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Research Article

Complications of Amniocentesis in Northwest IRAN

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Abstract

Purpose: This study aimed to evaluate the relation of amniocentesis with early (before 20th week) and late (after 20th week) pregnancy complications.

Materials: This is a "case-control" and "cross- sectional" study condu cted on consecutive pregnant patients scheduled for diagnostic amniocentesis (n=920), and patients who had counseling in the same period but did not undergo amniocentesis (n=426). The early complications were defined as those occurring during the first 7 days after procedure including miscarriage, spotting, and vaginal bleeding (as occurring in a menstrual period). The late complications were those occurring after 20th week of gestation, or vaginal bleeding after 7 days following the procedure.

Results: A total of 920 pregnant women were included as case group, of which 58.7% presented before 18th week and 41.3% presented after 18th week of GA for evaluating fetal genetic status. The most prevalent GA for this process was 16th week (15-23w). The early complications were water breaks (0%), Abortion (0.8%), spotting (0.3%), and vaginal bleeding (0.1%) during 7 days after sampling.

The late complications were water breaks (1.6%), Abortion (0%), spotting (0%), and vaginal bleeding (1.8%) after 20th week.

Conclusion: Evaluating complications of amniocentesis in Northwest of IRAN revealed acceptable rate of early and late complications. This is because of high-volume performance in this tertiary centre in expert hands. Considering the ethical and religious limitations we do recommend using first trimester screening methods in Islamic countries to get earlier results.

Introduction

Amniocentesis in second trimester is the most common invasive prenatal diagnostic procedure [1, 2]. The use of amniocentesis has increased dramatically after its introduction in 2004 [3, 4]. This procedure may result in the loss of a normal pregnancy, even though the technique is simple [2, 5, 6]. Although prenatal diagnosis by amniocentesis has been accepted as a reliable and low risk method [7, 8], it is still an invasive diagnostic procedure and carries the risk for procedure-related complications, including miscarriage (i.e. procedure-related loss). However, prenatal diagnosis also offers the opportunity to obtain important information about a pregnancy. This information is valuable to the families that desire to know as much as possible about the pregnancy and to the families that are considering terminating a pregnancy with an abnormality [9-11].

In previous reports, the complications associated with mid-trimester amniocentesis included leakage of amniotic fluid, infection, pregnancy loss, rectus sheath hematoma, and fetal injury [12, 13]. However, the major concern for pregnant women who decide to have amniocentesis is fetal loss. The total pregnancy loss rate after amniocentesis is a combination of the procedure-related loss and the spontaneous loss [2, 14]. Many

previous studies have reported that fetal losses might be related to technical methods, operator's skill, maternal age and gestational age at amniocentesis, previous history of miscarriage, previous bleeding and concomitant fetal anomalies [2, 4, 15].

The rate of procedure-related pregnancy loss recommended by the CDC and ACOG for amniocentesis counseling is 0.5% [16]. A randomized trial comparing low risk pregnant women who had a mid-trimester amniocentesis with those who had an ultrasound scan suggests that amniocentesis itself is associated with 1% extra risk of fetal losses, with a total loss rate of 1.7% [17].

This study aims to evaluate the relation of amniocentesis with early pregnancy complications, miscarriage and bleeding events up to 20th week. Also, we evaluated the relation of amniocentesis and late (after 20th week) pregnancy complications.

Methods

This is a "case- control" and "cross- sectional" study conducted on consecutive pregnant patients presenting to Tabriz Al-Zahra Educational-Medical center from 2008 to 2012.

Inclusion criteria for case group were: 1) pregnant women; 2) the high risk for trisomy syndromes according to NT or NF and double marker, triple marker or Quad test; 3) the history of having fetus or newborn with chromosomal abnormality or known congenital single gene disorders; 4) mothers with age 40 years or higher (when they had personal request); and 5) parents with structural chromosomal abnormalities.

Exclusion criteria were: 1) rejecting the participation in study; or 2) rejecting the procedure after giving information about sampling method, fetal risks of invasive intervention, or financial problems.

The information was collected from patients and their medical records using prepared questionnaires. For all pregnant women, demographic data, gestational age at amniocentesis, and complications were recorded.

