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Pain experienced during transvaginal ultrasound, saline contrast sonohysterography, hysteroscopy and office sampling: a comparative study

T. VAN DEN BOSCH*, J. VERGUTS*, A. DAEMEN†, O. GEVAERT†, E. DOMALI*, F. CLAERHOUT*, V. VANDENBROUCKE*, B. DE MOOR†, J. DEPREST* and D. TIMMERMAN*

**Department of Obstetrics & Gynaecology, University Hospitals, K.U.Leuven and †Department of Electrical Engineering, ESAT-SCD, K.U.Leuven, Leuven, Belgium*

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ABSTRACT

Objective *To evaluate and compare the pain experienced by women during transvaginal ultrasound, saline contrast sonohysterography (SCSH), diagnostic hysteroscopy and office sampling.*

Methods *This was a descriptive study of 402 consecutive patients presenting at a 'one-stop' Bleeding Clinic between October 2004 and November 2006. Thirty-nine percent of the patients were postmenopausal. The patients underwent the following examinations transvaginally: first ultrasound with color Doppler, second SCSH, third diagnostic hysteroscopy and fourth endometrial biopsy. After completion of the examinations the patients were asked to complete a questionnaire including a visual analog scale (VAS) about their subjective appreciation of all four examinations. Two-hundred and ninety-three (72%) patients returned the questionnaire.*

Results *The median (range) VAS scores for transvaginal ultrasound, SCSH, diagnostic hysteroscopy and endometrial sampling were 1.0 (0–8.1), 2.2 (0–10), 2.7 (0–10) and 5.1 (0–10), respectively (*$P < 0.0001$*). The patients' answers to the other questions about the pain experienced, including comparison with other minor procedures such as venous blood sampling, were all concordant with the VAS scores.*

Conclusions *Transvaginal ultrasound was the procedure best accepted, followed by SCSH, hysteroscopy and endometrial sampling. These results suggest that patients would prefer SCSH over hysteroscopy as an initial diagnostic approach in the evaluation of abnormal uterine bleeding. Copyright © 2008 ISUOG. Published by John Wiley & Sons, Ltd.*

INTRODUCTION

A variety of tools are used in the diagnosis of endometrial pathology, the most commonly used being transvaginal ultrasound, saline contrast sonohysterography (SCSH), diagnostic hysteroscopy and office sampling, used individually or in combination. When constructing a diagnostic algorithm, the choice of one test over another will depend primarily on its diagnostic accuracy. If different methods have comparable diagnostic accuracy, other factors, such as patients' acceptance, technical feasibility and cost are taken into account when selecting the method to be used. For instance, office hysteroscopy and saline contrast sonohysterography are comparable in diagnostic accuracy for focal intracavitary lesions[1–5] and, in Belgium, the specialist's fee for each examination is identical (currently €27.19). Therefore, the pain experienced during the examination may be useful in the decision as to which of these two methods should be used.

In this study patients presenting at the department's 'one stop' Bleeding Clinic underwent consecutive examinations by transvaginal ultrasound, saline contrast sonohysterography, diagnostic hysteroscopy and office sampling, according to the study protocol, and were asked to complete a questionnaire about the pain experienced. Our aim was to evaluate and compare the pain experienced by women during these four examination techniques.

METHODS

We enrolled into the study 402 consecutive patients presenting at the 'one-stop' Bleeding Clinic of the Department of Obstetrics and Gynaecology of the University Hospitals Leuven from 6 October 2004

Correspondence to: Dr T. Van den Bosch, Department of Obstetrics and Gynaecology, University Hospitals Leuven, Herestraat 49, 3000 Leuven, Belgium (e-mail: thierry.van.den.bosch@skynet.be)

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to 8 November 2006. The study was approved by the hospital's ethics committee and informed consent was obtained beforehand. The mean age was 51 (SD, 12; range, 21–85) years, 157 (39%) women were postmenopausal and 51 (12.7%) were nulliparous. The indications for referral to the Bleeding Clinic were abnormal uterine bleeding (376 (93.5%) cases) and/or the abnormal presence of endometrial cells on cytology (38 (9.4%) cases). According to the study protocol, patients first underwent transvaginal ultrasound examination with color Doppler and then SCSH, followed by an office hysteroscopy and, in most cases, by office endometrial sampling. All 402 women underwent the transvaginal ultrasound examination with color Doppler. SCSH was performed in 398 of the women; it was not attempted in four patients because of the presence of sufficient spontaneous intracavitary fluid and the procedure failed in 20 cases (5.0%) due to cervical stenosis or excessive backflow through the cervix precluding sufficient dilation of the uterine cavity. Hysteroscopy was attempted in 381 cases and failed in 14 (3.7%). Office endometrial sampling was attempted in 243 cases and failed in eight (3.3%).

