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Original Article

Abortion Rate Following Chorionic Villous Sampling and Amniocentesis in Twin Pregnancies

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Abstract

Objective: Amniocentesis and chorionic villus sampling (CVS) are the most widely used prenatal diagnostic methods. Despite their benefits, they can be associated with adverse pregnancy effects, but the exact prevalence of these complications especially in twin pregnancies is not exactly known. Therefore, the present study was conducted to determine post-amniocentesis or CVS complications in twin pregnancies.

Materials and methods: This retrospective observational study was conducted on 187 pregnant women who underwent amniocentesis or CVS in the perinatology department of Yas Hospital affiliated with Tehran University of Medical Sciences from January 2011 to March 2020. All participants were evaluated with amniocentesis or CVS by an expert perinatologist. The study outcomes were considered as the occurrence of vaginal bleeding, rupture of the membranes, chorioamnionitis, and abortion.

Results: The mean age of women was 33.5 ± 6.5 years. About 90 % of pregnant women underwent amniocentesis and the others underwent CVS. In 132 (70.6%) pregnant women, the most common indication for diagnostic prenatal tests was having high-risk first/second-trimester screening followed by abnormal ultrasound anomaly scan in 31 (16.6%) cases. It was also found that in 80 (42.8%) patients, the placenta site was in the anterior part and 65 (34.8%) in the posterior part. The diagnostic test results were normal in 170 (90.4%) cases, while trisomy 21 was detected in 13 (7%) cases and trisomy 13 in 4 (2.1%) cases. The rate of abortion following CVS or amniocentesis in twin pregnancies was 3.7%, which was not associated with the study variables.

Conclusion: The results of the present study showed that the rate of miscarriage following amniocentesis and CVS in twin pregnancies is 3.7%. Therefore, reassuring the parents about the benefits of amniocentesis or CVS rather than their rare complications is necessary.

Keywords: Abortion; Induced; Prenatal Diagnosis; Amniocentesis; Pregnancy; Twin

Introduction

Amniocentesis and chorionic villus sampling (CVS) are the most widely used prenatal diagnostic invasive methods (1-3), which help in the diagnosis of fetal chromosomal, genetic, and metabolic disorders. The common indications are positive first or second trimester of pregnancy screening tests, abnormal

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ultrasound anomaly scan, positive aneuploidy history, as well as advanced maternal age (≥ 35 years). CVS is also used in fetal anemia, platelet alloimmunization, hereditary diseases such as thalassemia and sickle cell anemia or genetic disorders such as Down syndrome in the fetus and the determination of fetal karyotype cases (4-6).

Despite their benefits, these methods can be associated with pregnancy complications including rupture of membranes, vaginal bleeding, and chorioamnionitis (7, 8). Possible risk factors for the occurrence or aggravation of these complications are the mother's age and obesity, gestational age, position of the placenta, the needling times, and multiple pregnancies (9-11).

In fact, the rate of abortion associated with amniocentesis has decreased with advances in imaging technology. Based on data from meta-analysis, the rate of abortion related to amniocentesis in twin and singleton pregnancies, if performed by experienced doctors, were approximately 3.07% and 1.9%. The miscarriage rate associated with CVS in twin and singleton pregnancies were 3.84% and 2.0% respectively (12).

Recently, new studies have shown that the risk of abortion following amniocentesis or CVS is much lower than currently reported by the guidelines (13, 14). However, there are still conflicting statistics in this field and these statistics, figures may differ in each center according to the experience and skill of the gynecologists, as well as the tools and equipment used (15).

Despite these findings, a need remains to reconcile these discrepancies and provide women with evidence-based information to facilitate informed decision-making regarding prenatal diagnostic procedures. On the other hand, the number of studies conducted on twin pregnancies is less than that of singletons, and there have not been many studies on the types of risk factors for fetal loss in twin pregnancies. Therefore, conducting more studies in this field and different centers is necessary and recommended. Hence, the present study was conducted to determine the rate of abortion after performing CVS and amniocentesis in twin pregnancies.

Materials and methods

This retrospective observational study was conducted on 187 pregnant women who underwent amniocentesis or CVS in the perinatology department of Yas Hospital affiliated with Tehran University of Medical Sciences from January 2011 to March 2020.

Inclusion criteria were women with twin pregnancies who needed a diagnostic procedure based on the indication of abnormal first-trimester screening biomarkers; history of chromosomal abnormality in previous pregnancies; abnormal ultrasound findings; a history of minor thalassemia in a couple or the birth of a child with major thalassemia; as well as a history of metabolic diseases or other hereditary diseases. Exclusion criteria were incomplete medical records; and major fetal anomalies.