The early complications were defined as those occurring during the first 7 days after procedure including miscarriage, spotting, and vaginal bleeding (as occurring in a menstrual period). The late complications were those occurring after 20th week of gestation, or vaginal bleeding after 7 days following the procedure.

The study was approved by the Regional Ethics Committee. Patients signed informed consent before the inclusion in the study.

Protocol of amniocentesis

Amniocentesis was performed by an expert obstetrician at second trimester between 16th and 22nd weeks of gestation. The fetal anatomy and fetal conditions were evaluated by ultrasonography before the procedure. All procedures were performed by the maternal-fetal medicine team under an aseptic technique and continuous ultrasound guidance using the free-hand technique without any anesthesia. A spinal needle no.22G was inserted into the free space of amniotic cavity without any fetal parts or umbilical cord, with care to avoid transplacental insertion as much as possible. Then, 15 to 20 ml of amniotic fluid (1 ml per week) was aspirated for chromosomal study, while discarding the first 1 ml. The patients were asked to take rest for 10–20 min after completion of the procedure. All cases without any complication were scheduled for the next visit approximately 2 and 4 weeks later.

Statistical analysis

The statistical analysis of the collected data was performed by SPSS software, using t-test and Fisher's exact test. The *p* values less than 0.05 were considered statistically significant.

Results

A total of 920 pregnant women were included as case group, of which 58.7% presented up to 18th week and 41.3% presented after 18th week of GA for evaluation of fetal genetic- chromosomal status. The early and late complications have been listed in (Table 1).

The mean maternal age during amniocentesis was 31.84±6.92 years (range: 15-47 years).

Also, 426 consecutive pregnant women with 16-19 weeks of gestational age were enrolled as control group, which presented for routine prenatal visits and did not undergo amniocentesis. In control group, 23 patients had spotting before 20th weeks of pregnancy which treated by vaginal progesterone suppository. Also, there were three cases of pregnancy termination in control group because of low amniotic fluid index, placenta previa, and IUGR (36th week). The early and late complications seen in the case group were studied in control group, and are compared in Table 1. In complicated cases (e.g. IUGR or Preeclampsia) mothers and babies were safe at the end of management.

Diagram 1 shows the gestational age in amniocentesis. As showed, the most prevalent GA for this process was 16th week (15-23 w).

Table 1. Early and late pregnancy complications in case and control series.

Stage	Case series (n=920)		Control series (n=426)		P value
	Complication	Frequency	Complication	Frequency	
Early	Water breaks during 7 days after sampling	0 (0%)	Water breaks during 7 days after visit	0 (0%)	-
	Abortion during 7 days after sampling	7 (0.8%)	Abortion during 7 days after visit	2 (0.5%)	0.73*
	Spotting during 7 days after sampling	3 (0.3%)	Spotting during 7 days after visit	1 (0.2%)	1*
	Vaginal bleeding during 7 days after sampling	1 (0.1%)	Vaginal bleeding during 7 days after visit	0 (0%)	1*
	Total	11	Total	3	0.57*
Late	Water breaks after 20 weeks	15 (1.6%)	Water breaks after 20 weeks	7 (1.64%)	0.99**
	Second or third trimester Vaginal bleeding	17 (1.8%)	Second or third trimester Vaginal bleeding	2 (0.46%)	0.048*
	Total	32	Total	9	0.18**

*Fisher's exact test; **Chi square test

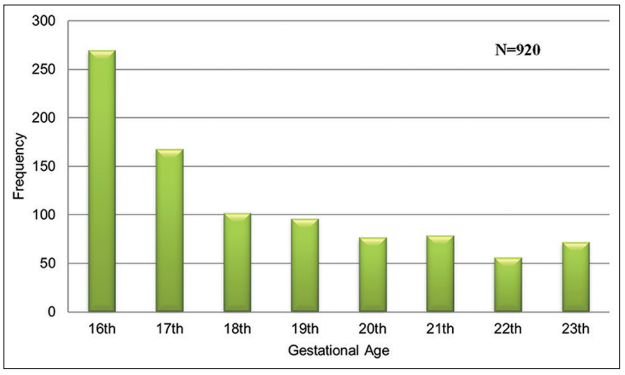

Diagram 1. Gestational Age in Amniocenthesis

Discussion

We studied the early and late complications of amniocentesis in a total of 920 pregnant women presented before or after 18th week of GA for evaluating fetal chromosomal status and compared the complications in 426 pregnant women who were presented for routine prenatal visits.