All ultrasound and SCSH examinations were performed by the same operator (T.V.). The ultrasound examination was performed using an Acuson Sequoia™ 512 (Siemens, Erlangen, Germany) ultrasound machine, equipped with an EV-8C4 endovaginal probe. Immediately thereafter, SCSH was performed without local anesthesia. An open-sided speculum was inserted into the vagina and the cervix was cleaned using a water solution of cetrimoniumbromide 0.5% and chloorhexidine 0.05%. A neonatal suction catheter 2 mm in diameter was inserted through the cervix, mostly without the use of a tenaculum and without dilatation of the cervix. The speculum was removed while the catheter was prevented from slipping out by forceps. The transvaginal ultrasound probe was reinserted and up to 20 mL of sterile saline was slowly instilled through the neonatal suction catheter while simultaneously performing the ultrasound examination.

Hysteroscopy and endometrial biopsy were performed by a senior consultant (J.D., 23% of cases), by a consultant (J.V., 55% and F.C., 7% of cases) or by another staff member (16% of cases). Office hysteroscopy was carried out, without local anesthesia, using a rigid Storz® scope (Storz, Tuttlingen, Germany) with an outer sheath 3 mm in diameter. A speculum was inserted into the vagina and the cervix was cleaned with a water solution of cetrimoniumbromide 0.5% and chloorhexidine 0.05%. The hysteroscopy was performed mostly without the use of a tenaculum and without dilatation of the cervix. Distention of the cavity was achieved by normal saline infusion. The endometrium was sampled directly after hysteroscopy using a Novak curette.

The patient characteristics recorded included age, weight, height, gravidity, body mass index, parity, number of miscarriages, menopausal status, date of last normal menstruation, use of hormonal therapy, presence or absence of an intrauterine device, presence or absence of abnormal uterine bleeding (type, duration, amount) and date and result of last cervical cytology report.

Patients were asked to complete a questionnaire about each examination providing they were Dutch-speaking and had no reading or writing difficulties; 293 women returned it. The questionnaire was handed over to the patient after completion of the ultrasound examination with SCSH. While waiting for the hysteroscopy they had time to answer the questions about the first set of examinations. After the hysteroscopy and endometrial sampling the patients then had time to complete the questionnaire. It was filled in without the help of the clinicians or the assisting sisters, and was returned at the end of the examinations at the sisters' desk.

The questionnaire included questions about the patients' satisfaction with their reception at the Bleeding Clinic and about their general satisfaction with the Bleeding Clinic's approach. They were then asked a series of questions addressing their perception of pain experienced during the procedure (Table 1) and to score the level of pain caused by the procedure using the visual analog scale (VAS) by indicating a point on a 10-cm line, with 0 meaning the procedure was not painful at all and 10 meaning it was the most painful experience one could imagine. At the end, the patients were asked to rank the examinations according to pain from 1 to 4 (1 for the least unpleasant examination and 4 for the most unpleasant one). Finally, the patients had the opportunity to write any additional comments.

Statistical analysis used paired tests to compare the four treatments: McNemar's test for binary nominal variables (Was this the first time?), repeated measures ANOVA for categorical nominal variables (Would you do it again?), Friedman's test for categorical ordinal variables (Was it painful? Was it as expected? How did it compare to blood sampling? How did it compare to dental care?) and Wilcoxon's signed-ranks test for continuous variables (VAS score). To compare the responders with the non-responders, we used unpaired tests: Fisher's exact test for categorical nominal variables (parity and menopausal status), Wilcoxon's rank sum test for continuous variables (age, weight, body mass index and endometrial thickness). Spearman's correlation coefficient was used for the influence of the patient's characteristics on the pain scores. A two-sided P-value < 0.05 was considered statistically significant.

