROM during the second trimester, it was shown that the incidence of pulmonary hypoplasia was 12.9% and the overall perinatal mortality rate was 54% [1]. In addition, the perinatal outcomes are correlated with AFI values. AFI values of <5 cm after pPROM between 24 and 32 weeks' gestation have been associated with increased risks of perinatal infections and shorter latency preceding deliveries [2]. Because of poor outcomes, termination of the pregnancies was the most common decision in early-onset oligohydramnios several decades ago. The

current trend is different. Augmenting the amniotic fluid volume may provide diagnostic or therapeutic benefits.

Diagnostic amnioinfusion can determine whether rupture of the membranes has occurred or not. Chromosome study can also be performed from washed amniotic fluid during the procedure. By increasing the amount of amniotic fluid, visualization of the fetal structures on sonography is markedly improved. The overall rate of adequate visualization of the fetal structures improved from 51% to 77% in patients with unexplained second-trimester oligohydramnios who underwent diagnostic antenatal amnioinfusion [3]. In our study, five fetal anomalies were diagnosed after amnioinfusion, which provided adequate visualization. Furthermore, the amount of retained amniotic fluid after the first amnioinfusion can determine the suitability for serial therapeutic amnioinfusion. Those who cannot preserve amniotic fluid after the first amnioinfusion would not be suitable

for serial amnioinfusion. When infused fluids were retained, subsequent serial amnioinfusion and prolongation of pregnancy were shown to occur in about 75% of patients [4]. In our five healthy babies, four of their mothers received amnioinfusion just once and the other received amnioinfusion twice. This implies that if the amnioinfusion works well the first time, it will provide good results. Persistent oligohydramnios after amnioinfusion indicates poor fetal outcome and/or severe fetal renal disease, thus an earlier decision could be made to terminate the pregnancy. In our study, six patients who underwent ineffective amnioinfusion terminated their pregnancies.

Subsequent serial amnioinfusions may provide effective therapeutic benefits, including prolonged pregnancy and decreased risk of pulmonary hypoplasia and perinatal mortality rate [5–10]. Significant short-term variability increase just after the amnioinfusion procedure from 5.55 ms to 8.24 ms and after 24 hours up to 7.25 ms was found [11]. Successful outcomes of pregnancies with serial saline amnioinfusion from the 16th week of gestation in pPROM cases have been reported [12]. In one of our cases with pPROM, even the retained amniotic fluid after the first amnioinfusion was not adequate (AFI, 4.8 cm); however, the patient decided to receive serial amnioinfusion after counseling. Fortunately, her pregnancy proceeded with normal amniotic fluid, and she was delivered of a healthy neonate at 38 weeks of gestation.

Procedure-related complications such as chorioamnionitis or placental abruption, which themselves may predispose to preterm delivery, may occur even in those who underwent successful serial amnioinfusion [4]. In one of our cases, the woman had preterm delivery within 1 week of the amnioinfusion. In addition, four other cases resulted in intrauterine fetal demise, which occurred within 2 weeks of the amnioinfusions.

In past time, most cases of oligohydramnios in early second trimester tended toward termination of the pregnancy because of poor prognosis of the fetus. In our opinion, the first amnioinfusion might play some role in early-onset oligohydramnios. It can help with a clearer diagnosis of the ruptured membranes with the increased amniotic fluid volume, enabling physicians to visualize the detailed fetal structures. In addition, it provides a more accurate prognosis according to the amount of retained amniotic fluid, as well as the information gathered during the chromosomal studies. All of these provide more information to be used in the counseling sessions. Successful therapeutic amnioinfusion improves pregnancy outcomes. If these patients choose to terminate their pregnancies because of early-onset oligohydramnios, they gain nothing. If they continue with the

pregnancy without any intervention for 1 month, their babies will have high risk of compression sequences. If we give them amnioinfusion once, and within 1 week after the procedure, we can provide them with more and clearer information so that they can make better choices.

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