All participants were evaluated with amniocentesis or CVS under ultrasound guidance by an expert perinatologist. CVS is done abdominally and is followed by tissue aspiration (chorionic villi) for genetic or chromosomal analysis with a syringe containing tissue culture media. The amniocentesis was performed using a 20 gauge spinal needle under high-resolution ultrasound guidance (ACUSON Sequoia 512™, Siemens Healthcare GmbH and USA), followed by aspiration of amniotic fluid, is traditionally performed around 16 weeks of gestational age (16).

The study outcomes were considered as the occurrence of vaginal bleeding, rupture of the membranes, chorioamnionitis, and abortion.

The study variables were age, BMI, number of previous pregnancies, number of live children, number of abortions, history of underlying diseases, and maternal chronic drug use.

Statistical analysis

Descriptive statistics including mean, standard deviation, and relative frequency were used to describe the data. For data analysis, the chi-square test (for correlation between qualitative variables) and t-test (for correlation between quantitative variables) were used. All analyses were performed using SPSS (Statistical Package for Social Science) version 23 software at a significant level of less than 0.05.

All participants gave oral and written informed consent and cooperated in the research. No additional costs were imposed on the subjects and their right to stop the study was guaranteed. Ethical approval of the study was obtained from the Institutional Review Board of Tehran University of Medical Sciences (IR.TUMS.MEDICINE.REC.1400.831) based on the Declaration of Helsinki.

Results

The mean age of women was 33.5 ± 6.5 years and the mean BMI was 25.21 ± 4.14 kg/m^2. The most number

(73.3%) of women in their first or second gravidity. The twin pregnancies in about 60% of women were spontaneous. A positive history of preterm labor was reported in 18 (9.6%) women. About 90 % of pregnant women underwent amniocentesis and the others underwent CVS.

In 132 (70.6%) pregnant women, the most common indication for diagnostic prenatal tests was having high-risk first/second-trimester screening followed by abnormal ultrasound anomaly scan in 31 (16.6%) cases. It was also found that in 80 (42.8%) patients, the placenta site was in the anterior part and 65 (34.8%) in the posterior part. The diagnostic test results were normal in 170 (90.4%) cases, while trisomy 21 was detected in 13 (7%) cases and trisomy 13 in 4 (2.1%) cases.

The rate of abortion following CVS or amniocentesis in twin pregnancies was 3.7% and chorioamnionitis was reported in 3 (1.6%) cases, all abortion and chorioamnionitis were happened within one week after procedures. The association between the rate of abortion and other variables is shown in Table 1, which was not associated with the study variables.

Discussion

The results of the present study showed that the rate of abortion following CVS or amniocentesis in twin pregnancies was 3.7%. These findings are largely consistent with the results of studies by Jain and Carbone et al. (15, 17).

The study by Beta et al., which was conducted to investigate the rate of abortion following CVS and amniocentesis, showed there was not a significant difference with women who did not undergo any of these diagnostic methods. In this study, a 1.5% abortion rate was reported in people who underwent CVS and a 0.8% abortion rate in people undergoing amniocentesis (18).

A meta-analysis study by Salmon et al. found that 580 miscarriages occurred after 63,723 amniocenteses compared with a rate of 1,726 abortions after 330,469 unmanipulated pregnancies, suggesting that the rate of miscarriage after CVS and amniocentesis was similar to pregnancy rate without manipulation (11).

Table 1: The demographic and clinical history of the mothers separately for the two groups of patients

Variable	Without Abortion (N=180) Mean ± SD or Number (%)	With Abortion (N=7) Mean ± SD or Number (%)	p-value
Age (years)	33.46±6.48	33.29±7.91	0.986
BMI (km/m^2)	25.26±4.15	23.85±3.81	0.568
Gravida (times)			0.064
1-2	134 (74.4)	3 (42.9)	
> 2	46 (25.6)	4 (57.1)	
History of preterm labor			1.000
Yes	18 (10.7)	0 (0)	
No	151 (89.3)	5 (100)	
Gestational age in procedure time	17.14±1.58	17.50±2.58	0.308
Procedure			0.449
Amniocentesis	166 (92.2)	6 (85.7)	
CVS	14 (7.8)	1 (14.3)	
The reason of procedure			0.099
High-risk screening test	130 (72.2)	2 (28.6)	
Abnormal ultrasound anomaly scan	27 (15)	4 (57.1)	
Others*	23 (12.8)	1 (14.3)	
Placenta location			0.904
Anterior	77 (42.8)	3 (42.9)	
Posterior	63 (35)	2 (28.6)	
Others**	40 (22.2)	2 (28.6)	
Chorioamnionitis			1.000
Yes	3 (1.7)	0 (0.0)	
No	169 (98.3)	7 (100.0)	

*including: Mother's request, Anomaly in the previous child, ** including: Fundal, Lateral, Previa placenta site.