RESULTS

All patients were either satisfied (34.5%) or very satisfied (65.5%) with their reception at the Bleeding Clinic and all but one patient were either satisfied (34.9%) or very satisfied (64.7%) with the Bleeding Clinic's approach. The results of the pain evaluation are summarized in Tables 1 and 2. Although hysteroscopy had been performed by different examiners, there were no significant differences in pain scores between examiners (one-way ANOVA). Comparing SCSH and hysteroscopy, the majority (59%) of women found that SCSH was 'not painful', whereas

only 25% said the same for hysteroscopy. A large majority (91%) of women found SCHS to be as expected or less uncomfortable than expected, compared with 75% for hysteroscopy. Compared with venous blood sampling, most women (78%) considered SCSH to be comparable or less painful (41%), compared with about half of patients (52%) for hysteroscopy, and most women (60.5%) reported SCSH to be less painful than dental care, compared with 29.5% for hysteroscopy. The vast majority of women declared that they would undergo all the procedures again if indicated. The median (range) VAS scores for transvaginal ultrasound, SCSH, diagnostic hysteroscopy and endometrial sampling were 1.0 (0–8.1), 2.2 (0–10), 2.7 (0–10) and 5.1 (0–10), respectively, ($P < 0.0001$) (Figure 1). When asked to rank the examinations in terms of pain experienced, ultrasound examination was preferred, followed by SCSH, hysteroscopy and lastly endometrium biopsy.

Table 1 Results of the questionnaire regarding pain experienced during transvaginal examination by ultrasound, saline contrast sonohysterography (SCSH), hysteroscopy and endometrial sampling

Question	*Ultrasound (%)*	*SCSH (%)*	*Hysteroscopy (%)*	*Endometrial sampling (%)*
1. Was this the first time you have undergone this examination?				
Yes	31.5	93.5	89.9	85.5
No	68.2	6.5	10.1	14.5
2. Was the procedure painful?				
Not painful	72.7	59.1	25.0	9.6
Painful but bearable	26.6	38.0	55.6	56.2
Really painful	0.7	2.9	14.5	28.1
Extremely painful	0	0	4.8	6.2
3. Was the procedure as expected?				
Less uncomfortable	35.1	42.1	29.8	18.4
As expected	61.7	48.7	44.9	39.5
Worse	3.2	9.2	25.3	42.2
4. Compared to venous blood sampling it was:				
Less painful	47.9	40.9	19.1	11.0
Comparable in terms of discomfort	37.9	37.2	28.5	24.1
Worse	14.3	21.9	52.4	64.8
5. Compared to dental care at your dentist it was:				
Less painful	—	60.5	29.5	16.4
Comparable in terms of discomfort	—	28.4	30.0	32.2
Worse	—	11.2	40.5	51.4
6. Would you undergo this examination again, if needed?				
Yes	92.2	89.1	82.8	74.3
Don't know	6.7	9.1	11.6	20.8
No	1.1	1.8	5.6	4.9
Top-4*				
1	93.3	42.2	17.7	6.2
2	5.2	50.0	28.8	13.3
3	1.0	5.2	31.8	23.9
4	0.5	2.6	21.7	56.6

*Top-4: the patients were asked to rank the examinations with respect to relative painfulness (scoring 1 for the examination they preferred and 4 for the most unpleasant one).

Table 2 Significance (*P*-values) of comparisons between the four techniques: ultrasound (US), saline contrast sonohysterography (SCSH), hysteroscopy (Hsc) and endometrial biopsy (EB)

Question	*US vs. SCSH*	*US vs. Hsc*	*US vs. EB*	*SCSH vs. Hsc*	*SCSH vs. EB*	*Hsc vs. EB*
1. Was this the first time?*	<0.0001	<0.0001	<0.0001	0.0755	0.0106	0.0490
2. Was it painful?†	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
3. Was it as expected?†	0.3458	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
4. How did it compare to blood sampling?†	0.0007	<0.0001	<0.0001	<0.0001	<0.0001	0.0004
5. How did it compare to dental care?†	—	—	—	<0.0001	<0.0001	<0.0001
6. Would you do it again?‡	0.0681	<0.0001	<0.0001	0.0006	<0.0001	0.0099
VAS score§	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Questions are given in detail in Table 1. Comparisons of two dependent groups were carried out using the following tests: *McNemar test for binary nominal variables; †Friedman test for categorical ordinal variables; ‡Wilcoxon signed-ranks test for continuous variables; § repeated measures ANOVA for categorical nominal variables. VAS, visual analog scale.

