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Complications Associated With Amniocentesis in the Third Trimester of Pregnancy

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Abstract

Background: Amniocentesis is a procedure done for diagnostic or therapeutic purposes. It is a useful resource to establish fetal lung maturity in the final stages of pregnancy, when it is necessary for the pregnancy resolution. The objective of the study was to determine the morbidity associated with amniocentesis in the third trimester of pregnant women.

Methods: A retrospective, cross-sectional, descriptive study in which 203 pregnant women underwent amniocentesis under ultrasound guidance was performed. Demographic data, etiology, clinical features of the maternal and fetal complications resulting from the procedure were analyzed.

Results: Two hundred forty-nine amniocentesis procedures were performed in the 205 patients. The mean gestational age was 36.7 ± 2.8 weeks. Extraction of hematic amniotic fluid (4.8%) and preterm labor (1.9%) were minor complications attributed to the procedure. Premature rupture of membranes was the main major complication (1.45%). No fetal loss from the procedure was recorded.

Conclusion: The amniocentesis during the third trimester of the pregnancy has decreased due to a better prenatal care and the ability to document the gestational age with ultrasound or other diagnostic techniques. However, despite the complications that may occur, amniocentesis is still a valid therapeutic and/or diagnostic tool in those patients who have indications for the realization of the procedure.

Keywords: Pregnant complications; Amniocentesis

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Introduction

Amnion puncture is an invasive technique for obtaining a sample of amniotic fluid by aspiration into the amniotic cavity using a needle via transabdominal [1-3]. Amniocentesis may be performed for diagnostic or therapeutic purposes. In the case of a diagnostic procedure, the sample of amniotic fluid is used to perform histopathological or biochemical studies, while in the case of a therapeutic procedure, this is intended to reduce the volume of amniotic fluid in patients with polyhydramnios [1-3]. According to the stage of gestation at which the amniocentesis is performed, it is classified into early, middle and late or third trimester. At present, the latter is mainly used to determine fetal lung maturity, passing to second term other applications [3, 4]. The respiratory distress syndrome is a significant cause of neonatal morbidity and mortality, therefore the assessment of fetal lung maturity with the amniocentesis test plays an important role in obstetric decisions. In this case, the lecithin-sphingomyelin index and/or lamellar bodies and the Clements test are realized with amniotic liquid obtained during the third trimester [1, 5, 6].

Amniocentesis is not an innocuous procedure; therefore indications, benefits and potential risks involved in the procedure should be carefully explained to the patient and family. The amniocentesis performed during the third trimester under ultrasound guidance is safe and effective. The major complications associated with the procedure are premature rupture of membranes, fetal direct and indirect injury, amniotic infection and fetal loss. On the other hand, puncture of abdominal viscera, hemorrhage and isoimmunization are rare maternal complications [4, 7, 8]. Complications due to amniocentesis have been reported in the first 48 h after the procedure that merit urgent resolution of pregnancy or before the completion of lung maturity. These include alterations in fetal heart rate, placental hemorrhage, placental abruption, uterine rupture, preterm labor and rupture of membranes [4, 9-11]. The total rate of pregnancy loss after amniocentesis varies from 0.3% to 11.2% [4, 10, 12-15]. That complication has been related to factors associated with the technique used, the placental insertion and gestational age. Publications of the complications associated to amniocentesis have been infrequent in our country. Therefore, the objective of this study was to determine the complications of the amniocentesis during the third trimester and the factors associated with these complications in a population of Mexican women.

Materials and Methods

This is a retrospective, descriptive study through the review of clinical records of women whose pregnancies were followed from 2008 to 2011. The study was performed in a public obstetrics and gynecology tertiary-care hospital in an urban part of Mexico. The hospital provides care for patients of lower and middle socioeconomic status. The Ethics and Investigation Committees approved the study protocol, and the study was performed according to the guidelines delineated by the Declaration of Helsinki.

Amniocentesis under ultrasound guidance was performed to the women during the third trimester. Sociodemographic variables, amniocentesis indications, gestational age at the procedures, number of punctures to obtain amniotic fluid, and maternal and fetal complications were obtained from the clinical records. Amniocentesis was performed by two operators using the technique known as "hands-free". One operator locates the puncture site by ultrasound, while the second operator performs puncture with a spinal needle number 20 and making the extraction of amniotic fluid [3].

Major complications were defined as those that potentially led to the termination of pregnancy (premature rupture of membranes, uncorrectable bleeding, and uncontrolled uterine activity), whereas minor complications were considered those that did not alter the course of pregnancy and whose appearance is directly associated with carrying out the process (sample contamination, uterine contractions, and leakage of amniotic fluid transvaginal). Statistical analysis was realized using the Statistical Package for Social Sciences (SPSS). Frequencies, percentage, central tendency and dispersion measures were obtained.

Results

A total of 205 women were included in the study (Table 1). The mean patient age was 27.0 ± 7.3 years, with a minimum age of 14 years and a maximum age of 45 years. Forty-two patients were multigravida women (20.7%).