Shirazi et al. stated that CVS or amniocentesis are invasive procedures that are associated with complications such as fetal death, rupture of membranes, vaginal bleeding, and chorioamnionitis. Also, other possible risk factors include the mother's age, gestational age, the position of the placenta, twins, fibroma, needling frequency, and bloody amniotic fluid. These findings are largely in line with the results of the present study and confirm the effect of some factors affecting the complications of these procedures, such as gestational age and place of sampling of placental villi (19).

Movahedi et al. found that with increasing maternal age, increasing number of pregnancies, and increasing fetal weight, especially in diabetic mothers and also in multiples, the chance of CVS complications increases. These findings are largely consistent with the results of the present study (20).

Alfirevic et al. stated in their study that although the diagnostic methods of amniocentesis and CVS are beneficial for detecting genetic and chromosomal abnormalities, they have complications, the most important of which is the occurrence of spontaneous abortions. Also, factors such as the mother's age, multiple pregnancies, number of pregnancies, and reason for performing the procedure are significantly related to it (21).

Many studies have shown that the risk of abortion complications for CVS and amniocentesis is about the same, about 1 in 100-200 singleton pregnancies. This amount has increased in multiple pregnancies and even reaches 5-10%, but the exact amount is unknown. In the current study, the rate of abortion following amniocentesis and CVS was found to be about 14.4%, which is much higher than the above results, which may be due to the type of study and the method of collecting patients' information and the lack of a complete investigation of all influencing factors (22-24).

Although CVS and amniocentesis can be associated with adverse pregnancy effects, alongside the first and second-trimester screening programs, they are the most effective way to prevent genetic diseases in society (25, 26).

Conclusion

The results of the present study showed that the rate of miscarriage following amniocentesis and CVS in twin pregnancies is acceptable. Therefore, reassuring the parents about the benefits of amniocentesis or CVS rather than their rare complications is necessary. However, the larger sample size of research is needed to show that no amniocentesis nor CVS has not exceeded the risk of abortion.

Conflict of Interests

Authors declare no conflict of interests.

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References

1. Choudry A, Masood S, Ahmed S. Feasibility and safety of transabdominal chorionic villus sampling. J Ayub Med Coll Abbottabad. 2012;24(1):38-43.
2. Tchirikov M, Arnold C, Oshovskyy V, Heinrich UR, Thäle V. Three years' experience of using a 29-gauge atraumatic needle for amniocentesis. J Perinat Med. 2012;40(4):413-7.
3. Shirazi M, Rabiei M, Rahimi F, Niroomanesh S, Golshahi F, Eftekhar Yazdi M. Does Chorionic Villus Sampling Increase the Risk of Preeclampsia or Gestational Hypertension? Int J Prev Med. 2019;10:24.
4. Lau KT, Leung YT, Fung YT, Chan LW, Sahota DS, Leung NT. Outcome of 1,355 consecutive transabdominal chorionic villus samplings in 1,351 patients. Chin Med J (Engl). 2005;118(20):1675-81.
5. Golshahi F, Khaleghinezhad K, Sahebdel B, Saedi N, Salari Z. The Indications of Amniocentesis for the Diagnosis of Aneuploidy among Pregnant Women. Journal of Midwifery and Reproductive Health. 2024;12(2):4264-9.
6. Alfirevic Z, Mujezinovic F, Sundberg K. Amniocentesis and chorionic villus sampling for prenatal diagnosis. Cochrane Database Syst Rev 2003;5(3): CD003252.
7. Eddleman K, Berkowitz R, Kharbutli R, Malone F, Vidaver J, Porter TF, et al. Pregnancy loss rates after midtrimester amniocentesis: the faster trial. Am J of Gynecol Obstet 2003;189(6): s111.
8. Tabor A, Philip J, Bang J, Madsen M, Obel EB, Nørgaard- Pedersen B. Needle size and risk of miscarriage after amniocentesis. Lancet. 1988;1(8578):183-4.
9. Tabor A, Vestergaard CH, Lidegaard G. Fetal loss rate after chorionic villus sampling and amniocentesis: an 11- year national registry study. Ultrasound Obstet Gynecol 2009;34(1):19-24.
10. Pritchard JA, MacDonald PC, Gant NF. William's obstetrics: Appleton-Century-Crofts New York; 1980.
11. Akolekar R, Beta J, Picciarelli G, Ogilvie C, D'Antonio

