

# A survey of current clinical practice of chorionic villous sampling

**Short Title:** Chorionic villus sampling: a survey across the UK

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### **What's already known about this topic?**

- Current guidelines for invasive procedures do not recommend one technique over the other leaving the choice to the individual operator's preference.
- A survey that reviewed the practice among RCOG sub-specialists in Maternal Fetal Medicine across the UK was published ten years ago.

### **What does this study add?**

- The introduction of non-invasive prenatal testing led to a decrease in both numbers of amniocentesis and CVS so a new survey is required to update the current practice across the UK.
- The most common route for CVS is transabdominal (96.8%): Only one centre uses transabdominal and trans-cervical technique equally frequently. The single-needle technique is used exclusively in half centres (51.6%) while the double-needle or both techniques are used in the remaining 32.3% and 16.1% of centres respectively.

### **Abstract**

*Objective:* The number of invasive procedures (chorionic villous sampling (CVS) or amniocentesis) for fetal testing is decreasing due to the availability of non-invasive prenatal test (NIPT) leading to a centralisation of prenatal diagnostic services to accredited fetal medicine centres. A new survey was conducted ten years after the previous one to update the current clinical practice among clinicians who regularly perform CVS.

*Method:* Consultants from 32 centres in the UK were invited to take part in an online survey evaluating: the total number of CVS procedures carried out in the Unit in a typical week, the preferred route (transabdominal (TA) vs transcervical (TC)), technique (use of local anaesthetic (LA) and needle technique).

*Results:* Response rate was 96.9%; TA was the preferred route (96.8%) in all centres except one. Single-needle technique is used exclusively in half the centres (51.6%). LA is used by most operators (90.3%) before the procedure. Three centres did not routinely use LA for CVS.

*Conclusions:* Operators across the UK almost exclusively use the TA route for CVS with single-needle technique in 51.6% of cases. The use of local anaesthetic prior to CVS is a very common practice in the UK.

**Word count:193**

**Key words:** chorionic villous sampling, survey, prenatal diagnosis, invasive procedures

### **Introduction**

An offer of screening and prenatal diagnosis of a genetic disease in the fetus has become a routine part of obstetric care. A small but significant minority of pregnant women undergo invasive tests for several reasons: increased risk of common trisomies on first trimester screening, history of a previous affected child, parental carrier status of a gene mutation or chromosome rearrangement, a structural anomaly seen on ultrasound, or high risk result for non-invasive prenatal test (NIPT).

Invasive diagnostic testing can be performed from 10<sup>+0</sup> completed weeks by chorionic villus sampling (CVS) or after 15<sup>+0</sup> weeks of gestation by amniocentesis.<sup>1-3</sup>

Several guidelines are available for both procedures focusing on several aspects, i.e. fetal loss, risks of transmission of infections, laboratory failure, etc. but there are no strict indications on other aspects such as the route, i.e. transabdominal (TA) vs. trans-cervical (TC) approach in CVS, single or double-needle techniques or on the use of local anaesthetic prior to the procedure.<sup>3,4</sup> In 2008 Carlin et al. published a survey that reviewed the practice among RCOG sub-specialists in Maternal Fetal Medicine across the UK.<sup>5</sup> For CVS, there was a considerable variation in needle choice. Most (89%) operators reported using a TA approach with administration of local anaesthetic (LA) prior to the procedure. Despite being a common practice, the evidence on the impact of LA prior to CVS in reducing the pain is still lacking as shown by Mujezinovic et al.<sup>6</sup>

In recent years, the number of invasive procedures for fetal testing is decreasing due to the availability of NIPT in prenatal diagnosis. There is increasing centralisation of prenatal diagnostic services to accredited fetal medicine centres. We conducted a survey, ten years after the previous one, to evaluate the current clinical practice

amongst clinicians who regularly perform CVS and to assess if the practice has changed.

## **Materials and Methods**

Following a combination of review of the published literature and brain-storming amongst the study team, a draft questionnaire was developed to survey the practice of CVS. This was piloted on two consultants outside the study team, and the draft was modified to generate the final 7-item questionnaire.

Our survey was addressed to all centres accredited by the Royal College of Obstetricians and Gynaecologists (RCOG) for Maternal-Fetal Medicine (MFM) subspecialty in the UK that perform invasive procedures in their daily practice. We obtained the list of these centres from RCOG and sent an invitation to one representative for each centre in order to reflect the activity of the centre. In addition, we sent the questionnaire also to other subspecialists in MFM working in other Hospitals who also perform invasive procedures routinely in order to obtain a more realistic reflection of current practice in different centres.

