Chorionic villus sampling: analysis of the first 350 singleton pregnancies by a single operator

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Summary

Objective: To assess factors that might influence the success rate, safety and reliability of chorionic villus sampling (CVS). *Design:* Analysis of the outcome of 350 cases of CVS (215 transabdominal and 135 transvaginal). *Setting:* The outpatient prenatal diagnosis and therapy laboratory of a university tertiary care centre. *Subjects:* 350 pregnant women that underwent CVS for prenatal genetic diagnosis between nine and 32 gestational weeks. *Results:* Fetal genotype was the most common indication for CVS 45% (158/350). The overall sampling success rate was 98% (343/350). The majority of cases, 92% (322/350), required one or two aspirations. Out of 331 cases in which CVS was successful 305 continued with the pregnancy. Thirty-five had therapeutic termination of their pregnancies and ten resulted in spontaneous abortions. There was an overall fetal loss rate of 1.7% (6/350). Early bleeding complications occurred in 11.4% (40/350). PROM 0.86% (3/350), preterm 5.1% (18/350), and placenta disorders 1.1% (4/350) did not exceed the expected values. *Conclusion:* CVS is a relatively safe and reliable method of prenatal genetic diagnosis. It needs be done by experienced personnel.

Key words: Chorionic villous sampling; Fetal; Prenatal genetic diagnosis.

Introduction

Chorionic villus sampling (CVS) allows diagnosis of genetic diseases within the first trimester of pregnancy.

Based on earlier identification of affected fetuses as compared with amniocentesis and relative safety, this procedure spread worldwide very rapidly [1, 2].

It became widely popular owing to its advantage of first trimester diagnosis, which meant early reassurance or early termination [3].

Several methods of chorionic villus sampling under ultrasonic guidance have been evaluated. The most commonly used are aspiration through a cathether [4-8] or biopsy by forcceps [9, 10] introduced through the cervix, and transabdominal sampling [11-14].

In this study, we assessed factors that might influence the success rate, safety and reliability of chorionic villus sampling using the transabdominal and transvaginal approach under ultrasound (US) guidance in 350 cases at risk of genetic problems.

Materials and Methods

Between February 1994 and February 2005 a total of 350 patients who had either transabdominal (215) or transvaginal (135) chorionic villus sampling for different genetic problems followed-up until delivery were analyzed.

CVS was carried out according to Holzgreve *et al*. [8] and Kaplan *et al*. [9].

No premedication or local anesthetic was administered. Betadine surgical solution was used during the chorionic villus sampling for cleansing of the external genitalia, vagina, cervix and abdominal wall depending on the method of approach.

For the transabdominal procedure we used a freehand needle technique and for transvaginal we used a Holzgreve cathether (Angiomed/Germany).

US was carried with a 7.5 mHz transducer (Combison 320-5, Kretz-Technik, Austria) and Siemens-Sonoline (Germany).

Sector and real-time scanners with transducers were used. Rhesus negative, unsensitized patients were given anti-D immunoglobulin in accordance with the guidelines of the German Society of Obstetrics and Gynecology and American College of Obstetrics and Gynecology [15, 18]. At the end of the procedure and at 12, 16 and 21 weeks, a US control study was performed to screen for trophoblasts, hematoma and fetal vitality. The weight of chorionic villi obtained was visually estimated by the author using the Holzgreve method [8]. After separation of maternal tissue from fetal tissue, DNA was extracted using a standard method [19]. Analysis for the sickle cell mutation was carried out on 200 ng of DNA by polymerase chain reaction (PCR) [20] on an Autogene thermocycler (Grant Instruments, England) to amplify a 770 bp segment of the β-globulin gene, followed by Dde 1 (GIBCO-BRL) restriction analysis of the PCR product. Where results seemed equivocal the analysis was repeated by the PCR - ARMS method [21]. The procedures were done after genetic counseling and STORCH antibody screening [22].

Results

The gestational age and time of sampling ranged between nine and 14 weeks of gestation, although about 55% of the patients were sampled within the tenth week.