F. Procedure-related risk of miscarriage following amniocentesis and chorionic villus sampling: A systematic review and meta-analysis. Ultrasound Obstet Gynecol. 2015;45(1):16-26.
12. Salomon LJ, Sotiriadis A, Wulff CB, Odibo A, Akolekar R. Risk of miscarriage following amniocentesis or chorionic villus sampling: systematic review of literature and updated meta-analysis. Ultrasound Obstet Gynecol. 2019;54(4):442-451.
13. Odibo AO, Gray DL, Dicke JM, Stamilio DM, Macones GA, Crane JP. Revisiting the fetal loss rate after second-trimester genetic amniocentesis: a single center's 16-year experience. Obstet Gynecol. 2008;111(3):589-95.
14. Odibo AO, Dicke JM, Gray DL, Oberle B, Stamilio DM, Macones GA, Crane JP. Evaluating the rate and risk factors for fetal loss after chorionic villus sampling. Obstet Gynecol. 2008;112(4):813-9.
15. Jain S, Acharya N. Fetal Wellbeing Monitoring: A Review Article. Cureus. 2022;14(9):e29039.
16. Borna S, Mirzamoradi M, Abdollahi A, Milani F, Pouransari P. Applying Maternal Serum and Amniotic Fluid CRP Concentrations, and Cervical Length to Predict Preterm Delivery. J Family Reprod Health. 2013;7(1):1-5.
17. Carbone L, Cariati F, Sarno L, Conforti A, Bagnulo F, Strina I, et al. Non-Invasive Prenatal Testing: Current Perspectives and Future Challenges. Genes (Basel). 2020;12(1):15.
18. Beta J, Zhang W, Geris S, Kostiv V, Akolekar R. Procedure-related risk of miscarriage following chorionic villus sampling and amniocentesis. Ultrasound Obstet Gynecol. 2019;54(4):452-457.
19. Shirazi M, Mohseni M, Ghajarzadeh M. Complications, Indications and Results of Two Screening Methods: Amniocentesis and Chorionic Villus Sampling. Acad J Surg. 2015;2(1-2): 23-6.
20. Movahedi M, Farahbod F, Zarean E, Hajihashemi M, Haghollahi F, Farahmand M. Evaluation of Fetal and Maternal Outcomes in Chorion Villus Sampling (CVS). Adv Biomed Res. 2023;12:133.
21. Alfirevic Z, Sundberg K, Brigham S. Amniocentesis and chorionic villus sampling for prenatal diagnosis. Cochrane Database Syst Rev. 2003;(3):CD003252.
22. Niromanesh S, Mousavi Darzikolaei N, Rahimi-Shaarbaf F, Shirazi M. Pregnancy outcome in amniocentesis and chorionic villous sampling: ten- year report. Tehran Univ Med J 2016;74 (6):400-407.
23. Krispin E, Wertheimer A, Trigerman S, Ben-Haroush A, Meizner I, Wiznitzer A, et al. Single or double needle insertion in twin's amniocentesis: Does the technique influence the risk of complications? Eur J Obstet Gynecol Reprod Biol X. 2019;3:100051.
24. Kamath V, Chacko MP, Kamath MS. Non-invasive Prenatal Testing in Pregnancies Following Assisted Reproduction. Curr Genomics. 2022;23(5):326-336.
25. Ghahramani F, Rezaei MA, Afrasiabi A, Nejad J. Epidemiological study of the patients referred for thalassemia diagnosis using chorionic villous sampling (CVS) in Genetic Laboratory of Dastgheib Hospital, Shiraz, 2011. J Family Reprod Health. 2012;6(3):111-114.
26. Nasiri H, Dastan J, Seifi MH, Dalooi N, Ghaffari SR. Application of Molecular Cytogenetic Technique for Rapid Prenatal Diagnosis of Aneuploidies in Iranian Population. J Family Reprod Health. 2009;3(2):51-54.

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