Two hundred forty-nine amniocentesis procedures were completed, with an average of 1.2 events/patient, with a minimum of one procedure and a maximum of four procedures. One puncture was realized in 69.5% (n = 173) of cases and two or more punctures were performed in 30.5% (n = 76) of cases.

Assessment of fetal lung maturity (n = 223; 89.6%), reduction of amniotic liquid (n = 16; 6.4%), and both indications (n = 10; 4.0%) were the main indications for amniocentesis.

In the case of pathological personal history, intrauterine growth restriction (n = 69; 34%), alterations in carbohydrate metabolism (n = 53; 26%), twin pregnancy (n = 22; 11%), pregnancy-induced hypertensive disease (n = 16; 8%), poly-oligohydramnios (n = 14; 7%) and others (n = 29; 14%) were the major comorbidities associated with gestation.

The mean gestational age at the moment of the procedure was 36.7 ± 2.8 weeks, with a difference of 2 weeks regarding the mean gestational age obtained by ultrasound (34.3 ± 2.3 weeks gestation).

Table 1. Clinical Characteristics of Women Included in the Study (n = 203)

	n	%
Comorbidities associated with gestation		
Intrauterine growth restriction	69	34%
Alterations in carbohydrate metabolism	53	26%
Twin pregnancy	22	11%
Pregnancy induced hypertensive disease	16	8%
Poly-oligohydramnios	14	7%
Others	29	14%
Indications for amniocentesis		
Fetal lung maturity	223	89.6%
Reduction of amniotic liquid	16	6.4%
Both indication	10	4.0%
Mayor and minor complications		
Complications mayor		
Membranes premature rupture	2	0.8%
Premature development of placenta	2	0.8%
Complications minor		
Hematic amniotic liquid	10	4.02%
Uterine contractility	4	1.6%

Eighteen (7.2%) complications due to the amniocentesis procedure were found in the present study. The incidence of minor complications was 5.6% (n = 14). In this sense, hematic amniotic liquid was obtained in 10 cases (4.02%) and uterine contractility occurred in four cases (1.6%). The incidence of major complications was 1.6% (n = 4). Membranes premature rupture occurred in two cases (0.8%) and placenta premature separation occurred in two cases (0.8%).

In the present study, no fetal loss occurred or was registered despite of the complications of the procedures.

The median of the time for resolution of pregnancy after amniocentesis was 24 h and it was mainly via cesarean birth (86.3%; n = 177), either because comorbidities were presented by patients or because the fetal maturity was confirmed.

Discussion

Amniocentesis is not an innocuous procedure; there are complications that can compromise the health of the mother and fetus. The most important concerns in assuring the safest possible execution of the procedure include adherence to correct indications for the procedure, the presence of an expert operator and the use of ultrasound guidance [13-15].

According to the literature, the greatest concern for most couples deciding whether to undergo diagnosis amniocentesis is the likelihood of fetal loss [14]. In this sense, the rate of amniocentesis-related pregnancy loss mentioned in the literature ranged between 0.3% and 11.2% [12-15]. However, several studies have reported a miscarriage rate that has not been

found different between women who chose amniocentesis and those who did not. For example, in a study with 2,256 women that undergoing amniocentesis, pregnancy loss occurred in 1.8% of women compared with 1.4% of controls women, being a non-significant difference [13]. In another study with more than 32,000 pregnant women, there was no significant difference in the miscarriage rate between women who chose amniocentesis and those who not [16]. In our study, the placenta premature separation forcing immediate birth occurred in two patients (0.8%). This pregnancy loss rate observed in our study was the same as that procedure-related fetal loss rate published by Haraldsdottir et al [17] of 0.8% on women who had amniocentesis and chorionic villus sampling in the Prenatal Diagnosis Unit at the Landspitali University Hospital during 1998 - 2007. However, it is important to clarify that these complications published by above authors were derived from studies of amniocentesis in the second quarter [17].

Factors that are associated with increased fetal loss rates include a transplacental approach, multiple needle insertions, larger needle caliper, an abnormal fetus, and potentially operator experience [13, 18]. It should be noted that in our study there were no fetal deaths related to the amniocentesis.

On the other hand, the overall incidence (7.2%) of complications (different to pregnancy loss) associated with amniocentesis in pregnant women in our study was practically the same as the incidence of 7.9% reported by Hernandez et al [10]. However, the percentage of minor complications in our study was slightly lower than that rate published by Hernandez et al [10] (5.6% versus 7.2%). Importantly, there are differences in both populations due to the characteristics of our unit, considered as a reference center without strict entry criteria. Likewise, another difference between the results of the study of Hernandez et al [10] and our study was the number of procedures by patients, being of 1.2 events/patient in our study versus 2.8 events/patient. The multiple needle insertion is a risk factor that is associated with complications due to amniocentesis [13, 18].

In conclusion, the complications rates observed in our study indicated that amniocentesis is still a valid therapeutic and/or diagnostic tool in those patients who have indications for the realization of the procedure.

Conflicts of Interest

The authors have no conflicts of interest relevant to this article.

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