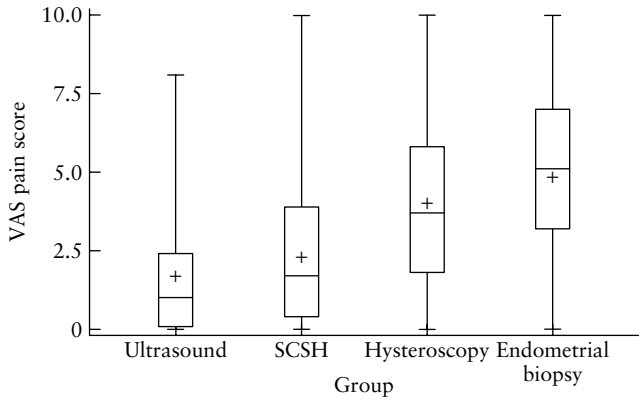

Figure 1 Box plot of the visual analog scale (VAS) scores after ultrasound, saline contrast sonohysterography (SCSH), hysteroscopy and endometrial biopsy, showing median and interquartile range (box with line), mean (+) and range (whiskers). Differences were statistically significant ($P < 0.0001$) for all pairs.

The possible influence of the patients' characteristics on the pain scores is described in Table 3. High parity and increasing endometrial thickness were associated with lower pain scores. Increased age, weight, parity and endometrial thickness were associated with lower VAS scores at hysteroscopy, and endometrial sampling was less painful in older women and in those with higher parity. The pain perception recorded by the VAS score according to parity is given in Table 4.

The characteristics of the women who returned the questionnaire was compared with those of the women who had not: there were no significant differences between the groups other than a marginally significant difference for endometrial thickness (mean endometrial thicknesses of 10.0 mm and 8.1 mm, respectively; $P = 0.04$, Wilcoxon's rank sum test).

DISCUSSION

Overall, the patients were satisfied with the one-stop Bleeding Clinic's approach: transvaginal ultrasound was reported to be the least painful examination, followed by SCSH, office hysteroscopy and endometrial sampling. To our knowledge, this study is the first to compare the pain experienced by patients undergoing all four examinations in a one-stop clinic setting. As expected, higher parity was associated with less pain during SCSH as well as hysteroscopy and endometrial sampling.

A patient's perceived pain might depend on the technique used for SCSH, hysteroscopy or endometrial biopsy. For SCSH we used a 2-mm neonatal suction catheter. This catheter has the advantage of being inexpensive and it can be inserted easily even in cases of a relatively stenotic cervical canal. Compared with a balloon catheter or a Goldstein catheter, it has the disadvantage that reflux may occur through the cervix, leading to suboptimal distension of the uterine cavity. To overcome this problem, the neonatal catheter is threaded further into the uterine cavity, until it reaches the fundus. When the top of the catheter touches the fundus, the clinician generally feels a slight resistance and the patient simultaneously feels some discomfort in the lower abdomen. During the fluid instillation, the catheter is slowly withdrawn as needed

Table 3 Influence of patient characteristics on the visual analog scale (VAS) pain scores for the four techniques (ultrasound, saline contrast sonohysterography (SCSH), hysteroscopy and endometrial biopsy) using Spearman's correlation analysis

	Age		*Menopausal status*		*Weight*		*Body mass index*		*Parity*		*Endometrial thickness*	
Technique	r	P	r	P	r	P	r	P	r	P	r	P
Ultrasound	−0.02	0.7	−0.08	0.2	−0.02	0.7	0.01	0.9	−0.07	0.2	−0.13	0.03
SCSH	−0.09	0.1	−0.05	0.4	−0.10	0.08	−0.09	0.2	−0.15	0.01	−0.17	0.005
Hysteroscopy	−0.16	0.01	0.01	0.9	−0.15	0.02	−0.12	0.06	−0.16	0.009	−0.19	0.003
Endometrial biopsy	−0.21	0.01	0.16	0.05	−0.14	0.09	−0.14	0.1	−0.20	0.02	−0.10	0.2

Although some associations reached statistical significance, the low *r*-values suggest low clinical relevance.