The definition of fetal loss associated with the amniocentesis used in each study can be varied quite widely. The fetal loss can either occur in less than 2 weeks after procedure, at 24th and 28th weeks of gestation or as long as early neonatal deaths [2, 18, 19]. We defined it as less than one week after the process.

Corrado et al. retrospectively evaluated all the consecutive amniocentesis, with known pregnancy outcome (n=2990). The patients who had counseling in the same period but declined to undergo amniocentesis represent the control group (n = 487). A total of 30 fetal losses occurred within 24 weeks of gestation (1%), while in the control group, there were four losses (0.8%). Procedural variables (transplacental sample, multiple needle insertions and gestational age) were not found to be predictive for increased fetal loss rate. We did not encounter such technical variations because all procedures were performed by one expert obstetrician [20].

Borrelli studied the complications of diagnostic amniocentesis on 1580 patients. Early complications (in the first 24 h) included light contractions (8.3%), loss of amniotic fluid (1.06%), and bleeding (0.85%). Late complications included abortions (in the week following amniocentesis) (0.78%), and preterm labor (6%). Early complications and the incidence of abortions were significantly associated with the double needle puncture but not with maternal age. They concluded that careful performance by experienced hands, as well as a careful selection of patients is necessary in order to further decrease the occurrence of complications due to amniocentesis [21].

Corrado et al. conducted a study on 2990 cases of amniocentesis with known pregnancy outcome, and concluded that previous vaginal bleeding increased the risk of pregnancy loss after amniocentesis, but a history of two or more miscarriages was not associated with a greater fetal loss rate, while the increased percentage in patients with uterine myoma was relevant to issue [20].

In a review of the 1000 amniocentesis performed at the Prenatal Diagnosis and Therapy Centre in Nigeria, there were 21 losses before 28 weeks of gestation (2.2%), three after 28 weeks (0.3%) and six stillbirths (0.6%) (4 due to infections) resulting in a total post procedural pregnancy loss rate of 3.1% [22]. Miscarriage within two weeks of amniocentesis occurred in six patients (0.62%). They concluded that Amniocentesis is a relatively safe and reliable method of prenatal diagnosis, but must be done by expert physician [23].

Balkan et al, performed 1,068 second-trimester amniocentesis. The maternal age between 35 and 39 years was the most common age group (34.5%) [24]. In our study the mean maternal age during amniocentesis was 31.84±6.92 years (range: 15-47years).

Kalogiannidis et al investigated amniocentesis complications in 5,948 singleton pregnancies. Advanced maternal age was the most common indication (53%) for amniocentesis. A need for repeated puncture was 2.1%. Aspiration of hemorrhagic amniotic fluid was observed in 3.7%. Fetal loss rate was 0.3% and there was no relationship with advanced maternal age (≥35 years), GA at amniocentesis >18weeks, repeated procedure, or aspiration of hemorrhagic AF [25].

The risk for abortion and preterm premature rupture of membranes (PPROM) does not increase in women who have undergone amniocentesis and received antibiotic prophylaxis [26].

Grether-González et al analyzed 1500 consecutive patients undergoing genetic amniocentesis. They reported 4.5% of chromosomopathy. Pregnancy outcome was known in 32%. There were five fetal losses (1%) [8].

Hanprasertpong et al studied all singleton pregnant women who had a second trimester amniocentesis for chromosome studies. Advanced maternal age was the most common indication for amniocentesis. Amniocentesis increased following positive result of screening aneuploidy tests. The fetal loss within 14 days after the procedure was 0.12%. Leakage of amniotic fluid occurred in 0.1% but only one case aborted. Fever occurred in two cases and a case of chorioamnionitis was diagnosed. The rate of fetal loss within 14 days after amniocentesis in singleton pregnant women was lower than that of the authors' previous 10 years [27].