The invitation was to complete an online questionnaire (Please see supplementary material S1), which was specifically designed to obtain general information about the current practice on CVS for each centre. We did not invite trainees to complete the survey, as this would not reflect the practice of the centre itself. Respondents were invited by email to respond to seven questions in order to provide information about: the total number of CVS procedures carried out in the Unit in a typical week; the preferred route (TA vs TC) and the standard technique (the first-line choice of needles and the use of LA). We did not ask about pre-procedure counselling as this would require an open answer, not only limiting the quantitative analysis of the answers but also restricting the generalizability as they would mainly reflect the practice of the single operator rather than the centre practice. Similarly, we did not ask about the length of the procedures, as this would probably depend more on the experience of the single operators and not reflect the experience of the different centres. In case of a lack of response, two further reminders were sent after one week each from the previous email, for a total of three e-mails.

A formal ethics approval was not required given the design of the study (The study

did not directly involve patients).

## Results

We sent an invitation to take part in our survey to consultants in 21 MFM-subspecialty training centres and 11 other Hospitals across the United Kingdom. Our response rate was (31/32) 96.9% after sending the initial invitation and two further reminders to non-respondents; only one centre did not respond to our survey. No question was left unanswered by those who responded.

All centers reported a reduction in the number of CVS procedures in the last 2-3 years. The number of CVS that each participant usually performs per week is reported in Table 1. Overall, almost half participants perform eight to 20 procedures per week. The most common route for CVS is TA in almost all centres (96.8%); only one MFM-centre uses both TA and TC according to the location of the placenta. In half the centres, the preferred technique is single-needle ( $n = 15$ , 51.6%), the double-needle technique is used by 32.3% ( $n = 10$ ) of centres and in the remaining 16.1% centres ( $n = 6$ ), both techniques are used equally frequently. The 18G needle is the most commonly used instrument for a TA CVS ( $n = 18$ , 58%). Figure 1 shows the distribution of preferences for the needle size during a CVS that emerged from our survey. Most operators, 27 out of 31 (87.1%), use local anaesthetic before the procedure, which is Lidocaine in all cases. Three centres (12.9%) did not routinely use LA for CVS. No other technique of analgesia (topical ethyl chloride spray, inhalation of  $N_2O$  gas) was reported.

## Discussion

Ten years after a previous one,<sup>5</sup> this survey evaluated the current practice in CVS among MFM centres across UK. Although all invasive procedures will probably be performed only in a few selected centres in the future, there are several smaller hospitals where invasive procedures are performed at present. Therefore, we extended the survey also to 11 other centers (all with MFM subspecialists) that currently perform invasive procedures.

A new survey is justified in view of the numerous changes in prenatal diagnosis in order to analyse the new trends in clinical practice. In fact, this is of particular interest since the number of invasive procedures has dramatically dropped due to the availability and use of NIPT from 2012. Several studies have already shown a 30% reduction in the number of women referred for genetic counselling and a 40-76% decrease in the number of invasive prenatal diagnostic procedures.<sup>7-9</sup>

In the past, the introduction of the first trimester screening had implied a decrease in the number of amniocentesis but an increase in the number of CVSs, as the results of the screening were available earlier, giving more time to the women to have access to CVS. The introduction of NIPT led to a decrease in both numbers of amniocentesis and CVS with a decrease mainly evident on the number of amniocenteses. In fact, Larion et al. reported that, with the introduction of more effective risk assessment by NIPT, the annual rate of amniocentesis decreased by 78.8%, and the annual rate of CVS decreased by 60.0% over the 9-year study period.<sup>10</sup> However, although NIPT is a great potential tool, clinical practice standards still recommend confirmation of positive NIPT screening results with a diagnostic karyotype or chromosomal microarray analysis.<sup>11-14</sup>

The reduction in the number of procedures will very likely lead to a centralisation in referral centres with a particular expertise in invasive procedures, where operators' competency can be maintained by carrying out adequate number of ultrasound-guided invasive procedures per year as recommended by RCOG.<sup>4</sup> The availability of NIPT from 10 weeks onwards is making the CVS the most common procedure performed in most centres with a decrease in the number of amniocentesis as shown by several studies.<sup>9,10,15</sup>

At present, the current guidelines for invasive procedures<sup>3,4</sup> do not recommend one technique over the others. These guidelines propose both TA and TC as reasonable alternative routes for the CVS, and the choice of single or double-needle approach,

different needle sizes is left to the individual operator's preference. The Cochrane review by Mujezinovic et al.,<sup>6</sup> reported no differences in pregnancy loss and miscarriage between the two routes although the studies were of very low-quality evidence. However, this survey, in contrast to the previous one, shows that currently the transabdominal route is almost exclusively used for CVS: only one centre still uses both TC and TA, choosing between the two according to the location of the placenta.

Our survey shows a trend: the majority of the centres uses 18 G needles with a single-needle technique and administering lidocaine as local anaesthetic before performing the CVS. The remaining participants almost equally use 17, 19 or 20 G with a single-needle technique. Among the three centres not using LA prior to CVS, two centres, with a mean of 4 to 8 procedures per month, use a single-needle technique; whereas the third centre, with a higher number of procedures (>20 per month) uses a double-needle technique.