The entire procedure was completed within 10-30 min. A sufficient amount of chorionic villi was obtained in all cases tested with a success rate of 98% (343/350).

In 119 (34%) a sufficient amount of villi was obtained on the first attempt, in 203 (58%) the second attempt, and in six (21%) after the third or more attempts. In seven

Revised manuscript accepted for publication November 26, 2008

Table 1. — *Indications for CVS in 350 patients*.

Type	No.	Percentage
Fetal genotype	158	45.1%
Previous family history of hydrocephalus/ spina bifida/Down's syndrome	97	27.7%
Down's syndrome and other defects	95	27.2%

Table 2. — *Number of insertion attempts for CVS (350 patients)*.

Type	No.	Percentage
First attempt	119	34%
Second attempt	203	58%
Third attempt	21	6%
Third or more attempts	7	2%

Table 3. — *Problems and outcome of diagnostic chorionic villus sampling*.

Problems	No. of cases (no = 350)	Percentage
Therapeutic termination of affected fetuses	35	10 (%)
Spontaneous abortion	10	2.85 (%)
Delivery at term	287	82 (%)
Preterm delivery	18	5.1 (%)
Fetal losses	6	1.7 (%)
Early bleeding	40	11.4 (%)
PROM	3	0.86 (%)
Placenta disorders	4	1.1 (%)
Subchorionic hematoma	38	10.86 (%)
Abdominal cramps	16	4.57 (%)

cases sampling was repeated one week later because of either an insufficient amount of trophoblasts obtained (four cases) or incomplete digestion of the DNA (three cases). The estimated weight of the chorionic villi obtained ranged from 10-70 mg. Sampling was more difficult in patients with a posterior placenta or anteverted uterus or uterine leimyomata. Seventy percent of the samples were pure without any decidual contamination which were easily purified under the microscope. Minor bleeding without any complications was observed in 40 (11.4%) cases; subschorionic hematomas were noted in 38% (10.86%) of the patients at the US control study done immediately after sampling. No case of amniotic fluid leakage occurred. There were six (1.7%) fetal loses (Table 3). The interval between sampling and fetal death or abortion was 1-12 weeks. In two of these cases, abortion was probably unrelated to the procedure because the pregnancies occurred four to ten weeks after cytomegalovirus IgG/IgM and rubella IgG/IgM seropositivity test result were positive.

There was no relationship between time of sampling and incidence of fetal loss. Eighteen patients (51%) delivered before term and 305 (87.1%) at term; 35 (10%) had therapeutic termination of pregnancies.

Discussion

This study has shown that chorionic villus sampling transabdominally and transvaginally under US guidance is an efficient procedure with a success rate of 98% confirming the results of others [8, 9, 23, 24].

The amount and quality of DNA obtained was suitable for diagnosis of sickle cell diseases and Down's syndrome by oligonucleotide analysis in the vast number of cases.

In this report – which is the first since we introduced and established prenatal diagnosis in Lagos in 1994 – the fetal mortality rate was 1.7% which is relatively less than the figure of 5% reported in the international registry regarding 13,506 cases reported by Jackson [19]. This could be the result of the introduction of TORCH serological antibody screening before the procedure and our experience, although our sample size was small.

Other complications of chorionic villi in this series included abdominal cramps in 16 (4.57%), premature rupture of the membrane in three (0.86%), and vaginal bleeding in 40 (11.4%) which differs from the report of Lippman *et al*. [20] showing abdominal cramps in 2.7% and vaginal bleeding in 26.6%.

In conclusion, CVS is a relatively safe and reliable method of prenatal genetic diagnosis but it needs to be carried out by experienced personnel.

Acknowledgement

For the training of author/grants: DAAD/DFG (Germany); Prof. W. Holzgreve, Prof. P. Miny and Prof. J. Horst (Basel/Switzerland/Munster/Germany). For other help: Prof. A. Agboola, Prof. O. Sofola, Prof. T. Odugbemi, Prof. O. Abudu, and Prof. F. Giwa-Osagie.

In memory of the late Prof. O. Coker, Prof. O. Akinrimisi, Prof. A. Akinkugbe and my late parents.

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