Original Article

Does Chorionic Villus Sampling Increase the Risk of Preeclampsia or Gestational Hypertension?

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Abstract

Background: Chorionic villus sampling (CVS) and amniocentesis are two methods for prenatal diagnosis. The goal of this study was to compare amniocentesis and CVS-related complications in a large sample of Iranian women. **Methods:** Medical records of 1624 women who underwent amniocentesis or CVS due to medical indications between 2008 and 2016 were reviewed. Data regarding age, gravidity, parity, gestational age, type of procedure, neonatal weight (and percentile), trisomia, abortion, intrauterine growth restriction (IUGR), severe IUGR, preeclampsia, and gestational hypertension were recorded. **Results:** Finally, 1215 cases were evaluated. Mean maternal age, gravidity, and gestational age were significantly different between two groups. Preeclampsia, gestational hypertension, IUGR, severe IUGR, and intrauterine fetal death were not significantly different between two groups. Trisomy 18 and 21 were common in cases underwent amniocentesis. **Conclusions:** Women who underwent CVS are not at higher risk for developing hypertensive disorders than women underwent amniocentesis.

Keywords: *Amniocentesis, chorionic villus sampling, intrauterine growth restriction, preeclampsia*

Introduction

Chorionic villus sampling (CVS) and amniocentesis are two methods for prenatal diagnosis.[1,2] CVS is applied in cases with advanced maternal age, first-trimester screening for Down syndrome, and cases who are known as high-risk group due to the United States Preventive Services Task Force and the Society of Obstetricians and Gynecologists Canada.[3] As the interest for first-trimester screening for aneuploidy has been increased, the number of CVS conducted in prenatal clinics has been increased.[1] Although against amniocentesis it is not an invasive method, fetal loss has been reported between 0.5% and 1.5% while this rate is between 0.06% and 1% for amniocentesis.[4-6]

Caughey *et al*. compared 9886 CVS and 30,893 amniocentesis procedures and found that loss rates were 3.12% for CVS and 0.83% for amniocentesis.[7]

There are some evidences that placenta damage after CVS is related to increase risk of preeclampsia. Focal placental hemorrhage and inflammation, stimulation of maternal immune system by fetal antigens, and imbalance between angiogenic and antiangiogenic placental products are factors considered as predisposing factors of CVS-related preeclampsia.[8-10]

On the other hand, miscarriage, infection, club foot, and puncture of the placenta are amniocentesis-related complications.

There are limited studies regarding comparing complications in women underwent CVS or amniocentesis.

The goal of this study was to compare amniocentesis and CVS-related complications in a large sample of Iranian women.

Methods

We conducted this retrospective study in Moheb YAS Hospital (affiliated hospitals of Tehran University of Medical Sciences). Medical records of 1624 women who underwent amniocentesis or CVS due to medical indications between 2008 and 2016 were reviewed.

Inclusion criteria

Patients with CVS conduction between 11 and 13 weeks of gestational age (with 20 gauge needle) or amniocentesis between 15 and 22 weeks with 22 gauge needle were included.

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Exclusion criteria

Patients with medical diseases such as diabetes, hypertension, kidney disease, thyroid disease, conduction of procedure twice or more, and entrance of needle in amniocentesis through placenta were excluded from the study. Patients with multiple pregnancies, maternal anomalies in sonography, maternal body mass index >35 kg/m^2, and cigarette smoking were also excluded from the study.

Data regarding age, gravidity, parity, gestational age, type of procedure, neonatal weight (and percentile), trisomia, abortion, intrauterine growth restriction (IUGR), severe IUGR (abdominal circumference <5th percentile), preeclampsia, and gestational hypertension were recorded.

We excluded induced abortion cases.

Statistical analyses were performed with SPSS (version 18, SPSS Inc., Chicago, IL, USA).

Results are presented as mean ± standard deviations and frequencies. The Chi-square test with Fisher's exact test was applied for comparing categorical variables and ANOVA test used to compare continuous variables. $P < 0.050$ was considered statistically significant.

Results

Medical records of 1624 pregnant women who underwent amniocentesis or CVS were reviewed. Mean maternal age, gravidity, and gestational age were significantly different between two groups [Table 1].

Abortion occurred in 67 cases who had amniocentesis and 12 who had CVS ($P = 0.2$). Three hundred and twenty-eight cases were lost to follow up. Finally, 1215 cases were evaluated. Nine hundred and ninety-one cases were in amniocentesis group and 224 in CVS group.