Comparing our data to the survey conducted ten years ago, the trans-cervical route seems to be now almost totally abandoned. The possible reasons for this may be because TC CVS may be more technically demanding than TA CVS and failure to obtain a sample is reported to be more common with TC CVS.<sup>16</sup>

The lack of evidence to guide for the choice among different needle sizes and between single versus double-needle technique is the most likely reason to explain the observed heterogeneity in the results of our survey. In fact, no previous studies have ever assessed the outcome of CVS using different needle gauges. Moreover, no randomised controlled trials have ever been conducted to evaluate between single vs. double-needle technique. However, such a trial would require more than 10000 women to demonstrate a clinically important 0.25% difference in pregnancy loss.<sup>5</sup> Our survey did not focus on the reason why a needle or a technique are preferred over others as this would have required narrative answers, making the generalizability of the answer itself difficult and consequently limiting its value for further analysis. No information about the rate of complications observed after a CVS in each centre was collected, as they are reported to be extremely rare.<sup>17-19</sup>

### *Strengths and weaknesses*

We used a questioner that was piloted before actual administration. Other strengths of this survey are a high response rate, and the fact that we were able to obtain

information from almost all MFM training centres in this survey. In addition to the RCOG accredited MFM centres, we also administered the survey to other centres across the UK where MFM subspecialists perform CVS to be more inclusive, so that a total of 31 centres participated in the survey. Therefore, this survey is likely to reflect the current practice in the most specialised centres.

We acknowledge some limitations of this study. Our response rate was not 100%, despite sending an invitation and two reminders, but 96.9%, which is similar to the previous survey.<sup>5</sup> It is known that the quality of data collected in survey research is often indicated by the response rate, the representativeness of the sample and the rate of completed questions (item-response).<sup>20</sup> Our response rate of 96.8% can be considered more than satisfactory as 75% is recommended as critical for statistical significance<sup>21</sup>. Moreover, there were no incomplete questionnaires. We believe that the collected responses are representative of the actual reality across the UK MFM practice.

## **Conclusions**

Operators across the UK almost exclusively use the TA route over the TC route for CVS. Half the centres use a single needle technique. The use of local anaesthetic for CVS is a very common practice in the UK.

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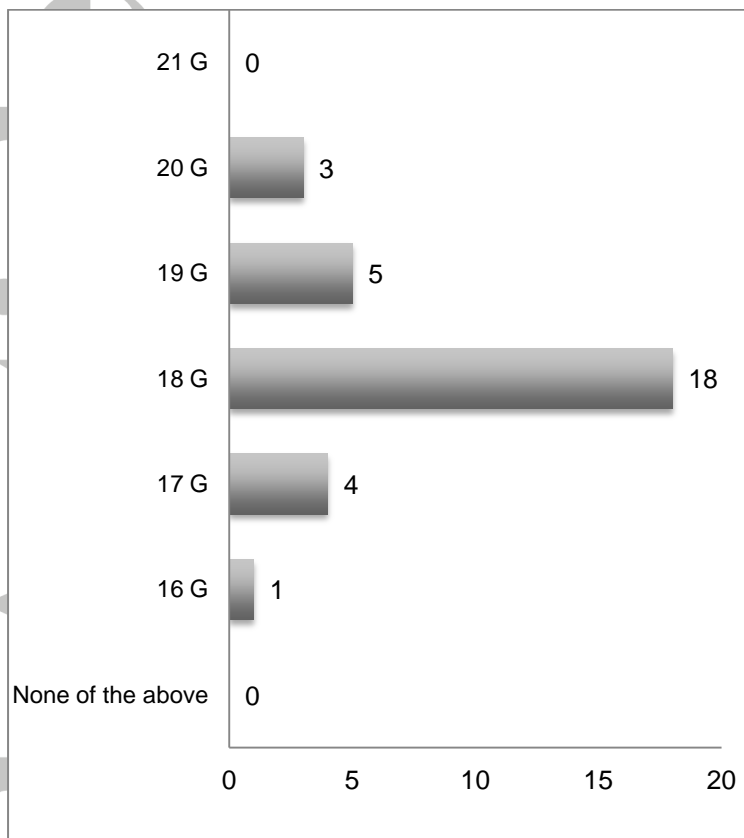
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**Table 1** - Number of CVS performed in each Unit per month

<b>Number of CVS per month in the Unit</b>	<b>N</b>	<b>%</b>
Four or less (usually one per week)	6	19.4%
Four to eight (usually one to two per week)	4	12.9%
Eight to twenty (usually two to five per week)	14	45.2%
More than twenty (more than five per week)	7	22.6%
TOTAL	31	100%

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**Figure 1-** Needle of choice for the CVS



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