Table 4 Differences in pain perception of the four techniques (ultrasound, saline contrast sonohysterography (SCSH), hysteroscopy and endometrial biopsy) between nulliparous and parous women

	VAS score							
	Nulliparous				*Parous*			
Technique	*Mean*	*SD*	*Median*	*Range*	*Mean*	*SD*	*Median*	*Range*
Ultrasound	2.07	1.8	1.6	0–6.4	1.63	1.9	0.9	0–8.1
SCSH	3.42	2.1	3.0	0.3–8.7	2.16	2.1	1.5	0–10.0
Hysteroscopy	5.39	2.6	5.4	1.5–10.0	3.76	2.7	3.6	0–10.0
Endometrial biopsy	6.55	1.9	6.3	1.0–10.0	4.87	2.6	5.0	0–10.0

VAS, visual analog scale.

to achieve optimal visualization. Unlike with a balloon catheter, there is less likely to be excessive intrauterine pressure during instillation through a neonatal suction catheter, because raising the intrauterine pressure leads to leakage through the cervix; this might help to prevent pain. We used a 20-mL syringe to instil the fluid, although usually the entire 20 mL were not needed to achieve adequate visualization. Using the ultrasound machine's cine-loop mode, it is generally possible to achieve a sufficient evaluation of the uterine cavity even in cases of moderate reflux. Some advocate the use of a larger syringe (e.g. 60 mL), but we only infrequently needed a second 20-mL syringe. Moreover, we find it is more difficult to control the instillation rate with a larger syringe, which may lead to the cavity being filled too quickly, resulting in greater pressure and pain.

For hysteroscopy, the thinner the diameter of the outer sheath, the less the cervical canal needs to be dilated and the lower the expected incidence of pain. Rullo *et al.*[6], however, when comparing 3- and 5-mm outer sheaths, found only a non-significant trend of lower pain scores with hysteroscopes of narrower diameter. Unfried *et al.*[7] reported that hysteroscopy was less painful for the patient when flexible telescopes were used as opposed to rigid endoscopes, although this was at the expense of less optimal optical qualitiy and lower success rates. The uterine distension medium may also influence the patients' satisfaction; Pellicano *et al.*[8] reported that the use of normal saline was tolerated better than was carbon dioxide, although this was not confirmed by others[9].

Transcervical instillation of lignocaine or mepivacaine before hysteroscopy or endometrium sampling has been proposed[10–13], although some studies[9,14] did not demonstrate any benefit of topical anesthesia. Some authors reported that patients suffered less pain after paracervical anesthesia[15,16], while others did not[17]. In our series we did not use local anesthesia or prescribed non-steroidal anti-inflammatory drugs[18] before any of the procedures, nor did we warm the sterile saline to prevent cramping.

In recent years the 'no touch' vaginoscopic technique has been proposed in outpatient hysteroscopy. This technique does not require a speculum or a tenaculum; instead, the hysteroscope is inserted into the vagina, which is distended by flowing saline, and the scope is further advanced under direct vision into the uterine cavity through the cervical canal. Sagiv *et al.*[19] reported that significantly less pain was experienced by patients undergoing the 'no touch' approach compared with 'traditional' hysteroscopy using a speculum, a tenaculum and intracervical anesthesia. Other prospective randomized studies[20,21], however, could not demonstrate any difference in pain score between 'traditional' versus 'no touch' techniques.

In our series, a Novak curette was generally used for endometrial biopsy, because it allows the clinician to aspirate the remaining intracavitary saline solution after hysteroscopy easily before obtaining a tissue sample. Substitution of the Novak curette by a Pipelle sampler in our series could have led to improved patient satisfaction[22–24].

The sequence in which the examinations are performed may also influence the patient's perception of pain: pain may accumulate, so that the later procedures could result in an artificially high level of pain perception. On the other hand, if, for example, the SCSH was less painful than expected, the patient may have been more reassured and less stressed during the subsequent hysteroscopy, leading to a lower perceived level of pain. We did not perform the examinations at random because certain examinations may affect those that follow. For example, endometrial sampling disturbs the endometrial lining and may cause intracavitary bleeding, making subsequent ultrasound evaluation unreliable[25]. SCSH was performed first because the diameter of the catheter used for SCSH was smaller than that of the outer sheath of the hysteroscope. In a randomized trial on patient perception of pain comparing office hysteroscopy and SCSH, Timmerman *et al.*[26] did not find any influence of the order in which these two examinations were performed.

Overall, we found that our patients were satisfied with the one-stop Bleeding Clinic approach, including ultrasound with SCSH, hysteroscopy and endometrial sampling. However, if the women had to choose between SCSH and hysteroscopy, the vast majority would rather undergo SCSH. Since both SCSH and hysteroscopy are similar in terms of diagnostic accuracy for focal intracavitary lesions, we propose that the combination of transvaginal ultrasound and SCSH be used as the initial diagnostic approach in the evaluation of abnormal uterine bleeding.

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