Preeclampsia, gestational hypertension, IUGR, severe IUGR, and intrauterine fetal death were not significantly different between two groups [Table 2].

Thalassemia was the most common finding of CVS while trisomy 18 and 21 were common in cases underwent amniocentesis.

Discussion

The result of this study showed that incidence of preeclampsia, gestational hypertension, and IUGR were not significantly different between amniocentesis and CVS groups.

This finding is against Daskalakis *et al*.'s findings. They evaluated 3243 women who underwent CVS and 6875 woman who underwent amniocentesis and reported higher rate of gestational hypertension in CVS group than amniocentesis group (3.8% vs. 1.7%).[11]

Table 1: Demographic characteristics of two groups

	Amniocentesis *n*=1042	CVS *n*=582	*P*
Maternal age	33.4±6.2	30.3±6.4	<0.001
Gravidity	2.5±1.3	2.2±1.3	0.001
Live birth	1.1±0.9	1±1	0.2
Abortion	1.2±0.8	1.2±0.6	0.9
Gestational age	15.8±2.9	11.1±2	<0.001
Neonatal weight	3084.5±710.3	3161.7±584.7	0.04

CVS=Chorionic villus sampling

Table 2: Pregnancy complications in two groups

	Amniocentesis (*n*=991), *n* (%)	CVS (*n*=224), *n* (%)	*P*
Preeclampsia	56 (5.6)	12 (5.3)	
Gestational hypertension	25 (2.5)	1 (0.4)	0.2
Severe IUGR	42 (4.2)	10 (4.4)	
IUGR	19 (1.9)	3 (1.3)	0.8
IUFD	18 (1.8)	3 (1.3)	0.6

IUGR=Intrauterine growth restriction, IUFD=Intrauterine fetal death, CVS=Chorionic villus sampling

In another study, Grobman *et al*. evaluated 501 women who underwent amniocentesis and 152 who had CVS with 653 women who had no test. They found that maternal age <25 years, nulliparity, and having CVS are factors which are associated with preeclampsia.[12]

Adusumalli *et al*. conducted a study to evaluate the relationship between CVS and pregnancy-related hypertensive disorders. They followed 1540 women who had CVS and 840 controls. Hypertensive disorders were reported in 4.9% of patients and 4.4% of controls.[9]

In a retrospective analysis of Swedish database, there was no increased risk of preeclampsia or gestational hypertension in women who had CVS.[13]

Basaran *et al*. conducted a systematic review to assess effects of CVS on preeclampsia and pregnancy-related hypertension. They investigated that CVS does not increase the risk of preeclampsia or hypertensive disorders in pregnancy.[14]

In a previous trial, CVS was related to 0.4% greater pregnancy loss before 20th week of gestation and a 0.7% greater rate before 28th week.[15]

We also found that conduction of CVS is not related with increased risk of IUGR which is consistent with Williams *et al*. and Ferguson *et al*.'s results that reported no significant difference between neonatal weight of amniocentesis and CVS groups.[16,17]

Daniilidis *et al*. reviewed medical record of pregnant women who underwent amniocentesis in their center. They reported Down syndrome in 4% of cases.[2]

Three hundred and eleven women who had amniocentesis were evaluated by Tchirikov *et al*.[18] Like our results,

Down syndrome followed by trisomy 18 was the most abnormal chromosomal anomalies.

Preeclampsia is one of the most leading causes of mortality and morbidity which is the result of impaired placentation.[19] There is a theory which supports that placenta disruption which occurs during CVS procedure will result in abnormal placental function and finally preeclampsia or gestational hypertension.[11]

CVS is a diagnostic test which includes chorionic villi cells from the placenta. The most indications for CVS conduction are advanced maternal age and family history or abnormal screening tests.[4] It usually is performed at 11 and 14 weeks of gestation and provides a valuable source of extravillous trophoblasts.[20]

CVS may damage placentation which causes inflammation and focal hemorrhage. These processes will cause placental perfusion reduction, impaired placental vasculature, and endothelial dysfunction,[8] leading to the development of preeclampsia or gestational hypertension.

However, there are controversies regarding results of different studies due to sample size, inclusion and exclusion criteria, and study design.

Larger, multicentric studies are recommended.

Conclusions

Women who underwent CVS are not at higher risk for developing hypertensive disorders than women underwent amniocentesis.

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Conflicts of interest

There are no conflicts of interest.

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