Chorioamnionitis is a rare complication of amniocentesis, which may quickly induce more serious complications [24, 28, 29]. Intrauterine infection has been responsible for 25-40% of preterm births [30]. Intraamniotic infection is a major risk factor for spontaneous rupture of membranes, clinical chorioamnionitis, preterm delivery (PTD), and poor perinatal outcome [31]. To date, some cases of maternal mortality following second-trimester amniocentesis have been reported [24, 32]. Septic shock is an extremely rare complication of amniocentesis [24, 33, 34]. There are reports of maternal mortality due to sepsis after second-trimester genetic amniocentesis (A 36-year-old woman) [24, 33]. There were no such infective complications or mortality in our studied series.

A principal factor affecting safety and effectiveness of amniocentesis is the volume of procedures performed by the operator. Perinatologists undertaking more than 50 amniocenteses per year are considered as high-volume performers [25, 35, 36]. High-volume experience is reported to have decisive impact on rates of procedure-related adverse outcomes [37]. In one study [25], more than 6000 amniocenteses have been performed over the last 15 years by the same operator, a number comparable or even superior to those of other analyses [25, 36, 37]. In our

institution, more than 2000 amniocenteses have been performed over the last 5 years.

The miscarriage rate in singleton pregnancies has been reported as 0.2% to 3% in literatures [4, 18, 38, 39]. In one study, no miscarriages occurred in the group of twins [25]. Yukobowich et al [40] reported a miscarriage rate of 2.73% up to four weeks after the procedure while Cahill et al reported 3.2% up to 24th gestational week [41]. We had 1.3% of abortion during a week after the process.

In a study by Leroy et al 114 pregnant women underwent CVS. The medical termination of the pregnancy was done in 18.42% of cases. Without accounting for underlying pathology, fetal loss rate was up to 5.75%. Only one case of unexpected fetal loss was noted (1.15% of the ongoing pregnancies) [42].

Pitukkijronnakorn et al studied all pregnant women ≥35 years old (2,990 cases) scheduled for second trimester genetic amniocentesis. The procedure-related fetal loss before 24th and 28th weeks was 0.17% and 0.50%, respectively. The most common presenting symptom before fetal loss was abdominal pain. All of the cases leading to abortion had symptoms initiated after 48 h after procedure. Significantly higher rates of abortion occurred in pregnant women ≥41 years old. However, the certain factors influencing the risk of fetal loss might be independent of the amniocentesis procedure [2].

Uludag et al compared short- and long-term complications of amniocentesis performed with 20G, 21G, and 22G needles on 793 pregnant women in Turkey, and showed that the rates of vaginal bleeding, bloody amniotic fluid, amniotic fluid leakage, and fetal loss were similar among the three groups [43].

Nassar et al studied the complications of 1,347 second-trimester amniocenteses. The most common indications were advanced maternal age (72.3%) and abnormal triple screen (20.3%). Twenty-two complications (1.6%) were observed: fetal loss (0.22%), bleeding (0.59%), and rupture of membranes (0.82%). An abnormal karyotype was detected in 34 (2.5%) fetuses. Complications were significantly associated with gestational age, number of punctures, and ultrasound anomalies. Genetic amniocentesis performed at a tertiary care institution was safe with the fetal loss rate of 0.22% [44].

A cohort study, including all singleton pregnant women who had an amniocentesis (n=32852) or CVS (n=31355), showed that the miscarriage rates after amniocentesis and CVS were 1.4% and 1.9%, respectively. This difference may be explained by the difference in gestational age at the time of the procedures. The miscarriage rate was inversely correlated with the number of procedures performed in a department [35].

Conclusions

Evaluation of Complications of Amniocentesis in Northwest of IRAN revealed acceptable rate of early and late complications. This is because of high-volume performance in this tertiary center in expert hands. The amniocentesis is more frequent procedure than CVS and it is done commonly in 16th-18th gestational weeks. Abortion occurred in 0.8% as early complication and water break and second or third trimester bleeding happened in 1.6% and 1.8% respectively. Considering the ethical and religious limitations we do recommend using first trimester screening methods in Islamic countries to get earlier results with CVS.

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